Parvatibai Chowgule College of Arts and Science
Autonomous
Accredited by NAAC with Grade A' (CGPA Score 3.41 on a 4 Point Scale 3rd cycle)
Best affiliated College-Goa University Silver Jubilee Year Award

DEPARTMENT OF GEOGRAPHY AND RESEARCH CENTER
SYLLABUS FOR M.A. DEGREE PROGRAMME IN GEOGRAPHY COURSE STRUCTURE

Sem	Code	Core Courses	Credits
I	PGM-GEG.C1	Advanced Geomorphology	4
	PGM-GEG.C2	Advanced Climatology	4
II	PGM-GEG.C3	Geography of Population	4
	PGM-GEG.C4	Advanced Economic Geography	4
III	PGM-GEG.C5	Statistical Techniques in Geography	4
	PGM-GEG.C6	Fundamentals of Remote Sensing	2
	PGM-GEG.C7	Practical's in Remote Sensing	2
IV	PGM-GEG.C8	Regional planning and development	4
	PGM-GEG.C9	Fundamentals of Geoinformatics System	2
	PGM-GEG.C10	Practical's in Geoinformatics System	2

ELECTIVES:

Code	Elective Courses	Credits
PGM-GEG.E1	Basics of Coastal Geomorphology	2
PGM-GEG.E2	Teaching Techniques in Geography	2
PGM-GEG.E3	Techniques of Academic Report Writing	2
PGM-GEG.E4	Geography of Environment	2
PGM-GEG.E5	Geography and Tourism	2
PGM-GEG.E6	Field Techniques	2
PGM-GEG.E7	Regional Geography of India	2
PGM-GEG.E8	soil geography	2
PGM-GEG.E9	Watershed Management	2
PGM-GEG.E10	Geographical Thought	2
PGM-GEG.E11	Basics of Research Methodology	2
PGM-GEG.E12	Map Interpretation & Cartography	2
PGM-GEG.E13	Geography and Development Models	2
PGM-GEG.E14	Digital Image Processing	2
PGM-GEG.E15	Tourism Planning and Development	2
PGM-GEG.E16	Urban Settlements	2
PGM-GEG.E17	Advance Coastal Geomorphology	2
PGM-GEG.E18	Dissertation	4

- Students have to complete 36 credits of Core courses and 36 credits of Elective courses.
- To develop the research skill of students, dissertation (PGM-GEG.E18) is an Elective component and will be completed during semester III and IV.

SEMESTER I
CORE
Course Title: Advanced Geomorphology
Course Code: PGM-GEG.C1
Credits: 03
Marks: 75
Duration: 45lectures of 1 hour each
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Pre-requisite Courses:

- Basic knowledge about geomorphic concepts

Course Objectives:

1. To understanding the natural processes which act on the earth's surface, shaping landforms.
2. To perform absolute dating techniques to find the ages of geological formation.
3. Assess the roles of structure, stage and time in shaping the landforms, interpret geomorphological maps and apply the knowledge in geographical research.
4. To develop skills in landform recognition and interpretation of geological features and maps

Course Learning Outcomes:
After successful completion of the course the students will be able to:
CLO1: Understand the dynamics of the physical geography including the origin of the Earth and its evolution through geologic time scale.
CLO2: Differentiate various process in landform formations which shapes the earth.
CLO3: Analyze the relationship between folding, faulting, volcanic activity, and plate tectonics.
CLO4: Applying geomorphology skills in Disaster management and planning.

Unit	Topic	Subtopic	Marks	Lectures
1	Concept of geomorphology and Geo tectonic	Geological time scale and related topographic and structural evolution. Endogenic and Exogenic processes Isostasy, Continental Drift, Plate tectonics, Geosynclines and Orogeny, Earthquakes, Volcanism, Geo-magnetism. cycle of erosion by W.M.Davis, Views of W. Penk on normal cycle of erosion Case study of the Indian Subcontinent.	25	15
2	Process Geomorphology	General degradational processes: Rock Cycle. Processes of rock weathering and their effects on landforms, Mass movement. Slope development and slope facets; Relationship between longitudinal and transverse slope recession. Erosional and depositional landforms produced by the process – Fluvial, Glacial & Periglacial, Aeolian, Karst and Coastal, Rejuvenated Landforms.	25	15
3	Applied Geomorphology	Role of Geomorphology in Hazard management and mitigation: Earthquakes,	25	15

		Volcanic eruptions, Landslides, Avalanches, Rockslides, Rock fall and Tsunamis. Application of geomorphology in planning and development		
		TOTAL	75	45

References:

Mandatory:

1. Kale, V. and Gupta, A. 2001: Introduction to Geomorphology, Orient Longman, Kolkata
2. Thornbury, W. D. (2013). Principles of Geomorphology. New Delhi: New Age International Limited Publishers.
3. Singh, S. (2006). Physical Geography. Allahabad: PrayagPustak Bhavan.
4. Hallam, A. 1973: A Revolution in Earth Science: From Continental Drift to Plate Tectonics, Oxford University Press, London
5. Chorley, R.J. (1969) Introduction to Fluvial Processes, Methuen, London

Supplementary:

1.Chorley, R.J., Schumm, S. A. and Sugden, D.E. (1984) Geomorphology, Methuen, London
2.Cooke, R.U. and Warren, 1973: Geomorphology in Deserts, Batsford, London
3.Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot ,Patna.

4.McCullagh, P. 1978: Modern Concepts in Geomorphology, Oxford University, Press, Oxford.
5.Morisowa, M. 1968: Streams, their Dynamics and Morphology, McGraw Hill, New York.
6.Siddhartha, K. (2013). The Earth's Dynamic Surface. New Delhi: Kisalaya Publications Pvt. Limited.
7.Steers J. A: The Unstable Earth, Kalyani Publishers, New Delhi
8.Goudie Andrew (2014), Encyclopedia of Geomorphology, Volume I, Routledge Publication
9.Goudie Andrew (2014), Encyclopedia of Geomorphology, Volume II, Routledge Publication

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1. **https://www.nationalgeographic.org/encyclopedia/uniformitarianism/**
2. **http://studymaterial.unipune.ac.in:8080/jspui/bitstream/123456789/4495/1/Gg.111%20davis%20theory.pdf**
3. **https://study.com/academy/lesson/isostasy-definition-equation-examples.html**
4. **https://www.geographynotes.com/geomorphology/7-major-geomorphic-theories-of-landform-development/686**
5. **https://www.bbc.co.uk/bitesize/guides/z83nj6f/revision/2**

Course Title: Practical in Geomorphology
Course Code: PGM-GEG.C1
Credits: 01
Marks: 25
Duration: 15 Practical's of 2hrs each
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Unit	Topic	Subtopic	Marks	Practical's
1	Drainage basin and network morphometry	Morphometric analysis.	5	3
2	Geomorphic Mapping	Geomorphic Mapping in different sieves on probability graph. Calculation of mean, median sorting index, skewness & kurtosis. Geomorphic mapping in the field-process and materials mapping. Soil sampling and texture analysis	10	9
3	Field work	Identification of faults lineament and rocks. Measurement of channel cross-sections in the field, Geomorphic map of channel bed, Study of erosional and depositional features in the field. Slope Models and aspect maps &Hypsometric curve and integral.	05	3
4	Journal	Journal & Viva	5	-
		TOTAL	25	15

References:
Mandatory:

1. Kings, C.A.M.(1996): Techniques in Geomorphology,Edward Arnold Ltd. London
2. R. L. Singh & Rana P. B. Singh: Element of Practical Geography, Kalyani Pub. New Delhi
3. Singh, R. B. (ed.), (2006). Natural Hazards and Disaster Management: Vulnerability and Mitigatio. Delhi, India: Rawat Publications
4. Mukherjee, Neela.,(1993): Participatory Rural Appraisal: Methodology and Application, Concept Publs. Co., New Delhi

5.Stoddard, R. H., (1982): Field Techniques and Research Methods in Geography, Kendall/Hunt.

