SYLLABUS

For

2 YEARS MA/MSC GEOGRAPHY PROGRAMME

(Revised Syllabus Approved by Academic Council)

Dept. of Earth Science

JUNE, 2019

UNIVERSITY OF SCIENCE &TECHNOLOGY, MEGHALAYA

Techno City, 9th Mile, Baridua, Ri-Bhoi, Meghalaya, 793101

1. About the Department of Earth Science

Vision: *To establish the department as the magnet of the brightest students for higher education and research activities in Geography and Environmental Science so that it can be the finest in its field and contribute towards the development of higher education in India in general and the North East India in particular.*

Mission:
  a. To develop the state of the art infrastructure for teaching and learning including the designing application oriented curriculum and research plans.
  b. To carry out R&D activities adopting multidisciplinary approach with special focus on exploration of resource potential, optimum resource utilization, harmonious social and cultural development including sustainable development in NorthEast India.

Department objectives:
  a. To build professional and research oriented mindset among students.
  b. To enhance conceptual and application skills of students in the fields of study.
  c. To explore opportunities towards employability both in public and private sectors.

2. Academic Focus

The importance of the subject Geography is felt everywhere now due to the multidisciplinary nature of the subject. Enabled with space based data and information Geography gives applicability and scope in diverse issues and fields of resources and infrastructure evaluation, planning and management decision supports for societal development and sustainable environment. The conceptual and theoretical ideas of Geography are blended with the scope of applications in diverse fields of interest in local, regional and global perspectives. Considering the importance of Geography as a subject and a global concern University of Science and Technology, Meghalaya (USTM) started Master Degree programme (M.A. / M.Sc.) in Geography from August 2013. The department as a part of USTM has made collaborations with NEIST, Jorhat, different R&D organizations, IITs, CRRI-New Delhi, Hi-Tec Ireland and many other universities.

Career Scope

There is a growing demand of the subject both in public and private spheres. The course is designed in such a way that it helps to gain a wide variety of employment opportunities in government sector, private sector, NGOs, international organizations, consultancy, national / multinational firms, academics and researches, gas exploration companies, environment protection agencies, town and country planning, application areas of GIS and Remote Sensing, pollution control boards, disaster management, forestry, agriculture, water resource management, rural & urban development, tourism, biodiversity & wildlife management, disaster management, etc. The job types are agricultural specialist, cartographer, field surveyor, demographer, forest manager, geographer, GIS and Remote Sensing specialist, regional and urban planner etc.

3. Programme details

Full time Post-Graduation (M. A. / M. Sc.) Course
Duration: Two years (four semesters)

Admission Eligibility

Graduation with at least 50% marks (5% relaxation in reserved categories) in honours in Geography or Geography as one of the subjects studied from any of the recognised university / college of the country.

Examination Patter

The End Semester evaluation consists of 70% and the internal evaluation consists of 30% which includes
15% for sessional examinations, 9% for Assignments, Group Discussions & Seminars and 6% for student's attendance, involvements and participants in various departmental activities.

4. Programme Outcomes of M.A./M.Sc. Geography:
  i) Students will develop the ethical aptitudes and dispositions necessary to acquire and hold leadership positions in industry, government and professional organizations.
  ii) Students will be able to synthesize geographic knowledge and apply innovative research strategies to solve problems in resource conservation, environmental change and sustainable development within the community, region and world.

5. Programme Specific Outcomes of M.A./M.Sc. Geography:
  i) Students will acquire an understanding of and appreciation for the relationship between geography and culture.
  ii) Students will have a general understanding of physical geographic processes, the global distribution of landforms and ecosystems and the role of the physical environment on human populations.
  iii) Students will be able to think in spatial terms to explain what has occurred in the past as well as geographic principles to understand the present and plan for future.

6. Programme Structure: The M.Sc. programme is a two year course divided into four semesters. The programme is of 88 credits and for the award of degree a student will be required to complete the credits as per the University norm.

COURSE STRUCTURE OF MA/MSc GEOGRAPHY

Semester - I

PAPER CODE	PAPER TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 101	Fundamentals of Geomorphology (CC 1)	4	T	30	70	100
MGE 102	Geographical Thoughts (CC 2)	4	T	30	70	100
MGE 103	Regional Geography: India and NE India (CC 3)	4	T	30	70	100
MGE 104	Introduction to Environment and Ecology (CC 4)	4	T	30	70	100
MGE 105	Cartographic Techniques-I (Practical) (CC 5)	4	P	30	70	100
	TOTAL	20		150	350	500

Semester – II

PAPER CODE	PAPER TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 201	Climatology and Oceanography (CC 6)	4	T	30	70	100
MGE 202	Socio - Cultural and Political Geography (CC 7)	4	T	30	70	100
MGE 203	Geography of Rural and Urban Development (CC8)	4	T	30	70	100
MGE 204	Fundamentals of Cartography (CC 9)	4	T	30	70	100
MGE 205	Cartographic Techniques-II (Practical) (CC 10)	4	P	30	70	100
	TOTAL	20		150	350	500

Semester – III

PAPER CODE	PAPER TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 301	Research Methodology (CC 11)	4	T	30	70	100
MGE 302	Quantitative Techniques (CC 12)	4	T	30	70	100
MGE 303	Fundamentals of Geoinformatics (CC 13)	4	T	30	70	100
MGE 304A	Regional Planning: Principles, Concepts and Theories (DSE 1)	4	T	30	70	100
MGE 304B	Hazards and Disaster Management: Basic Concepts (DSE 2)	4	T	30	70	100
MGE 304C	Geoinformatics: Principles and Techniques of Remote Sensing (DSE 3)	4	T	30	70	100
MGE 305	Geoinformatics (General) Practical (CC 14)	4	P	30	70	100
MGE 306	Northeast India: Land, People and Culture (GE 1)	4	T	30	70	100
	TOTAL	24		180	420	600

Semester – IV

PAPER CODE	PAPER TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 401	Geography of Economic Activities (CC 15)	4	T	30	70	100
MGE 402A	Regional Planning: Practices in India and Selected Countries (DSE 4)	4	T	30	70	100
MGE 402B	Hazards and Disaster Management:	4	T	30	70	100

	Preparedness and Mitigation (DSE 5)					
MGE 402C	Geoinformatics: Principles and Techniques of GIS and GPS (DSE 6)	4	T	30	70	100
MGE 403A	Regional Planning: Rural and Urban Development Planning in India (DSE 6)	4	T	30	70	100
MGE 403B	Hazards and Disaster Management: Issues and Policies (DSE 7)	4	T	30	70	100
MGE 403C	Geoinformatics: Applications in Major Areas (DSE 8)	4	T	30	70	100
MGE 404A	Regional Planning (Practical) (DSE 9)	4	P	30	70	100
MGE 404B	Hazards and Disaster Management (Practical) (DSE 10)	4	T	30	70	100
MGE 404C	Geoinformatics (Practical) (DSE 11)	4	T	30	70	100
MGE 405	Dissertation (CC 16)	4	P	70	30	100
MGE406	Disaster Management (GE 2)	4	T	70	30	100
	TOTAL	24		220	380	600

IA= Internal Assessment; T= Theory; P= Practical (*Fieldwork/Dissertation/Project etc.*)
CC= Core Course; DSE= Discipline Specific Elective; GE=Generic Elective (Multidisciplinary Course)
SEC=Skill Enhancement Course

TOTAL CREDITS = 20   **TOTAL MARKS: 500**

SEMESTER – I

PAPER	TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 101	Fundamentals of Geomorphology	4	T	30	70	100
MGE 102	Geographical Thoughts	4	T	30	70	100
MGE 103	Regional Geography: India and NE India	4	T	30	70	100
MGE 104	Introduction to Environment and Ecology	4	T	30	70	100
MGE 105	Cartographic Techniques-I (Practical)	4	P	30	70	100
	TOTAL	**20**		**150**	**350**	**500**

T= Theory, P= Practical, IA = Internal Assessment, ES = End Semester

MGE 101: Fundamentals of Geomorphology

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The study is focused about the fundamental concepts of geomorphology which includes the study of landform structure, factors controlling landform development, processes, cycles and recent trends in geomorphology including the applied aspects of the discipline.

Course outcomes

1. Primary objective of this course is to givebasic concepts of geomorphology
2. Students will learn different endogentic and exogenetic processes.
3. Students will have knowledge on landform structure & factors controlling landform development
4. Students will understand cycles of landform development.
5. Students will get the knowledge & information about the applied field of Geomorphology.

UNIT - I: Basics of Geomorphology

Definition, nature and scope of geomorphology. History and development of geomorphic thoughts. Recent trends in geomorphology. Fundamental concepts of Catastrophism, Uniformitarianism, Neo-catastrophism and Equilibriums, Systems approaches and threshold concept.

UNIT - II: Endogenetic processes

Basics of plate tectonics, plate margins & boundaries, types & distribution of plates; Faulting, folding and their geomorphic expressions. Earthquake - concept, causes, classification, intensity and magnitude, geographical distribution. Vulcanism - concept, mechanism and causes; Volcanoes- classification, volcanic materials; Topography associated with vulcanicity and their geographical distribution.

UNIT - III: Exogenetic processes

Weathering, erosion and mass wasting - meaning and concept, controlling factors, classification and significance. Dynamics of fluvial, aeolian, glacial and karst processes and resulting landforms.

UNIT - IV: Applied Geomorphology

Meaning; Applications of geomorphology in regional planning, engineering projects, mineral exploration and hydrology. Drainage basin morphometry, Applications of space technology in geomorphological studies, Regional Geomorphology of Northeast India - A Case study.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Drawings of geographical features of various environments, major plates, volcanic zones of the earth etc (Compulsory - any four)

References:

1. Dayal, P. 1990: *A Text Book of Geomorphology*, Shukla Book Depot, Patna.
2. Ritter, D.F., Kochel, R.C., Miller, J.R. 1995: *Process Geomorphology*, Wim. C. Brown Publishers, Chicago.
3. Singh, Savinder 2018: *Geomorphology (Revised Edition),* Prayag Prakashan, Allahabad.
4. Husain Majid 2009: *Fundamentals of Physical Geography, Second Edition*, Rawat Publications, Jaipur and New Delhi.
5. Strahler, A. 2006: *Introduction to Modern Physical Geography,* John Wiley & Sons, New York.
6. Wooldridge, S. W and Morgan, R.S. 1991: *An Outline of Geomorphology*, Orient Longmans, Calcutta.
7. Hess, D. 2011: *Mcknight's Physical Geography - A landscape Appreciation*, PHI Learning Private Limited, New Delhi.
8. Hart, M. G. 1991: *Geomorphology : Pure are and Applied*, CBS Publishers and Distributors, Delhi-32.

MGE 102: Geographical Thoughts

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                    50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The objective of this paper is to look back into the historical developmental concepts and approaches of geography and modern approaches in geography.

Course outcomes

1. One objective is to give knowledge about historical developmental concepts of Geography

2. Students will know theories of Geography

3. Students will know modern concepts of Geography

4. Students will understand contemporary trends on the topic.

5. Students will have knowledge about different models investigating geographical facts.

UNIT - I: Development of Geography and Approaches
Development of Geography through ages – contributions of Greek, Roman, Arabs, Indians. Man-environment interaction: Neo environmentalism, Place of Geography among sciences, Ideographic and nomothetic approaches in Geography.

UNIT - II: Concepts in Geography
Concepts: space, place, environment, time and spatial organization, spatial diffusion; spatial interaction, Region and regional typology; Culture and cultural landscape.

UNIT - III: Modern Approaches
Schools of geography, dualism and dichotomies; Philosophy and geography: Paradigm shifts; Quantitative revolution and challenges.

UNIT - IV: Contemporary Trends

Radicalism, Humanism, Positivism, Pragmatism, Existentialism; Qualitative paradigm; Behavioural revolution: perception and cognition, mental maps; Marxism; Postmodernism; Post-structuralism and Post-colonialism, Feminism.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Models of man-environment interaction, spatial diffusion and interaction, charting of approaches and schools of geography, paradigm shifts and stages of quantitative revolution (Compulsory - any four).