Supplementary:

1. Lawrence, G. R. P.: Cartographic Methods, Mathur Co. London
2. Khullar.D.R.(2007) Essential of Practical geography, New Academic Publishing Co. Jalandhar
3. Monkhouse, F. J. R and: Maps and Diagrams, Wilkinson, H.R. Methuen and Co., London.
4. Strahler, A.N(1964): Quantitative Geomorphology of Drainage Basin and channel Networks, Mc- Graw- Hill, New York.
5. Sarkar, A.,(2015):Practical geography: A systematic approach, Orient Black SwanPrivate Ltd., New Delhi.

Web References:

- https://www.hindawi.com/journals/geography/2014/927176/
- https://www.geomorphology.org.uk/sites/default/files/geom_tech_chapters/2.6_GeomMapping.pdf
- https://www.youtube.com/watch?v=BJR8drMF7yI
- https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2008JF001092#:~:text=The%20hypsometric%20curve%20represents%20the,Keller%20and%20Pinter%2C%202002%5D.
- https://www.youtube.com/watch?v=u6q7u2lIW_M

Course Title: Advanced Climatology
Course Code: PGM-GEG.C2
Credits: 03
Marks: 75
Duration: 45lectures of 1 hour each
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Pre-requisite Courses: NIL

Course Objectives:

1. To develop knowledge of the structure of the atmosphere and atmospheric phenomena and
2. To understand the nature and scope of modern study of climate by imparting latest knowledge about the basic thermal and dynamical atmospheric processes operating at different spatial and temporal scales
3. To understand climatic variability and change to the issue of current and future global environmental change.
4. To explain weather generation systems of the atmosphere and how they influence Climate of the world and regions in the long term

Course Learning Outcomes:

After successful completion of the course the students will be able to:

CLO1: Develop in depth basic knowledge of atmospheric weather and climate and the structure of the atmosphere.
CLO2: Understand and explain how temperature, pressure, humidity and wind motion vary in time and space and their effect on weather.
CLO3: Understanding the characteristics of climatic regions.
CLO4: Apply knowledge on upper atmospheric conditions and cyclonic features.

Unit	Topic	Subtopic	Marks	Lectures
1	Introduction	Weather & Climate, Subdivisions of Climatology, Earth's atmosphere: Physical properties, Chemical composition, Temperature changes, Vertical variations in the composition. Global & Local winds, Effects of wind on weather, Tri-cellular theory and Eddy theory. Jet streams, ENSO Events- El–Nino, La-Nina, Southern Oscillation	25	15
2	Insolation and Heat Balance, Temperature, pressure, Humidity and wind motion	Factors affecting Insolation, Latitudinal and Seasonal variation of Insolation, Albedo, Green House Effect, Heat Budget. Temperature, Pressure, Wind, Humidity Precipitation Theories: Ice-crystal theory, Collision-Coalescence Theory Theories of Monsoonal Circulation.	25	15
4	Impact of Climate change	Cyclones and anti-cyclones, Thunderstorms, Tornadoes, Hailstorms, Heat and Cold waves,	25	15

		Stable and Unstable Atmosphere Natural Vegetation, Agriculture, Human Life, Economy, Transport Global Warming (CFC's)		
		TOTAL	75	45

References:

Mandatory:

1. Lal, D. S. (2015). Climatology. Allahabad: Sharda Pustak Bhavan.
2. C.Donald Ahrens, Essential of Meteorology: An Invitation to Atmosphere
3. Roger G. Barry, Richard J Chorley. (2003). Atmosphere, Weather and Climate. Routledge: London.
4. Dennis l. Hartmann,Department of Atmospheric Sciences, University of Washington: Global Physical Climatology, Seattle, Wa, USA.
5. Richard Huggett: Physical Geography: The Key Concepts, London and New York: Routlege Taylor & Francis Group

Supplementary:

1. Aguado, E. Burt, J.E. (2001): Understanding Weather and Climate, Prentice Hall of India Pvt. Ltd, New Delhi.
2. Critchfield, H.J. (1983): General Climatology, Prentice Hall of India, New Delhi.
3. Syllabus for M.A./M.Sc. Degree Programme in Geography
4. Oliver John, E. and Hidore John, J. (2003): Climatology, Pearson Education.
5. A. Austin miller, M.Sc: Climatology, Methuen&co. Ltd. 36 essex street w.e. London
6. Oliver, J. E., and Hidore J. J., (2002): Climatology: An Atmospheric Science, Pearson Education, New Delhi.
7. Trewartha, G. T., and Horne L. H., (1980): An Introduction to Climate, McGraw-Hill

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1. https://tinyurl.com/yy4wpj7g
2. https://www.weather.gov/media/zhu/ZHU_Training_Page/clouds/stability_clouds/stability_clouds.pdf
3. https://www.earthonlinemedia.com/ebooks/tpe_3e/atmospheric_moisture/precipitation.html
4. http://www.coolgeography.co.uk/Alevel/AQA/Year%2013/Weather%20and%20climate/Structure/Tri-cellular%20Model.htm
5. https://vortex.plymouth.edu/dept/tutorials/precip/precip2aaa.html

Course Title: Practical in Climatology
Course Code: PGM-GEG.C2
Credits: 01
Marks: 25
Duration: 15 Practical's of 2hrs each

Unit	Topic	Subtopic	Marks	Practical's
1	Temperature and Rainfall Analysis	Collection and Processing of atmospheric data Analysis of atmospheric data – Tephigram (Temperature-Height diagram) Classification of Koppen and Thornthwaite's Climate. Discomfort index by Thom's (1959) method. Identification and categorization of heat and cold waves. Calculation of seasonal rainfall and annual variability of rainfall. Drought and Flood Analyses	15	9
2	Water Budget	Computation of water budget and water deficit amounts during crop growing season. Computation of Water Requirement Satisfaction index. Construction of crop-coefficient curve for any one crop.	10	6
		Journal & Viva		
		TOTAL	25	15

References:
Mandatory:
1.Mather J.R (1974) Climatology, Fundamentals and applications, McGraw Hill Book Co, New York.
2.R. L. Singh & Rana P. B. Singh: Element of Practical Geography, Kalyani Pub. New Delhi
3.Frere and Popov (1979)- Agro-Meteorological Crop monitoring and forecasting, FAO plant production Paper No. 17.
4.Mukherjee, Neela.,(1993): Participatory Rural Appraisal: Methodology and Application, Concept Publs. Co., New Delhi
5.Stoddard, R. H., (1982): Field Techniques and Research Methods in Geography, Kendall/Hunt.