References:

1. Adams, P., Steven, H. and Karel, T. (eds.) 2001: *Texture of Place. Exploring Humanistic Geographies.* University of Minnesota Press, Minneapolis.
2. Barnes, T. and Gregory, D. (eds.) 1997: *Readings in Human Geography: The Poetics and Politics of Inquiry*. Arnold, London.
3. Daniels, P., Bradshaw, M., Shaw, D. and Sidaway, J. 2000: *An Introduction to Human Geography. Issues for the 21st Century*. Prentice Hall, London.
4. Dear, M. J. and Flusty, S. 2002: *The Spaces of Postmodernity: Readings in Human Geography*. Blackwell Publishers, Oxford.
5. Dikshit, R. D. 2004: *Geographical Thought: A Critical History of Ideas.* Prentice-Hall of India, New Delhi. (in English and Hindi).
6. Harvey, M. E. and Holly, P.B. 2002: *Themes in Geographic Thought*. Rawat Publications., Jaipur and New Delhi.
7. Hubbard, P., Kitchin, R., Bartley, B. and Fuller, D**.** 2002: *Thinking Geographically: Space, Theory and Contemporary Human Geography.* Continuum, London.
8. Johnston, R, Gregory D, Pratt G, Watts M. and Whatmore S. 2003: *The Dictionary of Human Geography.* Blackwell Publishers, Oxford. 5th edition.
9. Rana, Lalita 2008: *Geographical Thought: A systematic Record of Revolution*., Concept Pub., New Delhi
10. Rana, Laita 2014: *Geographical Thought Clssical to Contemporay (Revised and enlarged)*., Concept Pub., New Delhi

MGE 103: Regional Geography: India and NE India

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
20 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The objective of this paper is to give students about the concept of region and regional planning. It also aims to give the idea of the concept of regional geography of India and North East India under various categories.

Course outcomes

1. Students will know physical basis of Geography of India
2. Students will acquire knowledge on population &economy of India
3. Students will know physical basis of Geography of North East India
4. Students will get knowledge on population &economy of North East India
5. Students will get an indepth knowledge about agricultural & industrial scenario of the country.

UNIT - I: Geography of India: Physical Basis

India as a geographical unit and its locational significance, Physical environment: physiographic characteristics – drainage, climate, soil and natural vegetation regions of India, watershed as a planning region.

UNIT - II: Population and Economy of India

Population characteristics: peopling process, growth, distribution, density, structure and composition; Agriculture: Agricultural development and Indian economy, modernization of agriculture, agro-climatic regions, agricultural

trade. Industry: Industrial development and Indian economy, distribution production pattern of major Industries (Iron and steel, cotton textile, petrochemicals, sugar, paper and cement industries), Transport: Roads and railways, air transport and pipe transport

UNIT - III: Geography of North East India: Physical Basis
Locational significance- physiography, drainage systems, natural hazards, climate, soil and natural vegetation.

UNIT - IV: Population and Economy of North East India
Population characteristics: peopling, growth, distribution and density, age sex composition, rural-urban composition and religious composition. Economic basis: Agriculture, Industries and Transport, economic potentialities and backwardness.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Map works (Location, Physiography, Climate, Vegetation, Soil, Natural Vegetation, Hazard prone areas, locations of various industries, road, railways and air connectivity maps) as home assignments (Compulsory: Any four)

References:
1. Deshpande C.D. 1992: *India - A Regional Interpretation*, Northern Book Centre, New Delhi.
2. Govt. of India: *India-Reference Annual, 2001*: Pub. Div., New Delhi.
3. Govt. of India: *National Atlas of India* NATMO Publication, Calcutta.
4. Govt. of India: *The Gazetteer of India*. Vol. I & III Publication Division.
5. Learmonth A.T.A et.al (ed) *Man and land of South Asia*, Concept, New Delhi
6. Shafi, M: *Geography of South Asia*, McMillan & Co., Calcutta, 2000.
7. Singh, Gopal, 1988. *Geography of India*, Atma Ram, Delhi.
8. Gopal Krishnan, R., 1996. *Geography of India*, Jawahar Pub. & Dist., New Delhi.

MGE 104: Introduction to Environment and Ecology

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
otal Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The study deals with the concepts of ecology and environment in relation to geography and their issues related to ecosystem and its management.

Course outcomes
1. This course will give knowledge on concept of biosphere
2. Knowledge on different ecosystems will be easy
3. Understanding environmental problems will be easy
4. Students will come to know about environmental issues, management.
5. Concept of sustainability will be easy.

UNIT - I: Geographical Perspectives on Environment and Ecosystem
Population, Resources and Environment; Biosphere: its concept and components, Ecology: definition, scope, concept and principles, Components of Ecosystem, Soil as component of environment, soil forming processes and factors, Soil horizon, Physical and Chemical properties of soil, Soil types and their characteristics.

UNIT - II: Forest, Desert and Coastal Ecosystem
Forest Ecosystem: Processes and Patterns; Desert Ecosystem, Desertification - Process and Patterns; Management Strategies, Coastal Ecosystem: Mangroves.

UNIT - III: Environmental Issues and Management

Environmental Problems and their Management-Air, Water, Noise, Solid Waste and Coastal pollution, Emerging environmental issues; Biodiversity: conservation and threat; Environment and sustainable development; Environmental degradation. Environmental monitoring and environmental management

UNIT - IV: Biogeography

Meaning, scope, bio-geochemical cycles – flow of energy, hydrological cycles, oxygen cycle, nitrogen cycle, food chain, Biomes, Biogeographic regions of the world.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Population growth chart of India and the World 1901 - 2011, Biosphere, Soil horizons, Flow of energy in the ecosystem, Distribution of Biomes, Hydrological cycle, Biogeographic regions (Compulsory- Any four).

References:
1. Balakrishnan, M., 1998: *Environmental Problems and Prospects in India*, Oxford & IBH Pub.,
2. Hussain, M., (ed.) 1996: *Environmental Management in India*, Rawat Pub., Jaipur
3. Hooja, R., et. al., (ed.) 1999: *Desert, Drought and Development: Studies in Resource Management and Sustainability*, Rawat Pub, Jaipur
4. Munn, T., (ed.) 2001*: Encyclopaedia of Global Environmental Change*, John Wiley & Sons, West Sussex
5. Saxena, H.M., 1999: *Environmental Geography*, Rawat Pub., Jaipur.
6. Singh, R.B., (ed.) 1990: *Environmental Geography*, Heritage Pub., New Delhi.
7. Singh R.B., (ed.) 2001 : *Urban Sustainability in the Context of Global Change*, Science Pub., Inc., Enfield (NH), USA
8. Singh, S., 1997: *Environmental Geography*, Prayag Pustak Bhawan, Allahabad.
9. Kormondy, Edward J, 2009: *Concept of Ecology*, Fourth edition
10. Stiling, Peter; 2010: *Ecology*, Fourth edition

MGE 105: Cartographic Techniques-I (Practical)

Total Marks:	100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)	
Total Credit:	04	
Total marks:	01 question of 20 marks	– 20 marks
	02 questions of 15 marks each	– 30 marks
	Practical book	– 10 marks
	Viva voce	– 10 marks

Duration of End Semester Examination   : 4 Four hours (with 3 questions)
Duration of Sessional Examination   : 2 hours (with 2 questions of 15 marks each)

Objective: The objective of this paper is to learn professionalism with different practical analysis of the subjects of geomorphology, physical, socio-economic aspects of geographical studies of any chosen theme by using graphic, cartographic and carto-statistical techniques.

Course outcomes
1. Students will learn practical knowledge on morphometric analysis from topographical sheets
2. Students will learn preparation of climatic maps and diagrams
3. Students will know on zoo-geographical regions of the world
4. Students will know soil distribution of India and the world.
5. Students will know about population growth & its impact on urbanisation.

1. Preparation of relative relief map (1 exercise).
2. Preparation of slope map by Wentworth's method and its analysis (1 exercise).
3. Drainage morphometry: drainage basin delineation and stream ordering, Computation and interpretation of (i) bifurcation ratio, (ii) length ratio, (iii) basin circulatory ratio (1 exercise).

4. Preparation of drainage density map and its interpretation and analysis (1 exercise).
5. Preparation of stream frequency map and its interpretation and analysis (1 exercise).
6. Drawing long profile of a basin area and its interpretation (1 exercise).
7. Drawing of cross profile and its interpretation (1 exercise).
8. Drawing of hypsometric curve (of a basin area / any selected area) and its interpretation (1 exercise).
9. Preparation of distribution map of urban population of India (only selected 10 - 20 largest cities) and the capital towns / cities of North East India by sphere method (2 exercises).
10. Preparation of one quantitative choropleth map of any socio-economic theme from India / NE India using natural breaks / standard deviations or equal intervals method (1 exercise).
11. Isopleth Mapping of distribution of rainfall and variability of rainfall of given data set for rain gauge stations or any other data of point locations(2 exercises).
12. Laboratory Note Book and Viva-voce.

Note: Each and every exercise including home assignment should contain the <u>Date of Assignment</u> and <u>Date of Submission</u> written on appropriate location of the exercise sheet, which is to be duly signed by concerned teacher on or before the date of submission. There should not be more than 7 days between these two dates for each exercise to be completed on regular basis by the student maintaining a standard practical note book. The student can appear for the sessional or end semester examination on practical by submitting completed assigned exercises only.

References:
  1. Monkhouse F.J. and Wilkinson, H. R, 1989: *Maps and Diagrams*, B. I. Publications, New Delhi.
  2. Singh R.L. And Singh, R. P. B, 1992: *Elements of Practical Geography*, Kalyani Publishers, New Delhi.
  3. Sarkar, A., 1997: *Practical Geography: A Systematic Approach,* Orient Longman, Calcutta
  4. Gregory, K. J. And Walling D. E., 1973: *Drainage Basin Forms and Processes*, Arnold, London
  5. Morisawa, M. 1968: Streams: *Their Dynamics and Morphology*, Edward Arnold, London.
  6. Goudie , A. Et al, 1981: *Geomorphological Techniques*, George Allen & Unwin, London

UNIVERSITY OF SCIENCE AND TECHNOLOGY, MEGHALAYA
SYLLABUS FOR M. A. / M. Sc. GEOGRAPHY

TOTAL CREDITS = 20   **TOTAL MARKS: 500**

SEMESTER - II

PAPER	TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 201	Climatology and Oceanography	4	T	30	70	100
MGE 202	Socio - Cultural and Political Geography	4	T	30	70	100
MGE 203	Geography of Rural and Urban Development	4	T	30	70	100
MGE 204	Fundamentals of Cartography	4	T	30	70	100
MGE 205	Cartographic Techniques-II (Practical)	4	P	30	70	100
	TOTAL	20		150	350	500

T= Theory, P= Practical, IA = Internal Assessment, ES = End Semester

MGE 201: Climatology and Oceanography

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                      50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The study of climatology and oceanography which are a part under physical geography deals with the basic concept and classification of climatology and oceanography and their applied approaches in present day context.

Course outcomes
1. Student will learn basic concepts and classification of climatology
2. Students will understand basic concepts and classification of oceanography
3. This course will provide knowledge on applied climatology
4. Students will have knowledge on applied oceanography.
5. Understanding impact of climatic factors on human lives will be easy .

UNIT - I: General Climatology
Meaning and scope of climatology. Structure and composition of the atmosphere. Heat budget and insolation. Atmospheric equilibrium, air masses and fronts. Planetary wind system and Atmospheric disturbances: Global Pressure belts, cyclones, tornadoes and water spouts. Monsoon and Jet streams; Classification of climate by Trewartha, Koppen and Thornthwaite; World distribution of major climatic types; Causes of long term climate change.

UNIT - II: Applied Climatology
Climate and biosphere. Climate and human environment: agricultural and industrial. Climate, urbanization and urban planning. Weather forecasting and recent trends in climatology. Air pollution, global warming. El Nino, La Nina and climatic change. Micro climates.

UNIT - III: General Oceanography
Meaning and scope of oceanography. Submarine topography and configuration of Pacific, Atlantic and Indian ocean floors. Ocean temperature and salinity. Ocean dynamics: currents, tides, tsunamis. Ocean deposits. Coral reefs.

UNIT - IV: Applied Oceanography
Ocean routes and world economics. Marine resources and their conservation. Marine Pollution and ocean dumping. Global warming and transgression of seas. Remote sensing in oceanographic studies.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Structure of atmosphere, heat budget, pressure systems of the world, wind systems, bottom configuration of Pacific, Atlantic and Indian ocean, Ocean currents, Coral reefs, Marine resources (Compulsory - any four)

References :
1. Barry, G. G. and Chorley, R. J. 1976: *Atmosphere, Weather and Climate*, Methuen and Co., London.
2. Barret, E.C. 1974: *Climatology from Satellites*, Methuen London.
3. Critchfield, H. J., 2011: *General Climatology*, Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Davis, R. J. A., 1986 : *Oceanography-An Introduction of the Marine Environment*, Win C. Brown, Lowa.
5. Hobbs, J. E., 1996: *Applied Climatology*, Oxford University Press.
6. Lal, D. S. 2010: *Climatology and Oceanography*,
7. Hussain, T. and Tahir, M. 2003: *Climatology*, Jawahar, New Delhi.
8. Hussain, T. and Tahir, M. 2003: *Oceanography*, Jawahar, New Delhi.
9. Siddhartha, K. 1999: *Oceanography-A Brief Introduction*, Kisalya Pub., New Delhi.
10. Singh, S. 2002: *Physical Geography*, Prayag Pub., Allahabad.
11. Oliver and Hidore, 2010: *Climatology: An Atmospheric Science,* Pearson Education. Singapore
12. Penke and Smith, 2009: *Climate change: from Science to Sustainability,*

MGE 202: Socio-Cultural and Political Geography

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                      50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The objective of the paper is related to socio-cultural study of the spatial distribution of ethnicity and their cultural association while political geography deals with the geographical aspects of global politics.

Course outcomes
1. Student will learn socio-cultural study of the spatial distribution of ethnicity
2. Students will understand cultural association
3. Understanding political geography will be easy
4. Students will understandgeopolitical significance of contemporary India
5. Understanding changing nature of political maps of the world & India will be easy.

UNIT - I: Fundamental Concepts, Patterns And Processes
Definition, scope and development of Social and Cultural Geography with special reference to India. Concepts of social space, social area analysis and social well-being, cultural landscape. Cultural realm and their distribution. Modernisation and social change - pattern and processes in the traditional societies.

UNIT - II: Social Structure and Issues in India
Distribution of racial and linguistic groups of India and their socio-economic issues. Levels of social well-being in India / HDI. Regional consciousness and national integration. Social conflicts and violence.

UNIT - III: Basics of Political Geography:
Development of Political Geography through ages; Geographic elements and the state; Physical Elements; Human Elements; Economic Elements; Political Geography and Environment Interface. Themes in political geography: State, Nation, Nation-state and Nation-building; Frontiers and Boundaries; Colonialism, Decolonization, Neo-colonialism, Federalism and other forms of governance. The changing patterns of World Powers Perspectives on core periphery concepts, Conflicts cooperation. Politics in world resources.

UNIT - IV: Geopolitical Significance of Contemporary India

Geopolitical significance of Indian ocean; Political scenario in SAARC region, South East Asia, Middle East. Political Geography of contemporary India - The changing Political map, Centripetal and Centrifugal forces, Stability and Instability, Inter- state issues (water disputes and riparian claims) and Conflict Resolutions Insurgency in boarder states; Emergence of New States and Federal India.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignment - Mapping of social, racial and linguistic groups in N. E. India / India / SAARC countries/South East Asia and Middle East; Changing political scenario of North East India since independence (Compulsory - any four).

References:
1. Taher, M 1994 : *An Introduction to Social Geography*, NEIGS
2. Sharma, H. N., 2000: *Social Geography*, in Singh J (ed) Progress in Indian Geography, (1996-2000) INSA, New Delhi
3. Sopher D.E. 1980 : *An Exploration of India : Geographical Perspective on Society and Culture*, Longman, London
4. Ahmed, A. 1999: *Social Structure and Regional Development*, Rawat Publication, Jaipur.
5. D. M. Smith 1995: *Geography and Social Justice*, Black-well.
6. Dube, S.C. 1991: *Indian Societies*, National Book Trust of India, New Delhi.
7. Dube, S.C, 1980: *Tribal Heritage of India*, Vikas Publishing Co., New Delhi.
8. Smith D.M., 1974: *Geography of Social Well Being*, Wiley, New York
9. D Blij, H J and Glassner, M. 1968: *Systematic Political Geography*, John Wiley, New York.
10. Dikshit, R. D. 1996: *Political Geography: A Contemporary Perspective*, Tata McGraw Hill, New Delhi.
11. Deshpandey, C.D. 1992: *India – A Regional Interpretation*, Northern Book Centre, New Delhi.
12. Adhikari, S. 1996: *Political Geography*, Rawat Publications Jaipur & New Delhi

MGE 203: Geography of Rural and Urban Development

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
   50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The subject rural and urban geography which is a part of human geography deals with the issues of rural development and urban planning and management.

Course outcomes
1. Students will have knowledge about rural development
2. Students will understand the issues of rural development
3. Students will understand urban planning
4. Students will have knowledge about management of rural and urban issues.
5. Understanding origin & development of urban area will be easy.

Unit - I: Rural Systems and Setting - Meaning, concept and scope of rural development. Recent trends in rural development, Rural settlements, Spatial and Ecological Approaches, Morphology of rural settlements; Rural dwellings: Ground plan, Architecture, building material, basic infrastructures and rural people's participation, rural population (distribution, density, composition and migration), Smart village and rural infrastructure planning.

UNIT - II: Urban Bases and Characteristics
Meaning and scope of urban geography; Recent trends in urban geography; Urban population: characteristics, processes and trends of urbanisation; Methodology in urban studies; Origin and evolution

of urban settlements; Distribution of urban centres. Characteristics of cities in different historical periods (both industrial and pre-industrial); Functions and functional classification of towns; Urban transportation, Major issues of urban planning and management, Characteristics of smart city.

UNIT - III: Spatiality and Models

Size and spacing of cities: Rank-size rule; Law of the primate city; Urban hierarchies; Central Place Theory (Christaller and Lösch); Urban land use and functional morphology: functional areas and peri-urban areas; Theories of urban structure (Burgess, Hoyt, Harris and Ullman, Mann, White).

Unit - IV: Rural-Urban Issues

Rural-Urban Continuum, Rural and Urban problems: environmental, poverty, slums, transportation, housing, crime; Rural-Urban Migration, Goals of sustainable rural-urban development, Planned cities- Chandigarh and Jaipur; Basic consideration in preparation of Town / City Master Plans: A case studies of Guwahati and Shillong.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignment- House types of North East India, Proportion of rural and urban population in the states North East India by pie-charting, Goals of sustainable rural / urban development, Christaller's Model of rural urban hierarchy, Model of urban structure of Hoyt / Burgess/ Ullman, Smart city / village (Compulsory - any four).

References:
1. Hall, P. 1992: *Urban and Regional Planning*. Routledge, London.
2. Hall, T. 2001: *Urban Geography*. (2nd edition). Routledge, London.
3. Jacquemin, A. 1999: *Urban Development and New Towns in the Third World – A Lesson from the New Bombay Experience*. Ashgate, Aldershot, UK.
4. Paddison, R. (ed.) 2001: *Handbook of Urban Studies.* Sage, London.
5. Pacione, M. 2005: *Urban Geography: A Global Perspective*, Routledge, London and New York.
6. Ramachandran, R., 1991: *Urbanisation and Urban Systems in India.* Oxford University Press, Delhi.
7. Singh, S. B. (ed.) 1996: *New Perspectives in Urban Geography.* M.D. Publications, New Delhi
8. Chambers, R. 1997: *Whose Reality Counts? Putting the First Last,* Intermediate Technology Publications, London.
9. Desai, A. R. 1990: *Rural Development*, Popular Prakashan, Bombay.
10. Singh, R. Y. 2015: *Geography of Settlements*, Rawat Publication, New Delhi
11. Chandna, R. C.2007: *Geography of Population*, Kalyani Publishers, New Delhi

MGE 204: Fundamentals of Cartography

Total Marks:	100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit:	04
Total Lectures:	60
Total marks:	20 marks - 20 objective type questions (*from all units*)
	50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The objective of this paper is to give exposure to the art and science of making map. Principles and different techniques for map creation and representation of real world phenomena through maps following manual and digital techniques are emphasized.

Course outcomes
1. Students will learn the art and science of making maps.
2. Students will understand the principles and different techniques for map creation
3. Students will get knowledge about representation of real world phenomena through maps.
4. Students will learn manual and digital techniques of map making.
5. Understanding cartographic concepts & techniques will be easy.

UNIT - I: Fundamentals of Cartography

The nature and scope of cartography, traditional versus modern cartography. Concept of base map and map types, principles of map design and layout. The Earth: shape and size, the earth models, Coordinate systems - Geographic / Global (latitude and longitude), Planar coordinates and Projected coordinate systems; Direction, distance and area in maps; Concept of map scale, Spatial resolution in satellite based maps and accuracy in representation of features. Thematic mapping types and techniques .

UNIT - II: Principles of Surveying

Principles of plane and geodetic surveying, Types of surveying, Principles of triangulation, Principles and techniques of surveying by Plane Table (Open traverse survey), Prismatic Compass (Open and closed traverse), Dumpy Level (Profile drawing and contouring) and Theodolite (determination of height of an object and Closed traverse survey).

UNIT - III: Map Projection

Map projection – Definition, classification and history of map projections, Basic principles of constructing Zenithal Gnomonic Projection (Equatorial case), Zenithal Orthographic Projection (Polar case) cylindrical (Equal area and Mercator's) and conical projections (Lambert's Equal area and Bonne's), Concept of orthomorphism, equal-area, equi-distance, Choice of map projection for various regions of the world and India.

UNIT - IV: Digital Cartography

History and development of Digital Cartography, Digital cartographic systems and tools - Computer Aided Design (CAD), Geographic Information Systems (GIS), Cartographic and GIS software, web cartography, Map registration / georeferencing; spatial data and their characteristics, nonspatial data, Choropleth and isopleth mapping, DEM data, Terrain mapping and analysis.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Drawing of 3-D globe at various scales and representation of parallels and meridians / latitude - longitude on globe, preparation of map at large scale (1: 10,000 to 1: 1,000) maintaining given distance and direction between the places, Drawing and labelling of survey equipments, Collection of satellite images and drawing of geographic grids (graticules) based on map projection principles (Compulsory - any four)

References:
1. Campbell, J., 1984: *Introductory Cartography*, Prentice Hall Inc., Englewood Cliff
2. Misra, R. P., Singh, R. B., Misra, B. and Pandey A., 2014: *Fundamentals of Cartography*, *(2nd Reviised Edition)* Concept Publishing Company, New Delhi
3. Robinson, A.H., et al 1995: *Elements of Cartography (6th Edition)* John Wiley & Sons, New York
4. Raisz, E. : *Principles of Cartography*, McGraw Hills, London
5. Kenetkar, T.P. and Kulkarni, S. U.: *Surveying and Levelling, Vol. I & II*, Vidyarthi Gritha Prakashan, Pune
6. Kellaway, G.P. 1979: *Map Projection*, Indian Edition, B I Publication, Bombay
7. Talukder, S., 2008: *Introduction to Map Projections*, Eastern Book House, Guwahati.
8. Mahmood, A., 1999: *Statistical Methods in Geographical Studies*, Rajesh Publications, New Delhi.
9 Singh, L. R. & Singh, R. 1991: *Map Work & Practical Geography*, Central Book Depot, Allahabad.
10. Sarkar, Ashis, 1997: *Practical Geography: A Systematic Approach*, Orient Longman Pvt. Ltd., Kolkata.

MGE 205: Cartographic Techniques- II (Practical)

Total Marks:	100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit:	04
Total marks:	02 questions of 10 marks each – 20 marks
	02 questions of 15 marks each – 30 marks
	Practical book – 10 marks
	Viva voce – 10 marks

Objective: The objective of this paper is to make student familiar with different practical analysis of the subjects of Socio-culture, Politics and different Cartography techniques.

Course outcomes

1. Students will be familiar with different practical analysis of the subjects of Socio-culture, Political and different Cartographic techniques.
2. Students will learn to apply surveying techniques.
3. Students will be able to analysevarious climatic parameters and their significance
4. Students will understand various aspects of map projection
5. Understanding cartographic concepts,techniques & real world application will be easy.