Supplementary:
1.Doorenbos J.(1977) and Pruitt W.O. Crop water requirement, FAO irrigation and drainage.
2.John F. Mather (1974) - Climatology Fundamentals and Application Oxford University Press.
3.Lawrence, G. R. P.: Cartographic Methods, Mathur Co. London
4.Monkhouse, F. J. R and: Maps and Diagrams, Wilkinson, H.R. Methuen and Co., London.
5.Trewartha G.T: An Introduction to climate Mc-Graw- Hill Book Co. New York.
6.Andrew. D. ward, and Stanley, Trimble., (2004): Environmental Hydrology, 2nd edition, Lewis Publishers, CRC Press.

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- **https://pdfs.semanticscholar.org/c380/203ee5805fdb318fa52ea539538b48783f31.pdf**
- **http://www.met.reading.ac.uk/~sgs02rpa/TEACHING/Tephigram.pdf**
- WSI_TECH_REP.pdf (europa.eu)
- **https://www.youtube.com/watch?v=e7pckUDQ9oI**

Course Title: Basic of Coastal Geomorphology
Course Code: PGM-GEG.E1
Credits: 02
Marks: 50
Duration: 30hrs

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Prerequisite Courses: NIL

Course Objectives:

1. To provide a theoretical background of the coastal systems and which shape the coastlines around the world.
2. To help determine interactions between coastal geomorphic processes.
3. To provide a detailed knowledge on all type's coastal environments.

Course Learning Outcomes: After successful completion of the course the students will be able to

CO1: Gain knowledge on coastal systems and processes.
CO2: Distinguish between the mechanisms that control these processes.
CO3: Analyze the knowledge of different types of coastal environments and Processes.
CO4: Understand the importance of coastal environmental management.

Unit	Topic	Subtopic	Marks	Lectures
1	Introduction to Coastal systems	Components of coastal systems processes, sediment transport Morphology, Stratigraphy, Spatial and temporal scales in coastal Geomorphology, Coastal classification – Genetic and Morphological..	25	15
2	Coastal environments and processes	Fluvial dominated, Wave-dominated, Tide-dominated and Biotic environments, Mangrove swamps and salt marshes, Corals and coral reefs Types of waves, Process of shoaling, wave breakers Currents, Currents – and its types Tides: Equilibrium Theory of tides, semidiurnal, diurnal, spring, and neap tides. Amphidromic point, co – tidal lines, coastal tides, tides in bays and estuaries.	25	15
		TOTAL	50	30

References:

A. Mandatory:

1. Masselink G, Hughes M G (2003): Introduction to coastal processes and geomorphology, Arnold, London
2. Davis J L (1980): Geographical variation in coastal development, Longman, New York

Supplementary:

1. Embelton and Thornes (1979): Process in geomorphology, Arnold, London

2. Hails J and Carr A (1975): Nearshore sediment dynamics and sedimentation, Wiley, London
3. KarlekarShrikant (1993): Coastal geomorphology of Konkan, Aparna Publication, Pune
4. Pethick John (1984): An Introduction to coastal geomorphology, Arnold Heinemann, London
5. Tooley M M and Shennan I (1987): Sea level changes, Basil Blackwell, Oxford, U K

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1. https://www.cambridge.org/core/books/introduction-to-coastal-processes-and-geomorphology/coastal-geomorphology/CD80B06016E7B6FE1C2E415A71BD993F
2. https://www.nap.edu/read/2249/chapter/5
3. http://uregina.ca/~sauchyn/geog323/coastal.html
4. https://www.britannica.com/science/coastal-landform
5. https://www.nationalgeographic.org/encyclopedia/coast
6. http://www.environmentguide.org.nz/issues/coastal/introduction-to-the-coastal-environment/

Course Title: Teaching Techniques in Geography
Course Code: PGM-GEG.E2
Credits: 02
Marks: 50
Duration: 30hrs
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Prerequisite Courses: NIL

Course Objectives:

1. To develop and understand and reveal importance of geography.
2. To acquire the knowledge and develop understanding about the various pedagogical principles involved in the teaching Geography.

Course Learning Outcomes: After successful completion of the course the students will be able to:

CLO1: Will be able to use different methods of teaching geography.
CLO2: Will be able to create a set of methods of teaching for specific sections of students group.
CLO3: Appreciate and apply theoretical geographical knowledge in application of geography.
CLO4: Will be able to develop research on the basis of motivation, participation and retention.

Unit	Topic	Subtopic	Marks	Lectures
1	Planning and designing for effective instruction in geography teaching	Design of Lesson planning, Methods; Lectures, Project, Discussion, Assignment, Problems solving, Demonstration, Inductive and Deductive, Regional, Case study, Instructional materials used in the teaching of geography- maps, globes, atlas, films, pictures, specimens, models, simple meteorological equipment's. Field work and excursions, Field trip, observation, questioning techniques	25	15
2	Media/materials in teaching geography, Evaluations methods and research tools in geography	Projected Media:- Overhead projector with transparencies; Films and slides Non-projected :- Pictures and charts; Chalk board Printed :- Text and reference books Newspapers and magazine Mass media :- Television ,Radio ,Audio, Computer Construction of tests in geography – designing Of tests, Blueprint of tests, framing the questions, assembling the questions and preparing the instructions, administration of tests, Diagnostic tests and remedial measures in geography.	25	15
		TOTAL	50	30

References:

Mandatory

1. M.S Rao, Teaching of geography (2009), Anmol Publication

Supplementary

1. Norman J Graves, Source book for Geography teaching (1982), Unesco Press
2. Ratho& Prakash, Emerging Trends in the Teaching of Geography (1995), Kanishka Publishers & Distributors
3. Fien, John et al The Geography Teachers' Guide to the classroom
4. Varma&Vedanayagam ,Geography Teaching
5. Arora, K.L., BhugolShikshan: The Teaching of Geography, Ludhiana; Parkash Brother

Web references:

1. https://education.cu-portland.edu/blog/classroom-resources/5-types-of-classroom-teaching-styles/
2. https://fctl.ucf.edu/teaching-resources/teaching-strategies/teaching-methods-overview/
3. https://www.educationcorner.com/teaching-methods-strategies.html
4. https://www.quora.com/What-is-the-best-teaching-method-And-what-is-your-reason
5. https://www.wgu.edu/heyteach/article/5-best-teaching-methods-i-used-year1805.html

Course Title: Techniques of Academic Report Writing
Course Code: PGM-GEG.E3
Credits: 02
Marks: 50
Duration: 30hrs

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Prerequisite Courses: NIL

Course Objectives:

1. This course aims to provide a theoretical background of the coastal systems and which shape the coastlines around the world.
2. The course aims to help determine interactions between coastal geomorphic processes.
3. This course aims to provide a detailed knowledge on all types coastal environments.
4. Also, it aims to provide a comprehensive coverage on current coastal issues.

Course Learning Outcomes: After successful completion of the course the students will be able to:

CLO1: The student's knowledge on coastal systems and processes will be strengthened.
CLO2: The students will get a comprehensive knowledge of different types of coastal environments.
CLO3: The students will understand the importance of coastal environmental management.
CLO4: The students will understand the scope of in-depth analysis in relation to coastal issues.