UNIT - I: Surveying

    i. Plane table surveying (Radiation & Intersection methods)
    ii. Traverse Surveying with Prismatic Compass
    iii. Profile leveling and contouring by Dumpy Level

UNIT - II: Map Projections

    i. Construction of graticules based on Mathematical derivation and calculation: Zenithal group (polar cases)- Stereographic and Equal-area
    ii. Cylindrical group : Cylindrical Equal Area and Gall's Stereographic projection
    iii. Conical Group: Conical Projection with two standard parallels and Bonne's Projection
    iv. Conventional Group : Sinusoidal

UNIT - III: Mapping / Charting of Socio-economic Data

    i. Pie-graph for representation of a theme: for example land use / cropping pattern/ rural-urban composition / religious composition, etc. (1 exercise)
    ii. Computation and plotting of rank-size rule graph of the towns of Assam / Meghalaya / Nagaland and interpretation thereof (1 exercise).
    iii. Computation and fitting population projection models (2 exercises)
    iv. Computation and plotting of distance decay model (1 exercise)

UNIT - IV: Climatic Maps and Diagrams:

    i. Preparation and interpretation of Climograph, Hythergraph and Wind Rose diagram (3 exercises)
    ii. Aridity Index, P-E and T-E Ratio, Ombrothermic Graph. (Any two exercises)
    iii. Weather Map interpretation and Forecasting (1 exercise)

Note: Each and every exercise and assignment should contain the <u>Date of Assignment</u> and <u>Date of Submission</u> written on appropriate location of the exercise sheet, which is to be duly signed by concerned teacher on or before the date of submission. There should not be more than 7 days between these two dates for each exercise to be completed on regular basis by the student maintaining a standard practical note book. The student can appear for the sessional or end semester examination on practical by submitting completed assigned exercises only.

References
    As cited in the course MGE204

TOTAL CREDITS = 24   **TOTAL MARKS: 600**

SEMESTER - III: COURSE STRUCTURE

PAPER	TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 301	Research Methodology	4	T	30	70	100
MGE 302	Quantitative Techniques	4	T	30	70	100
MGE 303	Fundamentals of Geoinformatics	4	T	30	70	100
MGE 304A	Regional Planning: Principles, Concepts and Theories	4	T	30	70	100
MGE 304B	Hazards and Disaster Management: Basic Concepts	4	T	30	70	100
MGE 304C	Geoinformatics: Principles and Techniques of Remote Sensing	4	T	30	70	100
MGE 305	Geoinformatics (General) Practical	4	P	30	70	100
MGE 306	Northeast India: Land, People and Culture (Multidisciplinary Course I)	4	T	30	70	100
	TOTAL	24		180	420	600

MGE 301: Research Methodology

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                      50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To create a background and awareness of the nature of research process and inquiry. It will expose the student to the methodological problems encountered in interdisciplinary research.

Course outcomes
1. This course will allow students to create a basic knowledge and awareness about the nature of research process and inquiry.
2. It also provides student an exposure to the methodological problems encountered and ways to deal in interdisciplinary research.
3. This course will provide knowledge and foundation on different types of research options
4. Students will learn sampling, data collection and data processing.
5. The course will help students to know research process.

UNIT - I: Introduction to Research
Meaning and characteristics of science and scientific method, steps in scientific method, objectives of research, types of research, research design; research questions, hypothesis: meaning, types, formulation, importance & difficulties; Salient features of good research.

UNIT - II: Sampling and Data Collection
Sampling - meaning, types, procedure, selection, merits and demerits, sources of data - primary and secondary, techniques of data collection - empirical observation, questionnaire, interview, schedule & data analysis.

UNIT - III: Data Processing and Analysis

Salient features of processing of qualitative and quantitative data, Variable construction, tabulation and charting, Data processing tools - GIS Software packages and their analytical tools, Spreadsheets, SPSS and R, Hypothesis testing and validation with specific examples, Data interpretation, analysis and conclusions.

UNIT - IV: Research Process

Introduction to the research problem, Key features of research problem, Survey of literature, Project formulation guide lines; Methods, Techniques and Methodology, Inductive, deductive and model building approaches in geographic research, Structural elements of scientific reporting, Moral and ethical questions in scientific writing, Plagiarism, paraphrasing and copyright violation; Importance of revisions and Specific guide lines on punctuation, using quotations, footnotes, references and bibliography.

Assignment & Seminar:

Formulation of a research proposal on a topic related to subject (with a research problem, its brief introduction / background, survey of relevant literature, objectives, research questions, data and methodology to be used, probable outcome and significance of the study) within a specified period followed by a seminar presentation and finalization of topic, collection of relevant data from primary and secondary sources.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Schematic diagram on steps of scientific research, research questions on selected theme of research, designing of questionnaire / schedule, formulation of research project, design of graph / charts from a given data set and derivation of basic statistics, Structural elements of scientific reporting, model building approach in geography (Compulsory - any four)

References :

1. Wililam J. Goode and Paul H. Hatt, 1981: *Methods In Social Research*, Indian Edition, MsGraw Hill, New Delhi
2. Sir Claus Moser and Grham Kalton, 1985: *Survey Methods in Social Investigation,* Dartmouth, New York:
3. Paul Oliver, 2008: *Writing Your Thesis*, 2nd Edition, Sage, New Delhi
4. Bridget Somekh and Cathy Lewin, 2005: *Research Methods in the Social Sciences,* Vistaar, New Delhi
5. Kothari C.R., 2004, *Research Methodogy Methods and Techniques*, New Age International (P) Limited, Publishers, New Delhi.

MGE 302: Quantitative Techniques

Total Marks:	100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit:	04
Total Lectures:	60
Total marks:	20 marks - 20 objective type questions (*from all units*)
	50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The main objective of this paper is to give the quantitative and qualitative processing and analysis of data for quality research work.

Course outcomes

1. The main objective of this paper is to give understanding of quantitative techniques in research.
2. Students will understand qualitative processing and analysis of data for quality research work.
3. Students will learn the application of quantitative techniques for large data set analysis.
4. Students will learn to implement suitable quantitative techniques for quality research.
5. Understanding statistical softwares will be easy.

UNIT - I: Introduction to Quantitative Techniques

Why quantification, Advantages and disadvantages of quantification, General concepts and significance of statistics to applied sciences, Universe / Population, Samples, Variables - Discrete and continuous; Data collection

- primary and secondary; Computation of descriptive statistics from grouped and ungrouped data- measures of central tendencies, measures of dispersion / variation, Monte Carlo Analysis, Moments, skewness and kurtosis.

UNIT - II: Geographic Data Matrix and Matrix algebra
Concept of geographic data matrix, its application in regional, systematic and historical studies of geographic phenomena; Basics of matrix algebra - Definition of matrix, types of matrices, minors and cofactors, determinant, adjoint matrix, inverse matrix; Solutions of systems of equations and development of multiple regression equation.

UNIT - III: Correlation and Regression Analysis
Concept of correlation and their types; Properties of- simple (linear), nonlinear, partial / multiple correlation; Coefficient of correlation and their properties; Concept of regression, Properties of- simple (linear), nonlinear, partial / multiple regression, Computation of coefficients of regression and their properties, fitting regression equation.

UNIT - IV: Data Reduction Techniques and Statistical Inference - Hypothesis Testing
Introduction to Cluster analysis and Principal Component Analysis (PCA). Hypothesis and null hypothesis; Types of error, Test of hypotheses- chi square test, T-test, Z-test, F-test and Analysis of variance-one way-ANOVA, Two way ANOVA; Statistical software-SPSS, STASTICA etc.

Note: Seminar and Group discussion may be incorporated during class hour. Home assignments - Computation of basic statistics from a data set, graphical representation of data, design of data matrix, computation of inverse matrix, drawing of regression lines, ANOVA, t-test, Spreadsheet calculations for Correlation, Regresssion (Compulsory - any four)

References:
1. Ram Ahuja, *Research Methods*, Rawat Publication, New Delhi.
2. Birdie, Douglas and Anderson, *Questionnaires Design and Use*, The Scarecrow Press, Inc.
3. C.R. Kothari, 2004, *Research Methodogy Methods and Techniques*, New Age International (P) Limited, Publishers, New Delhi.
4. Clark, W. A. V. and Hosking, P. L., 1986: Statistical Methods for Geographer, John Wiley & Sons, New York.
5. Gregory, S. 1978: *Statistical Methods and the Geographer,* Longman, London
6. Payne, Stanley, *The Art of Asking Question,* Princeton, Princeton University Press.
7. Gupta and Gupta *2005, Statistical Methods,* Sultan Chand and Sons, New Delhi
8. Mahmood, A. 1999: *Statistical Methods in Geographical Studies,* Rajesh Publications, New Delhi.

MGE 303: Fundamentals of Geoinformatics

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To appraise the benefits of geoinformatics in geographical studies and provide direction to take up research on thrust areas for future development in geoinformatics and its application.

Course outcomes
1. This course focuses to make students learn the basic concepts of remote sensing.
2. Students will understand Aerial Photographs and image interpretation.
3. Students will learn principles of Geographical Information System.
4. Principles and methodologies in Global Positing System will be understood
5. Students will learn Global Navigation Satellite System

UNIT - I: Remote Sensing

Definition and basic concept of Remote Sensing, Its history of development; Electromagnetic spectrum and Spectral reflectance; Types of Remote Sensing based on sensor characteristics; Remote sensing Sensors and satellites: Indian and other countries (LANDSAT, IRS, IKONOS, QUICK BIRD, CARTOSAT), Data products and their specifications.

UNIT - II: Aerial Photographs and Image interpretation.

Aerial photography : Aerial photographs and their types and sensors; Scale and distortion of aerial photographs; Geometry of vertical aerial photographs, Stereoscopy, Visual interpretation of aerial photographs and satellite images: Elements of image / photo interpretation and interpretation keys. An introduction to Digital Image Processing (DIP) Systems; DIP Techniques: Image enhancements; Supervised and Unsupervised classification.

UNIT - III: Geographical Information System

GIS: Introduction, Principles and concept; GIS components and softwares; Spatial and non-spatial data; Raster and Vector data structure, their properties; Georeferencing: coordinate and projection system; datum concept; Thematic mapping of attribute data for points, lines and polygons, Map design and layout.

UNIT - IV: Global Positing System and Global Navigation Satellite System

GPS- Definition, history and fundamentals. Types of GPS; Accuracy of GPS, GPS Signals and errors; Navigation system – GNSS, GLONASS, Galileo, IRNSS; Application areas of GPS with focus on survey and navigation.

Note: Seminar and Group Discussion may be incorporated during class hour. Home assignments - Drawing of Electromagnetic spectrum, List of Remote Sensing data products with specifications by satellite, Scale of aerial photograph, Image classification steps, Georeferencing and digitization flow charting, GIS Components, Data structures, Map Design and layout format, Thematic mapping steps (compulsory - any four)

References:
1. Sabins, F . F. 1987: *Remote Sensing Principles and Interpretation* , W. H Freeman & Co., New York.
2. Guha, P. K. 2013: *Remote Sensing for the Beginner,* Affiliate East West Publishers, New Delhi.
3. Lillesand Thomas M, & Keifer. , 1997: *Remote sensing & Image interpretation* , John Wiley, New York
4. Jensen, J. R. 2011: *Remote Sensing of the Environment – An Earth Resource Perspective*: Pearson Education., New Delhi.
5. Martin, David 2008 : *Geographic Information Systems*: Routledge
6. Heywood, Ian, Cornelius, S. 2011 : *An Introduction to GIS 4th Edition,* Pearson, New Delhi
7. Yadav, R. S. 1997 : *Remote Sensing in Land Evaluation*: , Rajesh Publication, New Delhi.
8. Agarwal, N. K. 2004: *Essentials of GPS* , Spatial Networks Pvt. Ltd., Hyderabad.
9. Gopi, S. 2005: *Global Positioning System Priciples and Applications*, Tata McGraw Hill,New Delhi

MGE 304A: Regional Planning: Principles, Concepts and Theories

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The objective of this paper is to give students an idea about the concept of region and regional planning.

Course outcomes

1. One objective of this course is to give students an idea about the concept of region and regional planning.
2. Students will have an understanding about need of planning for the development of a region.
3. Students will have knowledge about planning at world as well as neighbourhood level.

4. Students will learn various methods and techniques of regional planning.

5. Students will understand grass root level planning.

UNIT - I: Conceptual Basis of Regional planning
Concept of Region: Development of the concept of region, its types and levels; Regionalisation and delineation of Region-; Regionalism, Regional Planning; Concept of planning region; Geography and Regional planning.

UNIT - II: Theoretical framework of Regional planning
Central Place Theory, Growth Pole Theory, Centre Periphery Theory, Rostow's Stages of Growth.

UNIT - III: Neighbourhood Planning
Approaches to neighbourhood living in traditional and contemporary societies, elements of neighbourhood structure, Planning and design criteria for modern neighbourhoods, housing and area planning standards, net residential density and gross residential density, development controls and building byelaws in India, UDPFI guidelines, NBC 2005 provisions.

UNIT - IV: Methodology and Techniques of Regional Planning
Methodology, Techniques-analytical techniques, procedural techniques; Regions for planning-evolution, planning regions, characteristics, demarcation, method, planning regions of India with special reference to North-East, Surveys for planning-Concept and functions; Types of surveys- Regional surveys, Diagnostic surveys, Techno-Economic surveys; Role of Remote Sensing, GPS and GIS.

Notes: Seminar and Group discussion may be incorporated during class hour. Home assignment-Regional Planning in Developed world, Regional Planning in Less developed world, development controls and building byelaws in India, Importance of administrative boundary in regional planning, indicators of development (Compulsory any FOUR).

References:
1. Bhalla A. S., 1992: *Uneven Development in the Third World: A Study of India and China*, Macmillan, London.
2. Dreze J. and Sen A., 1996: *Indian Development: Select Regional Perspectives,* Oxford University Press.
3. Misra R. P., Sundaram K. V. and Prakasa Rao V. L. S., 1974: *Regional Development Planning in India A New Strategy*, Vikas Publishing, Delhi.
 4. Sundaram K. V., 1980: *Decentralised Multilevel Planning: Principles and Practices (Asian and African Experiences)*, Concept Publishing, Delhi.
5. Yugandhar, B. N. and Mukherjee, Amitava (eds.) 1991: *Readings in De-centralised Planning (with special reference to District Planning),* 2 vols. Concept Publs. Co.,New Delhi.
6. Misra, R. P. & Misra, K. eds. 1998: *Million Cities of India,* Sustainable Development Foundation, New Delhi.
7. Myerson, D.L.,2004: Involving the Community in Neighborhood Planning, ULI Community Catalyst Report, USA.
8. A Guide for developing Neighbourhood Plans,2002, Planning and Land Use Division, Winnipeg.
2.   Chandana, R.C. 2002: Regional Planning-A Comprehensive Text, Kalyani Publishers, New Delhi
10   Chandana, R.C. 2016: Regional Planning and Development, Kalyani Publishers, New Delhi, 5th Edition
11   Chand, M. and Puri, V. K. 2001: Regional Planning in India, Allied Publishers Ltd, New Delhi

MGE 304B: Hazards and Disaster Management: Basic Concepts

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)

                       50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objectives: To provide indepth knowledge on various types natural, hydro-meteorological and human induced disasters.

Course outcomes
1. This course provides concepts related to hazard and disaster.
2. Students will know disaster phenomena and events at global, national and regional levels.
3. Students will know mechanism, causes and consequences of different geological hazards.
4. Mechanism, causes and consequences of hydro-meteorological hazards will be understood.
5. Students will know the contribution of human activities to the cause of various disasters.

UNIT I: Understanding Hazard and Disaster
a) Definitions and concepts of Hazard, Risk, Vulnerability, Capacity and Disaster

b) Types, causes and effects of Hazards; Difference between Hazard and Disaster

c) Different stages involved in Disaster

d) Disaster phenomena and events *(Global, national and regional)*

e) Disaster Management Cycle.

UNIT-II: Introduction to Geological Hazards and Disasters: *Causes and Consequences of*
a) Earthquakes
b) Volcanic Eruption
c) Landslides
d) Tsunamis
e) Mine fire

UNIT-III: Introduction to Hydro-Meteorological Hazards and Disasters: Causes and Consequences of
a) Floods
b) Droughts
c) Snow falls
d) Cloudburst
e) Cyclones
f) Tsunamis

UNIT-IV: Introduction to Man Made Hazards and Disasters
a) Understanding Man-Made Disasters
b) Fires and Forest Fires
c) Nuclear, Biological, Industrial and Chemical disasters
d) Accident related disasters
e) Occupational Hazards

Notes: Seminar and Group discussion may be incorporated during class hour. Home assignment-Hazard-Risk-Vulnerability, Disaster phenomena and events, Disaster Management Cycle, Earthquakes, Landslides, Floods, Droughts, Fires and Forest Fires, Nuclear, Biological, Industrial and Chemical disasters, Accident related disasters (Compulsory any FOUR).

Suggested Readings:
1. Bryant Edwards (2005): *Natural Hazards*, Cambridge University Press, U.K.
2. Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila.
3. Central Water Commission, 1987, *Flood Atlas of India*, CWC, New Delhi.
4. Central Water Commission, 1989, *Manual of Flood Forecasting*, New Delhi.
5. Government of India, 1997, *Vulnerability Atlas of India,* New Delhi.
6. Sahni, Pardeep et.al. (eds.) 2002, *Disaster Mitigation Experiences and Reflections*, Prentice Hall of India, New Delhi.

MGE 304C: Geoinformatics: Principles and Techniques of Remote Sensing

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To understand the principles and techniques of Remote Sensing and to develop competency in data processing and analysis by using the science and technology of geoinformatics.

Course outcomes
1. This course helps students to understand the principles and techniques of Remote Sensing.
2. Students will know Digital Image Processing techniques.
3. Students will know Digital Image classification techniques.
4. Students will know post classification analysis.
5. Students will know the various areas and application of remote sensing tools in solving environmental issues and crisis.

UNIT - I: Principles and Techniques of Remote Sensing
Principles of remote sensing, Energy radiation processes, Remote Sensing platforms - Geosynchronous and Sun synchronous satellites, Spectral reflectance based on characteristics of earth surface (rocks, soils, vegetation, water); Remote Sensing data characteristics - Spectral resolution, radiometric resolution, spatial resolution and temporal resolution; Principles of thermal, hyper spectral and microwave remote sensing and Basic idea on Synthetic Aperture Radar (SAR) data.

UNIT - II: Digital Image Processing: Data Preparation
Data sources and characteristics of data, Geometric and radiometric correction of Remote Sensing digital data; Image segmentation (point, line, edge and combined detection), subsetting; resampling techniques; Image enhancement: Spatial domain methods and frequency domain methods.

UNIT - III: Digital Image Classification Techniques
Elements of image analysis - low, intermediate and high level processing; Image supervised classifiers - Maximum Likelihood, Minimum distance, Minimum Mahalanobis distance, Spectral angle; Theoretical framework of unsupervised classification/ ISOdata classification, Clustering by K-means, Intelligent classifiers.

UNIT IV: Image Post Classification Analysis
Ground truth collection by GPS or Spectrometer, Computation and interpretation of error matrix / confusion matrix, Kappa and Lamda coefficients for accuracy assessment; Change detection analysis, Advantages and disadvantages of classification techniques, Presentation of classification reports.

Essential Books:
1. Kumar, Meenakshi *Remote Sensing*, NCERT.
2. Guha, P.K. 2013: *Remote Sensing for the Beginner,* Affiliate East West Publishers, New Delhi.
3. Yavav, R. S. 1997*: Remote sensing in Land Evaluation*: Rajesh Publications, New Delhi.
4. Agarwal, N. K. 2004: *Essentials of GPS ,* Spatial Networks Pvt. Ltd., Hyderabad.
5. Curran, Paul J., 1985: *Principles of Remote Sensing ,* Longman, London & New York
6. Gupta, R. P., (2003): *Remote Sensing Geology ,* Springer-Verlag.
7. Jensen, J.R., 2011: *Introductory Digital Image Processing: A Remote Sensing Perspective,* New Jersey: Prentice-Hall.
8. Lillesand, T. M. and Kiefer R. W, 2011: *Remote Sensing and Image Interpretation* – (6th Ed.), Wiley.
9. Joseph, G. 2005*: Introduction to Remote Sensing,* Universities Press (India) Pvt. Ltd, Hyderabad.
10. Rampal, K K, 1993: *Handbook of Aerial photography and Interpretation,* Concept Publication. Comp., New Delhi.

Note: Seminar and Group Discussion may be incorporated during class hour. Home assignments - Drawing of Electromagnetic spectrum, List of Remote Sensing data products with specifications by satellite, Scale of aerial photograph, Image classification steps, Georeferencing and digitization flow charting, Data structures, Map Design and layout format, Thematic mapping steps (compulsory - any four).

MGE305: Geoinformatics (General) Practical

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total marks: 02 questions of 15 marks each – 30 marks
                       02 questions of 10 marks each – 20 marks
                       Practical book – 10 marks   Viva voce – 10 marks

Objective: To understand the practical knowledge of Remote Sensing, GIS and GPS and to develop competency in data processing and analysis by using the science and technology of geoinformatics.

Course outcomes
1. One objective is to understand the practical knowledge of geospatial technology.
2. Students will learn to develop competency in data processing.
3. Students will learn analysis by preparing maps and graphs.
4. Students will learn to apply remote sensing techniques.
5. Understanding of GIS & its relationship to mapping software development will be easy.

UNIT - I: Remote Sensing
    (a) Georeferencing of satellite images based on a georeferenced map (1 exercise)
    (b) Stacking of images (Image composition) with various spectral bands (1 exercise)
    (c) Mosaicking of image and clipping the same or any other image by vector polygon boundary (1 exercise)
    (d) Image manipulation / enhancements and interpretation and feature identification (1 exercise)
    (e) Computation of image histogram and statistics (1 exercise)
    (f) Classification- Visually interpreted by vector polygons, Supervised and Unsupervised (3 exercises)

UNIT - II: Aerial Photograph Interpretation.
    (a) Geometry of aerial photographs .
    (b) Photo interpretation and feature identification based on interpretation keys.
    (c) Determination of scale of aerial photograph
    (d) Computation of photo coordinates

UNIT - III: Geographical Information System
    (a) Scanning / digitization of maps of different themes.
    (b) Georeferencing of scanned maps with geographic coordinate system and earth model and its datum
                                    (1 exercise)
    (c) Projection system and Coordinate transformation of the georeferenced map and its layout.
                                 (1 exercise)
    (d) Creation and editing of vector data layers of points, lines and polygons including adding attributes and designing map layout of the theme(s).   (1 exercise)
    (e) Preparation of thematic maps from points (Population distribution by pie-chart, sphere) and map layout of the theme.   (2 exercises)
    (f) Digitization of drainages and drainage ordering and creation of map layout. (1 exercise)
    (g) Digitization of different types of roads and the railways and creation of map layout (1 exercise)
    (h) Polygon based thematic map (District level literacy / population density map of any state) (1 exercise)

UNIT - IV: Global Positing System
    (a) GPS/DGPS data collection of waypoints (Utility locations Bank, Hospitals, Shopping centres etc) and map layout (1 exercise)

(b) GPS/DGPS data collection of routes and mapping thereon (1 exercise)

(c) GPS / DGPS data collection of land use features and mapping (1 exercise)

(d) Georeferencing of large scale scanned map (building plan / site plan etc.) (1 exercise)

Note: Each and every exercise and assignment should contain the <u>Date of Assignment</u> and <u>Date of Submission</u> written on appropriate location of the exercise sheet, which is to be duly signed by concerned teacher on or before the date of submission. There should not be more than 7 days between these two dates for each exercise to be completed on regular basis by the student maintaining a standard practical note book. The student can appear for the sessional or end semester examination on practical by submitting completed assigned exercises only.

References:

1. Date, C.J., 1995 : *An Introduction to Data Base System*, 6th edition, Reading Messachusetts; Adderson Werley.
2. Fraser Taylor, D.R., (ed.), 1980 : *Progress in Contemporary Cartography*, John Wiley, Chichester U.K.
3. Fraser Taylor, D.R., (ed.), 1983 : *Graphic Communication and Design in Contemporary Cartograph**y***, John Wiley & Sons Ltd. New York.
4. Jones, C., 1997 : *Geographic Information Systems and Computer Cartography*, Longman, London.
5. Kraak, M-J., and Ormeling, F., 2004: Cartography: Visualization of Geospatial Data, Pearson Education.
6. Misra, R.P., et al 2014: *Fundamentals of Cartography,* Concept Publishers, Delhi.

MGE 306: Northeast India: Land, People and Culture

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)

Total Credit: 04

Total Lectures: 60

Total marks: 20 marks - 20 objective type questions (*from all units*)

50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To understand the biogeography, climate, agriculture, ethnicity, linguistics, economy, politics and cultural diversity of Northeast Region of India

Course outcomes

1. This course intends to make students to understand the biogeography, climate, agriculture, ethnicity, linguistics, economy and politics of Northeast Region of India.
2. Students will understand cultural diversity of Northeast Region of India.
3. The course will also make students know the speciality and uniqueness of the NE region.
4. Students will know industries and transportation of NE India
5. Students will understand and have knowledge on the different environmental related problems prevailed in the region.

UNIT I: North East India: Introduction to Physical Basis

Location and significance of North East Region of India; Physiography, Climate, Soil and Vegetation of NE Region; Biodiversity of NE Region; factors affecting biogeography of NE Region.

UNIT II: Population of North East India

Population characteristics: Peopling; Growth; Distribution and Density; Age and Sex composition; Rural–Urban composition and Religious composition; Ethnicity; Eco-Anthropology of the NE Region.