Unit	Topic	Subtopic	Marks	Lectures
1	Coastal Processes	Waves: Definition, wave length, wave height, amplitude, depth, period, fetch, frequency, Types of waves, Process of shoaling, wave breakers Currents: Currents – and its types Tides: Equilibrium Theory of tides, semidiurnal, diurnal, spring, and neap tides. Amphidromic point, co – tidal lines, coastal tides, tides in bays and estuaries.	25	15
2	Coastal environments and Applied Coastal Geomorphology	**Fluvial dominated, Wave-dominated**, **Tide-dominated and Biotic environments** Mangroove swamps and salt marshes, Corals and coral reefs Current coastal issues: Sea level rise, Storm hazard management, Coastal erosion Wetlands, Kharlands, Estuarine reclamation, Salt intrusion and subsidence of coastal aquifers	25	15
		TOTAL	50	30

References:

B. Mandatory:

3. Masselink G, Hughes M G (2003): Introduction to coastal processes and geomorphology, Arnold, London
4. Davis J L (1980): Geographical variation in coastal development, Longman, New York

Supplementary:

6. Embelton and Thornes (1979): Process in geomorphology, Arnold, London
7. Hails J and Carr A (1975): Nearshore sediment dynamics and sedimentation, Wiley, London
8. KarlekarShrikant (1993): Coastal geomorphology of Konkan, Aparna Publication, Pune
9. Pethick John (1984): An Introduction to coastal geomorphology, Arnold Heinemann, London
10. Tooley M M and Shennan I (1987): Sea level changes, Basil Blackwell, Oxford, U K

Web References:

7. https://www.cambridge.org/core/books/introduction-to-coastal-processes-and-geomorphology/coastal-geomorphology/CD80B06016E7B6FE1C2E415A71BD993F
8. https://www.nap.edu/read/2249/chapter/5
9. http://uregina.ca/~sauchyn/geog323/coastal.html
10. https://www.britannica.com/science/coastal-landform
11. https://www.nationalgeographic.org/encyclopedia/coast

Course Title: Geography of Environment
Course Code: PEM-GEG.E4
Marks: 50
Credits: 2
Duration: 30 lectures of 1 hour
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Prerequisite Courses: NIL

Course Objectives:

1. To understand the dynamic environment among the students.
2. To acquaint students with the fundamental concepts of Environment Geography.
3. The students will be able to analyse the problems of environment, its utilization and conservation in the view of sustainable development.
4. To create a model of sustainable management plan to overcome pollution.

Course Learning Outcomes: After successful completion of the course the students will be able to

CLO1: To create awareness among the youth on environmental concerns important in the long term interest of the society.
CLO2: Understand core concepts and methods from Ecological and Ecosystem.
CLO3: Evaluate the impacts of human activities on natural environments with special reference to India.
CLO4: Show awareness and responsibility towards the environment.

Unit	Topic	Sub Topic	Marks	Lectures
I		Environmental Geography-meaning, nature, scope and fundamental concepts, approaches and methods in Environmental Geography, Concept of Ecology, subdivisions and approaches in Ecology Ecosystem concept and components, Habitat and ecological niche, Spatial and temporal dimensions of ecosystem, Abiotic and biotic components, Biodiversity and its	25	15

		conservation		
II		Environmental Problems environmental systems, role of biotic and abiotic elements. **Terrestrial ecosystems**: Forest, Grassland, Desert and Agriculture. Biodiversity: Genetic, species, community and ecosystem diversity; biodiversity uses, threats to biodiversity, biodiversity conservation. **Case study** (India)-1. Global Warming and climate change 2. Ozone Depletion 3. Acid rain 4. Over use of chemical fertilizers, pesticides and insecticides **Environmental Planning and Management** 1. Need of Planning and Management 2. Environmental impact assessment	25	15
		TOTAL	50	30

References:

Mandatory:

1. Singh, S. Environmental Geography. Prawalika Publication, Allahabad, 2016.
2. Barucha, Arach. Textbook of Environmental Studies, University Press India, Hyderabad. 2016.
3. Siddhartha, K. Ecology and Environment. Kisalaya Publication Pvt. Ltd. Newdelhi. 2015.
4. Saxena, H. M. Environmental Geography. Rawat Publications. Jaipur, 1999
5. Roy, P. K. Resource Studies. New Central Book Agency, Calcutta, 2006

Supplementary:

1. Gautam, A. Geography of resources: Exploitation, conservation and management. Sharda Pustak Bhawan, Allahabad, 2013.

2. Sharma, B.L. & Puar P. Global Environmental Challenges. Rohini Books, Publishers &Distributors, Jaipur, 2004.
3. Saxena, H. M. Environmental Management. Rawat Publications, Jaipur, 2000.
4. Goudie, Andrew. The Human Impact on the Natural Environment. Blackwell Oxford, 1994.
5. Mukerji, A. and V.K. Agnihotri. Environment and Development. Concept , New Delhi, 1993.

Web-based:

1. https://www.uv.mx/personal/fpanico/files/2011/04/AA.-VV.-Environmental-geography.pdf
2. https://dducollegedu.ac.in/Datafiles/cms/ecourse%20content/PK%20(AECC-EVS)%20Chapter%20-%204%20Biodiversity.pdf
3. https://www.researchgate.net/publication/332511785_Review_of_global_warming_case_study_of_Himalayan_and_other_parts_of_North_India
4. http://www.iosrjournals.org/iosr-jagg/papers/vol2-issue2/Version-2/F02225056.pdf
5. https://slideplayer.com/slide/5974634/

Course Title: Geography and Tourism
Course Code: PGM-GEG.E5
Marks: 50
Credits: 2
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Prerequisite Courses: NIL

Course Objectives:

1. Understand how geography plays a key role in tourism
2. To perform and model sustainable tourism in various location with respect to geographical factors.
3. Relate various forms of tourism.

Course Learning Outcomes: After successful completion of the course the students will be able to

CLO1: Understand and describe reaction between tourism industries with geography.
CLO2: Categorize emergence of different types of tourism with respect to geographical attributes.
CLO3: Justify the relationship with tourism development with geography.
CLO4: Model the concept of tourism with reference to geographical location.

Unit	**Topic**	**Subtopic**	Marks	Lectures
I	Geography and tourism	Nature and Scope of Geography of Tourism, Geographic Factors affecting in tourism development • Physical Factors • Socio – Cultural Factors, • Religious Factors, • Historical and Cultural Factors, • Economic Factors,	25	15
II	Tourism Concepts and Resources	**Concepts of Tourism** □ Agro-tourism □ Eco-tourism □ Heritage tourism □ Adventure tourism **Impact of Tourism On various sectors** □ Economy □ Socio-cultural aspects □ Environment □ Sustainable Development of Tourism **Tourist resources of India** □ Natural Resources □ Popular Tourist Resources □ Pilgrimage Destinations: □ Fairs and Festivals □ Handicrafts and Handlooms	25	15
			50	30

REFERENCES

1. Stephen Williams 1998, Tourism Geography
2. Alan A. Lew, C. Michael Hall and Dallen J. Timothy 2008, World Geography Of Travel And Tourism A Regional Approach.
3. Gupta, SP, Lal, K, Bhattacharya, M. Cultural Tourism in India (DK Print 2002)
4. Dixit, M and Sheela, C. Tourism Products (New Royal Book, 2001)
5. Oki Morihiro, Fairs and Festivals, World Friendship Association, Tokyo, 1988.
6. Mitra, Devla, Buddhist Architecture, Calcutta.
7. Michell, George, Monuments of India, Vol. 1. London.
8. Davies, Philip, Monuments of India, Vol. II.,London.
9. Jain, Jyotindra & Arti, Aggrawala : National Handicrafts and Handlooms Museum.