UNIT III: Agriculture of North East India

Agricultural development and economy of North East India; Agro-climatic regions of NE Region; Agricultural practices and modernization of agriculture in NE Region; Major agricultural crops cultivated in NE Region.

UNIT IV: Industries and Transportation of North East India

Industrial development and economy of North East India; distribution and production pattern of major Industries (Oil, Coal, Handloom and textile, Cottage industry , Agro-based industry, Food processing industry, Petrochemicals, Sugar, Paper and Cement industries, Tourism industry, Power industries), Transportation in NE Region: Roadways, Railways, Waterways, Airways, and Pipelines.
Note: Seminar and Group discussion may be incorporated during class hour.

References:
1. Govt. of India: India-Reference Annual, 2001 Pub. Div., New Delhi.
2. Govt. of India: National Atlas of India NATMO Publication, Calcutta.
3. Govt. of India: The Gazetteer of India. Vol. I & III Publication Division.
4. Learmonth A.T.A *et.al* (etd.) Man and land of South Asia, Concept;
5. Shafi, M. 2000: Geography of South Asia, McMillan & Co., Calcutta.
6. Discovery of North East India - Geography, History, Culture, Religion, Politics, Sociology, Science, Education and Economy (11 Volumes) Mittal Publications.
7. Dikshit, K. R.et.al. 2014:North-East India: Land, People and Economy, Advances in Asian *Human-Environmental Research, Springer Science+ Business Median Dordrecht*

SEMESTER - IV

PAPER	TITLE	CREDIT	NATURE T/P	MARKS ALLOTED		
				IA	ES	FULL
MGE 401	Geography of Economic Activities	4	T	30	70	100
MGE 402A	Regional Planning: Practices in India and Selected Countries	4	T	30	70	100
MGE 402B	Hazards and Disaster Management: Preparedness and Mitigation	4	T	30	70	100
MGE 402C	Geoinformatics: Principles and Techniques of GIS and GPS	4	T	30	70	100
MGE 403A	Regional Planning: Rural and Urban Development Planning in India	4	T	30	70	100
MGE 403B	Hazards and Disaster Management: Issues and Policies	4	T	30	70	100
MGE 403C	Geoinformatics: Applications in Major Areas	4	T	30	70	100
MGE 404A	Regional Planning (Practical)	4	P	30	70	100
MGE 404B	Hazards and Disaster Management (Practical)	4	T	30	70	100
MGE 404C	Geoinformatics (Practical)	4	T	30	70	100
MGE 405	Dissertation	4	P	70	30	100
MGE 406	Disaster Management (Multidisciplinary Course II)	4	T	70	30	100
	TOTAL	**24**		**220**	**380**	**600**

MGE 401: Geography of Economic Activities

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                      50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To deal with the spatial pattern in economic geography in terms of resources, agriculture industry and transport.

Course outcomes
1. To deal with the scope and approaches in economic geography
2. To study models of agricultural systems.
3. To deal with classification of industries and also different industrial approaches.
4. To aware students about different transportation model.
5. Will understand models of economic geography.

UNIT - I: Economic Geography
Meaning and scope, Approaches in economic geography: regional, systematic and sectoral; Concept of resources and resource classification; natural and human resources, renewable and non-renewable resources, biotic and

abiotic resources; conservation of resources. Distribution and production of resources in global context: Forests, Coal, Iron ore, Water

UNIT - II: Approaches and Models of Agricultural Systems
Nature, scope and significance of Agricultural geography; Approaches: commodity, systematic, regional and ecological; Determinants of agricultural development: physical, technological, institutional; World agricultural systems. Agricultural location models: Von Thunen and Lösch; Cropping patterns and their measurements: crop concentration, crop diversification, crop combinations, measurement of agricultural efficiency, agricultural productivity; Green revolution and its effects on economy, society and environment; Problems and prospects of Indian agriculture.

UNIT - III: Industrial Geography
Classification and types of industries; Localisation factors; Weber's and Losch's approaches; Process and Pattern of Industrialisation; Resource based and foot-loose industries

UNIT - IV: Geography of Transport
Models of transportation and transport cost; Accessibility and connectivity: Inter-regional and Intra-regional; comparative cost advantage

Note: Seminar and Group discussion may be incorporated during class hour.

References:
1. Guha, J.L. and Chattoraj, P.R.: *A New Approach to Economic Geography*, The World Press Pvt. Ltd., Kolkata.
2. Alexander, J.W.: *Economic Geography*, Prentice Hall.
3. Leong, G.C. and Morgan, G.C.: *Human and Economic Geography*, Oxford University Press
4. Roy, P. and Mukherjee, S.: *Economic Geography – An Appraisal of Resources*, Central Educational Enterprise, Kolkata.
5. Thoman, R.S. and Corbin, P.B.: *The Geography of Economic Activity*, McGraw Hill
6. Negi, B.S.: *Geography of Resources*, Kitab Mahal, Delhi
7. Chauhan,D. 2010. *Agricultural Geography,* Ritu Publications
8. Brown,L.R. 1990 *The Changing World Food Prospects- The Nineties and Beyond*, World Watch Institute, Washington D.C.
9. Dyson, T. 1996. *Population and Food – Global Trends and Future Prospects,* Routledge, London.
10. Hussain Majid. Agricultural Geography, Concept Publication.
11. Gregory,H. F. 1970. *Geography of Agriculture*; Prentice Hall Englewood Cliff; New Jersey.

MGE 402A: Regional Planning: Practices in India and Selected Countries

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                                50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)
Objective: The objective of this paper is to give students an idea about the Methodology and strategies of regional planning with special reference to India.

Course outcomes
1. The objective of this paper is to give students an idea about the different planning process in India.
2. To aware them about different problems of regional planning in India.
3. To deal with different resource planning and management process in India.
4. To aware them about different planning process of developed country like USA.
5. To aware them about different prospects of regional planning in India.

UNIT - I: Process of Planning and Development in India

Process and types of planning, levels of planning, 73ʳᵈ constitutional Amendment Act,1992; Decentralized planning in India; Need for Regional planning, Importance of administrative boundary in regional planning; Concept of regional development, indicators of development;

UNIT - II: Problems and Prospects of Regional Planning in India

Regional Inequality, Regional Disparity and Regional Diversity in India; Regional Approach to Planning in India's Five Year Plans; Experience of Regional Planning in India: Multi-Level Planning (State, District and Block Level Planning), Regions for Planning (identification, characteristics, problems and policies)

UNIT - III: Resource Planning and Management in India

Techno-centric and Eco-centric Planning of Resources, Land Crisis for Development and SEZ , Development and Displacement and Rehabilitation; Human Resource Development: Employment Opportunity and Capability Building.

UNIT - IV: Case studies from selected countries
Case Studies of:
  d. Regional Planning in USA (TVA)
  e. Regional Planning in Netherlands (Polders)
  f. Regional Planning in Israel (Jazrael Valley)
  g. Regional Planning in UK (Lancashire)
  h. Regional Planning in Irrawaddy Valley (Myanmar)
  i. Regional Planning in Singapore
  j. River Valley Development Plan: Damodar Valley and Tribal Area Development Plan (North-East
  k. Hill Area Development Plan: Western Ghats, Himalaya, North-East India
  l. Metropolitan Regional Plan: National Capital Region, Guwahati Metropolitan Region

Notes: Seminar and Group discussion may be incorporated during class hour. Home assignment-Guwahati Metropolitan Region, Human Resource Development, India's Five Year Plans, Regional Planning in Singapore, Hill Area Development Plan, Regions for Planning (Compulsory any four).

References

  1. Bhat, L.S., 1976: *Micro Level Planning in India*, K.B. Pub. New Delhi.
  2. Misra R. P. (ed), 1980: *Regional Planning Concepts, Techniques, Policies and Case Studies*, Vikas Publishing, Delhi.
  3. Sharma H. S and Chattopadhyaya S., 1998: *Sustainable Development: Issues and Case Studies*, Concept Publishing, Delhi
  4. Chandana, R.C. 2002: Regional Planning-A Comprehensive Text, Kalyani Publishers, New Delhi
  5. Chandana, R.C. 2016: Regional Planning and Development, Kalyani Publishers, New Delhi, 5ᵗʰ Edition

MGE 402B: Hazards and Disaster Management: Preparedness and Mitigation

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                      50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objectives: To understand the techniques and tools for preparedness, mitigation and overall management of various disasters

Course outcomes

1. This course provides in-depth knowledge on various type natural and human induced disasters.
2. Students can understand different tools and techniques for disaster preparedness and mitigation.
3. Role of government and NGOs will be understood
4. Technologies for disaster management will be known.
5. Information on various governmental and non-governmental organisations working on disaster management field.

UNIT-I: Introduction to Disaster Preparedness
   a. Disaster Management: Prevention, Preparedness and Mitigation
   b. Disaster Preparedness: Concept & Nature
   c. Disaster Preparedness Plan
   d. Disaster Preparedness for People and Infrastructure
   e. Vulnerability-Women, Children and Old age people and economically poor people
   f. Community based Disaster Preparedness Plan

UNIT-II: Roles & Responsibilities of Different Agencies and Government
   a. Roll of Information, Education, Communication & Training
   b. Role and Responsibilities of Central, State, District and local administration
   c. Role and Responsibilities of Armed Forces, Police, Para Military Forces
   d. Role and Responsibilities of International Agencies, NGO's, Community Based Organizations (CBO's)

UNIT-III: Technologies for Disaster Management
   a. Role of IT in Disaster Preparedness
   b. Remote Sensing, GIS and GPS
   c. Use and Application of Emerging Technologies
   d. Application of Modern Technologies for the Emergency communication.
   e. Application and use of ICST for different disasters.

UNIT-IV: Disaster Mitigation
   a. Disaster Mitigation: meaning and concept
   b. Disaster Mitigation Strategies
   c. Emerging Trends in Disaster Mitigation
   d. Crises Management
   e. Mitigation management
   f. Role of Team and Coordination

Notes: Seminar and Group discussion may be incorporated during class hour. Home assignment-Disaster Management-Prevention, Preparedness and Mitigation, Disaster Preparedness Plan, Vulnerability-Women, Children and Old age people, Role of Education, Information, Training, Remote sensing, GIS and GPS, disaster mitigation, crises management (Compulsory any FOUR).

Suggested Readings:
1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.
3. Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing Corporation, New Delhi.

MGE 402C: Geoinformatics: Principles and Techniques of GIS and GPS

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                            50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To appraise the benefits of geoinformatics in geographical studies and provide direction to take up research on thrust areas by understanding and using the science and technology of geoinformatics.
Course outcomes
1. To teach the students the various principles of GIS and GPS technology.
2. Students will learn fundamentals of Geodasy.
3. Data management in Geoinformatics will be understood
4. Students can understand the benefits of geoinformatics tools in environmental studies.
5. Students will be provided direction to take up research on thrust areas.

UNIT - I: Fundamentals of Geodesy
Fundamentals of geodesy: Shape and size of the earth, Geoid, Ellipsoids and their flattening, Geodetic datum, Geodetic coordinate System, Map Projection System, Errors in GIS, Vector data editing tools and concept of tolerance- weeding and snapping, merging, combining, splitting and clipping; Errors in GIS,

UNIT - II: Database Management in Geoinformatics
Concept of Database Management System (DBMS), Relational Database Management System (RDBMS), Geodatabase and data models in GIS. Attribute data processing and management; DEM data sources and the characteristics of data - SRTM, GTOPO, GLOBE, LiDAR, CARTOSAT DEM; GPS/DGPS data management and mapping- technical issues

UNIT - III: Principles and Techniques of GIS - GPS Techniques
 Topological relationships of vector data and network analysis, Spatial interpolation techniques - types, uses and problems; Uses of Digital elevation/terrain / surface model (DEM /DTM/ DSM) and Triangulated Irregular Networks (TIN) model; Concept, principles and applications of GPS/ DGPS and Errors involved in GPS signals.

UNIT - IV: Spatial Modeling and Analysis
Concept of spatial modeling and analysis, Spatial autocorrelation; Geographically Weighted Regression; Spatial decision support by raster overlay analysis, Geoprocessing functions and tools- buffering, union and intersection; Web-GIS.

Note: Seminar and Group Discussion may be incorporated during class hour. Home assignments - Drawing of Electromagnetic spectrum, List of Remote Sensing data products with specifications by satellite, Scale of aerial photograph, Image classification steps, Georeferencing and digitization flow charting, Data structures, Map Design and layout format, Thematic mapping steps (compulsory - any four).

Essential Books:
1. Martin, D. 1995: *Geographic Information Systems Socioeconomic Applications,* Routledge
2. Heywood, Ian, Cornelius, S. 2011 : *An Introduction to GIS 4th Edition,* Pearson, New Delhi
3. Chang, Kang-tsung , 2008: *Introduction to Geographic Information System* – (4th Ed.), Tata McGraw-Hill.
4. DeMers, M. N. 2000: *Fundamentals of Geographic Information Systems* : , John Willey, New York.
5. Longley, P. A M. Goodchild, M., D. J. Maguire, D. J. And Rhind, D. W. 2001: *Geographic Information Systems and Science* , John Willey, New York
6. Burrough, P. A. 1998: *Geographical Information for Land Resource Assessment* , Oxford.
7. Agarwal, N. K. 2004: *Essentials of GPS* , Spatial Networks Pvt. Ltd., Hyderabad.
8. Gopi, S. 2005: *Global Positioning System Priciples and Applications*, Tata McGraw Hill,New Delhi

MGE 403A: Regional Planning: Rural and Urban Development Planning in India

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: The objective of this paper is to give students an idea about urban planning strategies with special reference to India.

Course outcomes
1. The objective of this paper is to give students an idea of rural development in developed and developing countries.
2. To aware about the concept of Economic liberalization and regional disparities in India and NE India.
3. To give idea about the fundamentals of urban development planning.
4. To aware them about urban development in North East India
5. To aware them about urban development and associated problems in North East India

UNIT I: Rural Development Planning

Rural development in developed, developing and under developing countries. Administrative planning for rural development. Integrated rural Development: Concept, issues and challenges, Approaches to integrated rural development, issues in rural industrialization, utilization of surplus labor, time and technology. Role of Cooperative sector. Role of agriculture in rural development in Israel and India. District Level Planning-Lessons and experience. Role of Self Help Groups (SHGs), Role of Micro Finance in rural development.

UNIT II: Economic Liberalization and Regional Disparities in India and NE India

Economic Liberalization-Concept and issues, India Economy- Pre and Post Economic Liberalization Period, National and Regional Growth in Indian Economy. Regional disparities in India, resource distribution and development in India, Levels of Development in NE India-Industrial sector, agricultural sector, marketing system. Unemployment in NE India-some issues, Look east policy-its impact on rural development in NE India.

UNIT III: Fundamentals of Urban Development Planning

Evolution of human settlements in modern context. Understanding of different types of urban infrastructures in planning, layout of service lines and interface. Physical nature and characteristics of the urban environment and its components; Land uses, physical structure and relationship between parts of city. Approaches to urban redevelopment, Urban Renewal. Urban reconstruction, urban rejuvenation. Alternative Approaches for Delivery of Basic Services to the Urban Poor, Community planning approach, low cost alternatives and institutional reforms approach.

UNIT IV: Urban Development and Associated Problems in North East India

The fundamental problems of the city; changes with time and growth; technological, social and other changes in size and scale Multi-nuclei developments: Inter-city issues and problems, Alternative strategies to metropolitan growth - planning for New towns: types, design criteria, development process and issues. New town approach in North East India: small and medium town development. Urban Growth Management.

Notes: Seminar and Group discussion may be incorporated during class hour. Home assignment-issues in rural industrialization, Role of Self Help Groups (SHGs), Role of Micro Finance in rural development, Look east policy-its impact on rural development in NE India, Regional disparities in India, Evolution of human

settlements in modern context, New town approach in India: small and medium town development (Compulsory any FOUR).

References:

1. Misra, R. P. (ed), 1980: *Regional Planning Concepts, Techniques, Policies and Case Studies*, Vikas Publishing, Delhi.
2. Horelli,E.(ed),2013: *New Approaches to Urban Planning,* Aalto Universities Publication Series, Finland.
3. Riddell, R. ,2004: *Sustainable Urban Planning,* Blackwell Publishing.
4. Hall, P. 1992: *Urban and Regional Planning*, Routledge, London
5. Singh, S. and Chetry, P. 2016: Agricultural Growth, Productivity and Regional Change in India: Challenges of globalisation, liberalisation and food insecurity, Routledge, London
6. Bhalla, G. S. and Singh, G. 2012: Economic Liberalisation and Indian Agriculture: A District-Level Study, Sage Publications India PVT Ltd, New Delhi (1ˢᵗ Edition)
7. Nayyar, D. 2012: Liberalization and Development Oxford University Press, London 1ˢᵗ edition
8. Sahu, B. K. 2003: Rural Development in India, Anmol Publisher, New Delhi
9. Lakhsman, T. K. and Narayan, B. K. (eds). 1987. Regional Development in India: A Multi Dimensional Analysis, Himalayan Publishing House, New Delhi
10. Mahapatra, A. C. and Pathak, C. R. (eds). 2003. Economic Liberalisation and Reghional Disparities in India-A Focus on North Eastern Region, Star Publishing House, Shillong

MGE 403B: Hazards and Disaster Management: Issues and Policies

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objectives: To provide depth knowledge on various types of rehabilitation, reconstruction, different policies of disaster management and local knowledge through various case studies on disasters.

Course outcomes
1. Students will be taught various issues related to natural hazards
2. Students will learn man-made hazards and disaster in India.
3. Students will learn different policies framed for disaster management.
4. Students will learn various strategies adopted for disaster management.
5. Students will get knowledge of different disasters occurred locally and globally.

UNIT I: Rehabilitation, Reconstruction and Recovery
a) Recovery aspects- long term and short term

b) Physical and social infrastructure

c) Relocation and reconstruction of structural and non-structural components,

d) Social and economic rehabilitation

e) Capacity building and skill enhancement for livelihood development,

f) Training and awareness programmes

g) Medical aid therapy and counselling

h) Agricultural aids

i) Repair and retrofitting

j) Role of Micro finance in disaster management

UNIT II: Policies for Disaster Management

a) Yokohama Declaration

b) International Decade for Natural Disaster Reduction (IDNDR)

c) Hyogo framework

d) United Nations International Strategy for Disaster Reduction (UNISDR)

e) Global Facility for Disaster Risk Reduction (GFDRR)

f) Disaster prevention through Sustainable development

g) Community participation

UNIT III: Case studies of major Hazards and Disasters in India and the Globe *(in the last and present century)*

a) Earthquakes
b) Landslides
c) Tsunamis
d) Snow Falls
e) Floods
f) Droughts
g) Cyclones
h) Tsunamis
i) Nuclear, Biological, Industrial and Chemical disaster
j) Road Accidents

UNIT IV: Causes, Consequences, Mitigation/Management of Hazards and Disasters in North East India

a) Earthquake
b) Floods and Flash Floods
c) Landslides
d) Droughts
e) Accident related disasters

Notes: Seminar and Group discussion may be incorporated during class hour. Home assignment-Rehabilitation, recovery, reconstruction, Physical and social infrastructure, Training and awareness programmes, Medical aid therapy and counselling, Yokohama Declaration, IDNDR, UNISDR, Assam Earthquake-1950, Flood in Assam (Compulsory any FOUR).

Suggested Readings:
1. Carter, W.N. (1992): *Disaster Management: A Disaster Manager's Handbook*, Asian Development Bank, Manila.
2. *Disaster Management (108)*: Books Prescribed by IGNOU
3. Goel, S.L. (2006)*: Encyclopaedia on Disaster Management*: Disaster Management Policy and Administration, Deep & Deep Publications Pvt. Ltd. New Delhi.
4. Hulme, David and Paul Mosley, "*Finance against Poverty",* Rout ledge London, 1996.

5. Kapur. Anu & Neeti, Meeta, Deeptiman, Roshani & Debanjali (2005): *Disasters in India Studies of Grim Reality,* Rawat Publications, New Delhi.
6. Kapur. Anu, (2010): *Vulnerable India,* Sage publications, New Delhi.
7. Kumar. Arvind (2010): *Disaster Management Recent Approaches.* Anmol Publications Pvt. Ltd. New Delhi.
8. Mathur, G.C. (1986): *Housing in Disaster prone areas, National Building Organization and U.N. Regional Centre.* ESCAP, New Delhi.
9. Meyer, Richard L, *"Micro finance, Poverty alleviation and Improving Food Security: Implications for India" in Food Security and Environmental Quality,* CRC Pres LLC, Boca Raton, FL. 2002.
10. Mishra, P.K. *Transforming adversity into opportunity: experiences from Gujarat earthquake reconstruction program World congress on Natural disaster mitigation proceedings*, February 2004.
11. National Disaster Response Plan, NCDM, New Delhi, 2001.
12. Report of the High Powered Committee (HPC) on Disaster management, NCDM, New Delhi, 2001.

MGE 403C: Geoinformatics: Applications in Major Areas

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: To appraise the benefits of geoinformatics in geographical studies and provide direction to take up research on thrust areas by understanding and using the science and technology of geoinformatics.

Course outcomes
1. To appraise the benefits of geoinformaticsfor natural resources monitoring and management.
2. To give idea about geoinformatics for environmental studies, hazards and disaster management.
3. To aware about different geoinformatics application in planning and development.
4. To study geoinformatics for drainage basin analysis.
5. To study geoinformatics for hydrological analysis.

UNIT - I: Geoinformatics for Natural Resources Monitoring and Management
Land use / Land cover (LU/LC) mapping: Introduction to Land use / Land cover: Definition and classification scheme (by USGS after Anderson and by NRSC at Level-1, Level-2 and Level-3), LU/LC interpretation keys for LANDSAT/IRS data, Resources mapping - water resources, soils, forests, minerals, agriculture etc.

UNIT - II: Geoinformatics for Environmental Studies, Hazards and Disaster Management
Identification of flood prone area, landslide prone area, forest fire - data sources and dataset requirements, methodology charting and basic considerations, biodiversity, environmental pollution and climate change studies; Monitoring and warning systems of disastrous / hazardous events and mitigation plans.

UNIT - III: Application of Geoinformatics in Planning and Development
Rural and urban infrastructure survey, mapping and planning - transportation, health , education and others; Urban sprawl and water logging mapping, Development strategy planning for flood and drought prone areas, hilly areas, Smart villages and smart cities.

UNIT - IV: Geoinformatics for Drainage Basin and Hydrological Analysis
Drainage basin morphometry from maps and satellite data, basin hydrological studies, Geoinformatics based methodology for integrated approaches of basin development, Ground water potential studies; DEM generation and DEM based applications.

Note: Seminar and Group Discussion may be incorporated during class hour. Home assignments - Land use system India, Drawing of flow / activity charts - preparation of land use / land cover map, flood hazard zoning, development strategy planning, integrated basin development, biodiversity mapping, disaster warning system, smart village planning, groundwater potential estimation (Compulsory - any four).

Essential Books:

1. Agarwal, C. S and Garg, P. K. 2000: *Text book on Remote Sensing in Natural Resource Monitoring and Management* – A. H . Wheeler, New Delhi-1.

2. Guha, P.K. 2013: *Remote Sensing for the Beginner,* Affiliate East West Publishers, New Delhi.

3. Lillesand Thomas M, & Keifer, 1997: *Remote sensing & Image interpretation* , Wiley, New York

4. Gautam, N. C., Raghavswamy, V. And Nagaraja, R. (Chief Editor) 1994: *Space Technology and Geography*, NRSC, Hyderabad

5. Jensen, J. R. 2011: *Remote Sensing of the Environment – An Earth Resource Perspective*: Pearson Education., New Delhi.

6. Heywood, Ian, Cornelius, S. 2011 : *An Introduction to GIS 4th Edition,* Pearson, New Delhi

7. Yadav, R. S. 1997 : *Remote Sensing in Land Evaluation*: , Rajesh Publication, New Delhi.

8. Joseph, G. 2005*: Introduction to Remote Sensing,* Universities Press (India) Pvt. Ltd, Hyderabad.

9. *Academic Journals and Periodicals*

MGE 404A: Regional Planning (Practical)

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from Final Examination)
Total Credit: 4
Total marks: 20 marks - Viva (10 marks) + Practical Note Book (10 marks)
50 marks – Set of 03 questions

Objective: The objective of this paper is to make students familiar with different practical analysis and techniques of Regional Planning.

Course outcomes

1. The objective of this paper is to make students familiar with different practical analysis in regionalisation methods.