SEMESTER II
CORE
Course Title: Geography of Population
Course Code: PGM-GEG.C3
Credits: 04
Marks: 100
Duration : 60hrs
==========
Prerequisite Courses: NIL

Course Objectives:
1. To introduce basic and advance concept of population characteristics to understand the dynamics of population.
2. To enable students to develop an understanding and apply certain theories of population theories in the context of population growth, resources and migration.
3.To envisage contemporary population issues in the context of India .

Course Learning Outcomes: After successful completion of the course the students will be able to
CLO1: Identify, describe, and explain key terms, themes, and concepts in population geography/Demonstrate basic understanding of key population geography concepts, patterns, and processes
CLO2: Demonstrate competency with population geographic and demographic datasets and analysis methods.
CLO3: Identify and apply theoretical social science concepts explain past and current population trends national &global contexts.
CLO4: Synthesize various theoretical frameworks and construction order to interpret principal causes and impacts associated with population change.
CLO5: Analyze and interpret and represent geographic population data using case studies that signify important recent and ongoing population trends

Unit	Topic	Sub topic	Marks	No.of lectures
1	Population Geography as a discipline Spatio – temporal dynamics of population m	Introduction to Population Geography: Development ofpopulation geography, contents approaches of populationgeography and sources of population data. Brief History of World Population growth,Factos affecting population distribution . Case study of African country and an European country	25	15
2	Human Population over Time and Space, Determinants of population growth	Fertility andmortality: Determinants of Fertility and Mortality,Demographic Transition theory, its relevance and impacts. Theories of Population growth : Malthus and Saddler. Importance of Migration, types of migration, cause – effectof migration, Indian migration abroad, recent trends and consequences. Migration theories – Lee, Ravenstein and	25	15

		Zelinsky.		
3	Population Issues - Global and India	Global Pro – natal and post –natal population policies, two case studies, Population ageing , issues and challenges , climate change and displacement, India's Population Policy and consequences, Demographic divedenddeclining gender ratio, women equity and empowerment in India. Human development Index	25	15

References:

1. Chandna, R.C. (2002) Geography of Population: Concept, Determinants and Patterns, Kalyani Publishers, New Delhi.
2. Hassan Mohammed (2007) Population Geography ,Rawat Publication, Jaipur
3. Kayastha S L (2006) Geography of Population ,Rawat Publication, Jaipur
4. Newbold K. B., 2009: Population Geography: Tools and Issues, Rowman and Littlefield Publishers.

Course Title: Practical's in Population Geography
Course Code: PGM.GEG.C3
Credits: 01
Marks: 25
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Unit	Topic		Hours	credits
1	Population growth and Distribution	Population growth and projections (semi average method, Least square method,Exponential population growth), Population density and concentration Index. Migration rate	**15**	
2	Models	Demographic Transition model Human Development Index Poverty index	**15**	

References:

1. Chandna, R.C. (2002) Geography of Population: Concept, Determinants and Patterns, Kalyani Publishers, New Delhi.
2. Hassan Mohammed (2007) Population Geography ,Rawat Publication, Jaipur
3. Kayastha S L (2006) Geography of Population ,Rawat Publication, Jaipur
4. Newbold K. B., 2009: Population Geography: Tools and Issues, Rowman and Littlefield Publishers.

Course Title: Advanced Economic Geography

Course Code: PGM-GEG.C4

Marks: 100

Credits: 4

Duration: 60 lectures of 1 hour each

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Prerequisite Courses: Nil

Course Objectives:

1. To understand the ways in which economic activities are organized
2. To analyse the rapidly increasing integration of economies processes such as globalization, trade and transportation and their impacts on economic, cultural and social activities
3. To evaluate economic processes operating at different geographical scales are depending on the complex economic-political-social interactions that are framed at the global level.
4. Apply various statistical techniques, relevant to research in economic geography

Course Learning Outcomes:

At the end of this course, students will be able:

CO1. Understand and contrast on the theories related to economic geography with an emphasis on alternative viewpoints.

CO2. Recognize the significance of geographic concepts for understanding socio-economic processes and outcomes.

CO3. Apply and compare the global economic patterns with local economic scenarios

CO4. Apply, analyzing and interpreting statistical data.

Unit	Title	Topic	Hours	Marks
I	**Introduction to Economic Activities**	Trends in economic geography, Approaches in Economic Geography, Factors of location of economic activities (Physical, social, economic and cultural))	15	25

II	**Models in economic geography**	Von Thunen's model and its modifications. Potential Population Surfaces Labor Theory of Value- Karl Marx Behavioral Location Theory – Cyert and March \economic development in \India	20	25
III	**Transportation (National and International)**	Modes of transportation and transport cost; accessibility and connectivity: international, inter and intraregional; comparative cost advantages. Typology of markets and market system.	10	25
IV	**Crop Concentration, Crop Diversification, Crop Combination** **Agricultural efficiency** **Transport Network**	a) Jasbir Singh's modified method b)Gibbs Martins Index a)Maximum Positive Deviation method of Raffiullah(1956) b) Athawale's method of crop combination (1966) a) Sapre and Deshpande b) Calories per head **I Graph Theoretical measures of whole transport network,** a)Non-ratio measures cyclomatic number diameter b) Ratio measures : Eta, Theta, Iota, Pi c) Measurement of route **II) Measures of Individual elements of transport** a)Associated number b) Degree of connectivity network c) Dispersion d) Accessibility Index	20	25

References:

Mandatory:

1. Singh K. & Siddiqui A. R. Economic Geography, Pravalika Publisher, Allahabad. 2016.
2. Roy, P. K. Economic geography: A Study of Resources, New Central Book Agency Ltd. Kolkata, 2014.
3. Saxena, H. M. Economic geography. Rawat Publication. New Delhi. 2013.
4. Sharm, T.C. Economic geography of India, Rawat Publication. New Delhi. 2013.
5. Berry, Conkling & Ray (1988): Economic Geography Prentice Hall of India, New Jersey.