2. To aware them about different parameters of network analysis.

3. To give idea about different crop combination methods.

4. To aware them about delimitation of influence areas of nodal centers.

5. Understanding practicality of grass root planning techniques will be easy.

Unit - I: Regionalisation methods
  a) Overlapping of different themes
  b) Ranking using 'z' score
  c) Factor Analysis and Principal Component Analysis
  d) Ternary diagram

Unit - II: Network Analysis
  (A) Application of aggregate connectivity using:
  a) Road density(Dn)
  b) Cyclometic number(μ)
  c) Alpha Index(α)
  d) Beta Index(β)
  e) Gama Index(γ)
  f) Eta Index(η)
  g) Theta Index(θ)
  h) Detour Index
  (B) Shape Index

Unit - III: Crop combination methods
  (1) Weaver's method
  (2) Nelson's method

Unit - IV: Delimitation of influence areas of nodal centers

      (1) Breaking point method
      (2) Gravity potential method

Note: Each and every exercise and assignment should contain the <u>Date of Assignment</u> and <u>Date of Submission</u> written on appropriate location of the exercise sheet, which is to be duly signed by concerned teacher on or before the date of submission. There should not be more than 7 days between these two dates for each exercise to be completed on regular basis by the student maintaining a standard practical note book. The student can appear for the sessional or end semester examination on practical by submitting completed assigned exercises only.

Internship/Field work: Students have to undergo internship under any government/non-government organization or field work for a period of minimum one month (30 days). On completion of internship/field work a report have to submit in the Department.

MGE 404B: Hazards and Disaster Management (Practical)

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from Final Examination)
Total Credit: 4
Total marks: 20 marks - Viva (10 marks) + Practical Note Book (10 marks)
                50 marks – Set of 03 questions

Objective: The objective of this paper is to make students familiar with different practical analysis and techniques of Hazards and Disaster Management.

Course outcomes
1. This course will make students familiar with practical analysis and techniques of hazard and disaster management.
2. Students will get knowledge on mapping of major crustal plates, earthquake zones
3. Mapping of flood and landslide hazard zones will be known
4. Understanding of risk mapping will be easy.
5. Students will know what to do in emergency situation through mock-drill.

1. Mapping of Major Crustal Plates of the Earth

2. Diagrams showing relationship between earthquakes and plate margins

3. Mapping of Earthquake Zones of India according to risk levels

4. Mapping of Flood Hazard Regions of India/NE India using GIS

5. Mapping of Landslide Hazard Regions of India/ NE India using GIS

6. Prepare a brief report on Institutional survey on disaster preparedness and mitigation (hospitals / Schools).

7. Methods of Risk Mapping.

8. Mock drill.

Field Visit:

1. State Disaster Management Authority (SDMA) Assam.
2. Lokpriya Gopinath Bordoloi Regional Institute of Mental Health, Tezpur
3. Guwahati Psychiatric Hospital, Guwahati
4. Meghalaya Administrative Training Institute (MATI), Shillong.
5. Fire Safety Station, Dispur, Guwahati.

Note: Each and every exercise and assignment should contain the <u>Date of Assignment</u> and <u>Date of Submission</u> written on appropriate location of the exercise sheet, which is to be duly signed by concerned teacher on or before the date of submission. There should not be more than 7 days between these two dates for each exercise

MGE 404 C: Geoinformatics (Practical)

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total marks: 20 marks - Viva (10 marks) + Practical Note Book (10 marks)
 50 marks – Set of 03 questions

Objective: To enhance capacity building in handling geoinformatics tools.

Course outcomes
1. This course will enhance student's capacity in handling geo-informatics tools.
2. This will help in learning on how to collect data using GIS technology
3. This will provide knowledge on how to process data using GIS technology.
4. Students will learn geoinformatics tools and can utilize in their project work.
5. Practicals using GPS will be known.

UNIT - I: Remote Sensing
   (a) Stacking of images (Image composition) with various spectral bands (1 exercise)
   (b) Mosaicking of images and clipping the same by vector polygon boundary and preparation of Land use / land cover map using vector polygons based on visual interpretation (1 exercise)
   (c) Unsupervised classification and recoding of enhanced image and derivation of statistics (1 exercise)
   (d) Computation of NDVI from IRS-1C/1D/Resourcesat/ LANDSAT data (1 exercise)
   (e) Preparation of Land use / Land cover map of the same area for two different time periods and to perform change detection and accuracy assessment (1 exercise)
UNIT - II: Aerial Photograph Interpretation.
   (a) Stereoscopic visualisation of Air photograph and drawing geographic features.
   (b) Photo interpretation and feature identification based on interpretation keys.
   (c) Determination of scale, parallax and displacements from aerial photograph
   (d) Computation of distance between the two known points on aerial photograph.
UNIT - III: Geographical Information System
   (a) Digitization of contour features from a portion topographical map in projected system of coordinates and creation of TIN model with standard map layout. (1 exercise)
   (b) Creation of 2-D surface model from TIN model with standard map layout (1 exercise)
   (c) Generation slope from 2-D surface model. (1 exercise)
   (d) 3-D visualization of 2-D surface model with vertical enhancement (1 exercise)
   (e) Preparation of aspect map from slope and map layout of the theme. (1 exercises)
   (f) Drawing profiles from 2-D surface model (1 exercise)
   (g) Preparation of thematic map of Assam / Meghalaya or any N E state on 3 different themes (1 exercise)

UNIT - IV: Global Positing System
   (a) GPS/DGPS data collection of few waypoints randomly from a variable terrain and preparation of a DEM and generation of contours (1 exercise)
   (b) GPS/DGPS data collection of a part of campus and mapping thereon (1 exercise)
   (c) GPS / DGPS data collection of land use features and mapping (1 exercise)
   (d) Preparation of large scale map from scanned map (building plan / site plan etc.) (1 exercise)

Note: Each and every exercise and assignment should contain the <u>Date of Assignment</u> and <u>Date of Submission</u> written on appropriate location of the exercise sheet, which is to be duly signed by concerned teacher on or before the date of submission. There should not be more than 7 days between these two dates for each exercise to be completed on regular basis by the student maintaining a standard practical note book. The student can appear for the sessional or end semester examination on practical by submitting completed assigned exercises only.

References:

1. Jensen, J. R., 2011: *Introductory Digital Image Processing: A Remote Sensing Perspective,* New Jersey: Prentice-Hall.

2. Rampal, K K, 1993: *Handbook of Aerial photography and Interpretation,* Concept Publication Comp., New Delhi.

3. Gonzalez, R. C. and Woods, R. E., 2000: Digital Image Processing, Addison-Wesley, Singapore.

4. Lillesand, T. M. and Kiefer R. W, 2011: *Remote Sensing and Image Interpretation* – (6th Ed.), Wiley. New York

5. DeMers, M. N. 2000: *Fundamentals of Geographic Information Systems* : , John Willey, New York.

6. Longley, P. A M. Goodchild, M., D. J. Maguire, D. J. And Rhind, D. W. 2001: *Geographic Information Systems and Science* , John Willey, New York

7. Fraser Taylor, D.R., (ed.), 1980 : *Progress in Contemporary Cartography*, John Wiley, Chichester U.K.

8. Fraser Taylor, D.R., (ed.), 1983 : *Graphic Communication and Design in Contemporary Cartograph**y***, John Wiley & Sons Ltd. New York.

9. Jones, C., 1997 : *Geographic Information Systems and Computer Cartography*, Longman, London.

10.Kraak, M. J., and Ormeling, F., 2004: Cartography: Visualization of Geospatial Data, Pearson Education.

11. Agarwal, N. K. 2004: *Essentials of GPS* , Spatial Networks Pvt. Ltd., Hyderabad.

12. Gopi, S. 2005: *Global Positioning System Priciples and Applications*, Tata McGraw Hill,New Delhi

MGE 405: Dissertation

Total Marks: 100 (70 marks from Internal Assessment + 30 marks from End Semester Examination)
Total Credit: 04

Dissertation works	Internal	External
(a) Progress Report (Presentation)	30 marks*	-------
(b) Pre-submission (Presentation)	40 marks*	--------
(c) End semester evaluation	-----------	30*

[**Project work =10 marks, Presentation 10 marks and viva-voce 10 marks]

*Average of marking by all the faculties on the basis of student's performance

Objectives:

1. *Students will be given a topic related to their optional subject to prepare a dissertation .*
2. *Students are required to give viva-voce exam after the submission of dissertation.*

Course outcomes

1. This course allows students to identify and design a research problem related to environment and ecology/ disaster management / socio-cultural issues/ urban planning /rural development/ regional planning.

2. It allows students to apply theoretical and practical knowledge to carry out a research work on a topic of physical and human geography.

3. This course will allow students to utilize various tools and techniques to analyse the research problem.

4. The course will impart training to students on how to present their research work and findings via power point presentation

5. Students will learn presentation through dissertation and research papers.

The topic of dissertation will be taken from the view point of physical and human geography which will cover the problems and remedial aspect of the subject. The subject matter that will cover are environment and ecology, disaster management, socio-cultural issues, urban planning and rural development, regional planning, population,

agriculture and settlement. The dissertation by the student will be made by using recent statistical and geo-informatics tools and techniques which will help student for a quality analysis and research.

Objectives:

1. Students are required to select a topic of their interest and prepare a dissertation .
2. Student need to submit a synopsis before the end semester for approval from the Supervisor in a specified format.
3. Students are required to give final presentation on objectives, methodology and findings of the study after the submission of dissertation.

MGE 406: Disaster Management

Total Marks: 100 (30 marks from Internal Assessment + 70 marks from End Semester Examination)
Total Credit: 04
Total Lectures: 60
Total marks: 20 marks - 20 objective type questions (*from all units*)
                          50 marks – Set of 08 descriptive type questions of 10 marks (*Two from each unit*)

Objective: *To provide basic knowledge on various types natural and human induced disasters. To understand the techniques and tools for preparedness, mitigation and overall management of various disasters*

UNIT I: Understanding Hazards and Disaster
Hazard and Disaster; Natural and Human-induced disasters – Introduction, Conceptual framework; difference between Hazard and Disaster, different stages involved in Disaster; Disaster phenomena and events *(Global, national and regional)*.

UNIT II: Environmental and Human Induced Disasters
Environmental disasters –Earthquake and associated impacts, Earthquake prediction, Structural damage and its prevention, Dams and earthquakes, Tsunami: Mechanism and Control; Coastal Disaster and management (CRZ); Flood and Drought – causes, impacts, precautions and mitigation, Landslide and River bank Erosion – Mechanism and Control.
Human induced disasters –Industrial and chemical disasters, road/air/rail accidents, fire incidents, epidemics, disease outbreaks, alcoholism and suicides, violence, occupational health hazards, poverty, urban slum, migration and refugees, conflict, terrorism. Adaptation Strategies.

UNIT III: Disaster Management and Disaster Mitigation
Concept of disaster management; International Decade for Natural Disaster Reduction (IDNDR), Hyogo framework, Disaster prevention through Sustainable development and community participation.
Concept of mitigation and preparedness, Institutional framework for disaster preparedness and mitigation- Global and Indian scenario, Training Need Analysis and Human Resource Development Plan, Family disaster plan, Applications of GIS and GPS in Disaster Mitigation.

UNITIV: Rehabilitation, Reconstruction and Recovery
Recovery aspects- long term and short term, Physical and social infrastructure: Relocation and reconstruction of structural and non-structural components, Social and economic rehabilitation: Capacity building and skill enhancement for livelihood development, training and awareness programmes, medical aid therapy and counselling, agricultural aids. Repair and retrofitting.

Note: Seminar and Group Discussion may be incorporated during class hour.

Essential books:
1. *Disaster Management: A Disaster Manager's Handbook*, Carter, W.N.(1992), Asian Development Bank, Manila.
2. *Encyclopaedia on Disaster Management: Disaster Management Policy and Administration*, S.L. Goel, (2006)*:* Deep & Deep Publications Pvt. Ltd. New Delhi.
3. *Disaster Management Recent Approaches.* Arvind Kumar (2010): Anmol Publications Pvt. Ltd. New Delhi.
4. Kapur Anu and Neeti, Meeta, Deeptiman, Roshani and Debanjali (2005): *Disasters in India Studies of Grim Reality,* Rawat Publications, New Delhi.

Reference Books:
1. *Vulnerable India,* Anu Kapur (2010): Sage Publications, New Delhi.
2. *Housing in Disaster prone areas, National Building Organization and U.N. Regional Centre*. G.C Mathur, (1986), ESCAP, New Delhi.
3. *Transforming adversity into opportunity: experiences from Gujarat earthquake reconstruction program World congress on Natural disaster mitigation proceedings*, (2004) P. K. Mishra, February.
4. *Natural Hazards and Disasters Management-Vulnerability and Mitigation,* R.B. Singh.