Supplementary:

1. Haninkdean M. (2012) Principles and Applications of Economic Geography: Economy, Policy, Environment**,** John Wiley& Sons
2. Miroslav N. Jovanovic(2009) Evolutionary Economic Geography, Location Of Production And The European union Routledge, London And New York
3. M. Sokol (2011) Economic Geography. Undergraduate Study In Economics, Management, Finance And The Social Sciences, University Of London.
4. Pachurapiotr (2011) The Economic Geography Of Globalization, (Ed) Intech Pub.
5. Sharmistha Bagchi-Sen And Helenlawton Smith (2006) Economic Geography Past, Present And Future (Edited). Routledge, USA.
6. Hegget Peter, Cliff A.D. et. al. (2001) Locational Methods, Locational Analysis in Human Geography, Vol. II Arnold – Heinemann Pub. (India)

Web Based:

1. http://dl.booktolearn.com/ebooks2/science/economy/9781138924512_An_Introduction_to_Economic_Geography_0868.pdf
2. https://london.ac.uk/sites/default/files/uploads/gy2164-economic-geography-study-guide.pdf
3. https://transportgeography.org/?page_id=5260
4. https://web.ccsu.edu/faculty/kyem/GEOG110/Economic_Geography/Economic%20Geography.htm
5. https://www.networkideas.org/wp-content/uploads/2020/11/STEP_Report.pdf

6. https://www.thoughtco.com/reillys-law-of-retail-gravitation-1433438
7. https://www.geographyforyou.com/2019/09/maximum-positive-deviation-crop.html
8. http://sajms.com/wp-content/uploads/2017/10/paper_2-1.pdf
9. http://gswb.in/wp-content/uploads/2012/08/v2n1jully2012_18.pdf

ELECTIVES
Course Title: Field Techniques in Geography
Course Code: PGM-GEG.E6
Credits: 02
Marks: 50
Duration : 30 Practical's of 2 hrs each
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Pre-requisite Courses: Students must have knowledge of cartography skills such as scales and map types.

Course Objectives:

1. Understand what a survey, pre-requisites and post field work practices.
2. Apply various field based methods for data collection.
3. Design and formulate survey plans and questionnaires.

Course Learning Outcomes: After successful completion of the course the students will be able to:

CO1: Will be able to perform survey techniques in different terrain and conditions.
CO2: Will be able to prepare and test questionnaire.
CO3: Enhancement of skills in using of various field instruments like GPS & DGPS in survey.
CO4: Able to create plans and map layouts using cartography skills.

Unit	Topic	Subtopic	Marks	Practicals
I	Introduction to Field Survey and Village Survey. Chain and Plane Table Survey Prismatic compass method	Introduction to survey. Importance of field instrument survey - scope and purpose, principles and application of selected survey instruments. Fundamentals of Village survey, prerequisites of village survey, preparation of questionnaires. Chain Survey Plane Table Survey (Radiation Method) Plane Table Survey (Intersection Method) Prismatic Compass	25	15
II	Dumpy Level Survey and Web based Applications in data collection and Survey	Dumpy level: traverse survey, contour plan preparation. Geographic data collection through web based app's and processing and mapping of the data through computer techniques.	25	10

References:
Mandatory:

1. Clendinning , J. Principles and use of Surveying Instruments. 2nd edition, Blockie. A 1958.

Supplementary

1. Clendinning ,J Principles of surveying 2nd edition 1960.
2. Hotine, Major M. The re-triangulation of Great Britain. Empire survey review 1935.
3. Mitra,R.P. and Ramesh A : Fundamentals of Cartography Revised Edition, Concept Publication, New Delhi.
4. Monkhouse - Maps and diagrams Methuen 1971.
5. Negi, Balbir Singh. Practical Geography Third revised Ed. KedarNath and Ram Nath, Meerut &Delhi, 1994-95.
6. Sandover,J.A. Plane Surveying. Arnold 1961.
7. Singh &Karanjta - Map work and Practical Geography Central Book Dept Allahabad 1972.
8. Singh, R.L.andDutt, P.K. Elements of Practical Geography, Students Friends, Allahabad.1968.

Web references:

1. http://uregina.ca/~sauchyn/geog411/
2. https://www.arcgis.com/home/item.html?id=12bde0260dd84c148446072c52c7c9d2
3. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1015&context=geographyfacpub
4. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/field-survey
5. https://methods.sagepub.com/reference/encyclopedia-of-survey-research-methods/n187.xml

Course Title: Advanced Regional Geography of India
Course Code: PGM-GEG.E7
Marks: 50
Credits: 2
Duration : 30 hrs
==========

Pre-requisite Courses: Nil

Course objective:

1. To develop an understanding of regional geography of India in context of location, Physiography, drainage and climate.
2. To appreciate the unique regional diversity of India and the unification.
3. To enable to analyze and establish relationship between various factors in India's physical and cultural dimension.

Course Learning Outcomes:

1. **CO1**: Students will understand the issues related of disparities in various regions of India.
2. **CO2**: Students will able to differentiate various regions in India and its resource distributions, particularly from the perspective of physical, environmental and human perspective.
3. **CO3:** Students will apply their knowledge to identify different types of soils and vegetation found in India.
4. **CO4:** Students will develop the idea of origin and the mechanism of monsoon in India and students will relate how monsoon is playing significant role in Indian economy.

Unit	Topic	Subtopics	Marks	No. of hours
1	Location, Physiography, Drainage and Climate	Location importance, Extent and Geopolitical Significance and Major Physiographic Regions and their Importance, Drainage System of India and their characteristics, Origin and Mechanism of M onsoon, Various Seasons	**25**	**15**
2	Resources in India and Contemporary Issues	Types of Soils, natural vegetation and Mineral resources distribution and degradation. Mineral Resources and its distribution, Energy Resources:	**25**	**15**

		Conventional and Non-Conventional. Regional disparity, Poverty, Globalization, Impact of Development on Environment Social and Ethnic Issues.		

References:

Mandatory:

1. Govt. of India: India - Reference Annual, 2001 Pub. Div, New Delhi, 2001.
2. Govt. of India: National Atlas of India, NATMO Publication, Calcutta..
3. Learmonth, A.T.A. et.al(ed.) : Man and Land of South Asia Concep t, New Delhi.
4. Shafi, M: Geography of South Asia, McMillan & Co., Calcutta, 2000.
5. P. G. Saptarshi, J. C. More, V. R. Ugale& A. H. Musmade :A Geographical Region of India : Diamond Publication (2009)(Marathi)
6. Patil S. G., Suryawanshi R. S., Pacharne S., Choudhar A. H. : Economic Geography, AtharavPrakashan, Pune. (2014) (Marathi).
7. Aher A. B. ,Arekar R. : Commercial Geography, AtharavPrakashan, Pune. (2013) (Marathi).
8. Datt & Sundharam: Indian Economy (2014), S. Chand & Co., New Delhi

Web references:

- https://www.patnauniversity.ac.in/e-
- https://www.toppr.com/guides/geography/drainage/drainage-system-of-india/
- https://www.tutorialspoint.com/geography/geography_india_drainage_system.htm
- https://www.researchgate.net/publication/227467090_India's_Water_Resources_Contemporary_Issues_on_Irrigation
- https://econpapers.repec.org/bookchap/oxpobooks/9780195682168.htm

Course Title: Soil Geography
Course Code: PGM-GEG.E8
Credits: 02
Marks: 50

Pre-requisite Courses: basic knowledge of soil formation, understanding of rock cycle and nitrogen cycle.

Course Objectives

1. To introduce key concepts of formation of soil and distribution of soil globally
2. To aware students importance of soil in resource development.
3. To attain the knowledge related to soil content.

Course Learning Outcomes

After successful completion of the course the students will be able to

CO1: Will be able to classify types of soil.
CO2: Differentiate soil horizons and importance of horizons in flora development.
CO3: Analyse soil based on physical properties of the soil.
CO4: Model the sustainable practices in the development of soil

Unit	Topic	Subtopic	Marks	Lectures
1	Introduction to Soil	Introduction to soil, Types of soil. Soils and Agriculture, Factors of soil formation. Soil Horizons.	25	15
2	Soil Properties & Quality	Soil Texture, , Soil Color, Soil Organic Matter, Physical parameters of soil. Soil degradation and conservation	25	15

Mandatory References:

1. White Robert. (2005). Principles and Practice of Soil Science: The Soil as a Natural Resource, 4th Edition. Wiley & Sons, Inc – Blackwell. USA
2. Brady Nyle. (2002). The nature and properties of soil. MacMillan Publishing company, USA
3. Budhu, M. (2011). Soil Mechanics & foundation. In M. BUDHU, SOIL MECHANICS. JOHN WILEY & SONS, INC.
4. Wissem Frikha, S. V. (2017). Soil Testing, Soil Stability and Ground Improvement. In S. V. Wissem Frikha. Springer.

Supplementary Refrences

1. Foth Henry. (1984). Fundamentals of soil science. John Wiley & Sons, Inc. USA
2. Munns Donald and Singer Michael. (1996). Soils – An introduction. Prentice-Hall Inc, New Jersey, USA
3. Lal R and Stewart B.A. (1990). Advances in soil sciences. Springer-Verlag New York.

Website

1. http://online.sfsu.edu/jerry/geog317/G317syl.pdf
2. https://www.eolss.net/Sample-Chapters/C01/E6-14-02-05.pdf
3. https://ncert.nic.in/ncerts/l/kegy106.pdf

Course Title: Watershed Management
Course Code: PGM-GEG.E9
Credits: 02
Marks: 50
Duration : 30hrs
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Prerequisite Courses: Nil

Course Objectives: To develop and understand the importance of water and watershed management. To analyze different practices involved in watershed management.

Course Learning Outcomes: After successful completion of the course the students will be able to

CO1: Will be able to understand importance of water as a resource.
CO2: Will be able to classify different techniques and methods depend on the location and availability of resources.
CO3: Will be able to apply modern techniques in preparation of watershed management plans.
CO4: Will acquire skills to develop watershed management models using GIS.

Unit	Topic	Subtopic	Marks	Lectures
1	Introduction to Watershed Management and Management Practices	Concept of watershed Erosion control measures for non-agricultural lands, Contour and Staggered Trenching, Gully Control Structures, Sediment Retention Structures, Gully and Ravine Reclamation, Bunding, Check Dams, Loose boulder Dams	25	15
2	Groundwater and Issues related to Water conservation and harvesting	Movement of Groundwater, Factors affecting movement of groundwater, Soil Erosion, Soil Salinity, Siltation, Runoff, Deforestation, Water Scarcity, Groundwater depletion, Flooding etc. Methods, Potential, Assessment. Treatment of Catchments, Small Storage Structures, Planning Earth Dams, Agronomic measures in soil and water conservation problem and techniques of soil water conservation, Rainwater Harvesting, Rooftop Harvesting	25	15

References:

1. **Mandatory** Gleick, P.H. (ed.): Water in Crisis Oxford University Press, New York 1993.
2. Morisawa M: 'Streams - Their Dynamics and Morphology' McGraw Hill, New York, 1968.
3. Mutreja K.N. (1987) – Applied Hydrology, Tata Mckraw Hill.
4. Vir Singh, Raj ,(2000) Watershed Planning and Management, YashPublishing House, Bikaner, 2000.

Supplementary

1. Tideman E.M. (1996) – Watershed Management : Guidelines for Indian conditions, Omega, N. Delhi 1996.
2. Todd D.K.(1959) - Ground Water Hydrology, John wiley, New York.
3. Pereira H.C. (1973) – Land use and water Resources Cambridge University Press, Cambridge

Web references:

1. http://www.yourarticlelibrary.com/watershed-management/watershed-management-meaning-types-steps-and-programmes/77309
2. http://agritech.tnau.ac.in/agriculture/agri_majorareas_watershed_watershedmgt.html
3. https://dep.wv.gov/WWE/watershed/Pages/watershed_management.aspx
4. https://www.rdrwa.ca/node/27
5. https://www.teriin.org/blog/watershed-management-and-development

Course Title: Geographical Thought
Course Code: PGM-GEG.E10
Credits: 02
Marks: 50
Duration : 30hrs
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Prerequisite Courses: Nil

Course Objectives:
1. The course aims to develop a basic understanding and critical thinking of the various contributions from numerous scholars.
2. To gain grounding knowledge in the history, philosophy and scope in the discipline of geography

Course outcome:
After successful completion of the course the students will be able to

CO1: At the end of this course, student will gain sense of chronological organization and areal variation in human activities.

CO2: The students will be able to evaluate theoretical concepts from geography and elsewhere and demonstrate an understanding of the dynamic and contested nature of the discipline and its contemporary issues.

Unit	Topic	Subtopic	Marks	Lectures
1	Development of Geography	Geographical knowledge of the Ancient, Medieval & Modern period. Period. Contributions of explorers. Indian Schools of Thought, Contribution of Herodotus, Eratosthenes, Strabo, Ptolemy etc. Scientific explanations: Routes to scientific explanations Arab School of thought, Dark age, Age of Discovery, Contribution of Marco Polo, Columbus, Vaso-De-Gama and Captain Cook etc. Foundations of modern geography, German, French, British and American schools of thought, Contributions of Kant, Humboldt, Ritter, W. M. Davis, Charles Darwin etc.	25	15
2	Dualism in Geography & Geography in 21st Century	Systematic & regional geography; physical & human geography, the myth and reality about dualisms, Determinism and possibilism, Neo-determinism, Positivism, behaviorism, postmodernism. Conceptual and methodological developments and changing paradigms, Scientific methods, Quantitative revolution, Quantification and application of statistical techniques in Geography, Computer applications in geography.	25	15

References:

Mandatory

1. Gleick, P.H. (ed.): Water in Crisis Oxford University Press, New York 1993.
2. Morisawa M: 'Streams - Their Dynamics and Morphology' McGraw Hill, New York, 1968.
3. Mutreja K.N. (1987) – Applied Hydrology, Tata Mckraw Hill.
4. Vir Singh, Raj ,(2000) Watershed Planning and Management, YashPublishing House, Bikaner, 2000.

Supplementary

1. Tideman E.M. (1996) – Watershed Management : Guidelines for Indian conditions, Omega, N. Delhi 1996.
2. Todd D.K.(1959) - Ground Water Hydrology, John wiley, New York.
3. Pereira H.C. (1973) – Land use and water Resources Cambridge University Press, Cambridge

Web references:

1. http://www.yourarticlelibrary.com/watershed-management/watershed-management-meaning-types-steps-and-programmes/77309
2. http://agritech.tnau.ac.in/agriculture/agri_majorareas_watershed_watershedmgt.html
3. https://dep.wv.gov/WWE/watershed/Pages/watershed_management.aspx
4. https://www.rdrwa.ca/node/27
5. https://www.teriin.org/blog/watershed-management-and-development

SEMESTER III
Course Title: Statistical Techniques
Course Code: PGM-GEG.C5
Credits: 04
Marks: 100
Duration : 60 hrs
==========

Pre-requisite Courses:

1. Basic knowledge of statistics
2. Bridge course is compulsory for those who have not completed statistics at under graduate level

Course Objectives:

1. To introduce statistical techniques, relevant to geographical research.
2. To acquaint students about the potentials and applications of statistical techniques.

Course Learning Outcomes:

At the end of this course, students will be able to:

CO1: Acquire knowledge of drawing inferences using the geographical database
CO2: Develop an understanding and appreciation of the mutual dependence of different techniques and their relevance.
CO3: Formulate and test the hypothesis
CO4: Use of open source software for Statistical analysis
CO5: Estimate and predict trends and patterns of geographical phenomena.

Unit	Topic	Subtopic	Marks	Lectures
1	Frequency Distribution , Measures of Central Tendency & Dispersion	Introduction to statistics, Graphical & Diagrammatic representation of statistical data . Mean ,median , quartiles , declices , percentiles ,mode . Range , mean deviation , quartile deviation , standard deviation ,Lorenz curve .	25	15
2	Correlation and Regression Analysis . Moments Skewness and Kurtosis	Scatter diagram, Karl Pearson's correlation coefficient. Rank correlation: Spearman's and Kendal's rank correlation coefficient. Moments, Concept, measures of skewness and kurtosis	25	15
3	Time series analysis Testing of hypothesis	Moving averages and chi square test	25	15
4	Introduction to GRETL	Gretl: Gnu Regression and Time-series Library	25	15

References:

Mandatory

1. Bagavathi .V.Pillai R.S.N (2005) Statistics theory and practice ,S.chand and Company Ltd, New Delhi -110055
2. Gupta S.C (2015), Fundamentals of statistics , Himalaya publishing house, Delhi -1100
3. ZamirAlvi 2000: Statistical Geography: Method and Applications Rawat Publications, New Delhi
4. Gregory, 1963: Statistical methods and the Geographer, Longman S. London
5. Rastogi R.S.(2005): Elementary Statistics: Rohit Publications – Delhi-110 006

Supplementary:

1. Johnson R.J. 1980: Multivariate statistical Analysis in Geography, Longman
2. Khan Z.A 1998: Text book of practical Geography – New Delhi
3. Pal Saroj K. 1982: Statistical Techniques: A basic approach to Geography: Tata –McGraw Hill, New Delhi.
4. P.K. Majumdar 2002: Statistics: A Tool for Social Sciences, Rawat Publications: Jaipur & New Delhi.
5. Succheti D.C. and Kapoor V.K. 2002 - statistics (Theory, methods and application)

Web references

1. (n.d.). Retrieved from Regression: http://uregina.ca/~gingrich/regr.pdf
2. Alredaisy, S. M. (2014, January). Research Gate. (university of khartoum Faculty of Distant Education) doi:10.13140/2.1.4332.1923
3. Darthmouth Library. (2020, April 4). Retrieved from Geography: Statistics/Data for Geography: https://researchguides.dartmouth.edu/geography/statistics
4. eGyanKosh. (n.d.). Retrieved from Measures of Skewness and Kurtosis: http://egyankosh.ac.in/bitstream/123456789/19499/1/Unit-6.pdf
5. Rogerson, P. A. (2001). Sage Research Methods. doi: https://dx.doi.org/10.4135/9781849209953

Course Title: Fundamentals of Remote Sensing
Course Code: PGM-GEG.C6
Credits:02
Marks: 50
Duration: 30 hrs

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Prerequisite Courses: Nil

Course Objectives:

1. To introduce basics of remote sensing and its importance.
2. Attain a foundational knowledge and comprehension of the physical computational and perceptional biasof remote sensing.
3. To attain the data collection processes in remote sensing.
4. Aware and use of modern techniques in geography through remote sensing.

Course Learning Outcomes:

After successful completion of the course the students will be able to

CO1: Understand basic principles of remote sensing.
CO2: Compare traditional vs.modern techniques of remote sensing.
CO3: Explain basic computational properties of remote sensing.
CO4: Classify the different datasets and products of remote sensing applications.

Unit	Topic	Subtopic	Marks	Lectures
1	Introduction to Remote Sensing & Satellites	Concept of Remote Sensing, Types of Remote Sensing, Advantage & Disadvantage, Polar orbital &Geostationary satellites, Sensors and platforms Sources of Satellite Data Elements of visual Image Interpretation	25	15
2	Electro-magnetic Radiation, Resolution and Spectral Signatures	Electro-magnetic Radiation (EMR) Concept, Electro -magnetic spectrum and its components, EMR Interactions with Earth's Atmosphere and Surface features. Resolution & Its Type, Spectral Signature Curve,	25	15

Reference Books:

Mandatory:

1. Thomas M. Lillesand and Ralph W. Kefer, Remote Sensing and Image Interpretation, John Wiley & sons, New York, 1994.

Supplementary:

1. Barrett E.C. and L.F. Curtis : Fundamentals of Remote Sensing and Air Photo Interpretation, Mcmillan, New York, 1992.
2. Compbell J. : Introduction to Remote Sensing, Guilford, New York, 1989.
3. Curran, Paul J : Principles of Remote Sensing, Long man, London, 1985.
4. Luder D: Aerial Photography Interpretation : Principles and Application, McGraw Hill, New York, 1959.
5. Pratt W.K. Digital Image Processing. Wiley, New York, 1978.

Web references:

1. https:// grindgis.com/ gis/differences -between-remote-sensing-and-gis
2. https:// www.researchgate.net/ publication/ 311577535_Remote_Sensing_and_Geographical_Information_System_GIS_and_Its_Applicationn_in_Various_Fields

Course Title: Practical's in Remote Sensing
Course Code: PGM-GEG.C7
Credits: 02
Marks: 50
Duration: 30 Practical's of 2 hrs each

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Prerequisite Courses: Nil

1. Basic knowledge of Remote Sensing
2. Bridge course is compulsory who have not completed Remote Sensing at under graduate level.

Course Objective:

1. To introduce basics of remote sensing and its importance.
2. Attain a foundational knowledge and comprehension of the physical computational and perceptional bases of remotesensing.
3. To attain the data collection processes in remote sensing.
4. Aware and use of modern techniques in geography through remote sensing.

Course Learning Outcomes:

At the end of this course, students will be able to:

CO1: To recognize and explain basic level of fundamentals physical principles of remote sensing.
CO2: Understand traditional vs. modern techniques of remote sensing.
CO3: To understand and recognize and explain basic computational properties and remote sensing.
CO4: Classify the different datasets and products of remote sensing applications.

Unit	Topic	Subtopic	Marks	Practical
1	Data Representation& Accessing Web Resources	Representation of Raster and Vector format, Band combinations, Color Composites, Identification of features using False Color Composite. Downloading free satellite data: Landsat, LISS, ASTER, SRTM	25	15
2	Image Interpretation, Image Classification & Change Detection	Interpretation of satellite image: Land sat TM, Resourcesat, Quick bird, Land sat Thermal Band Generating land use map using satellite image classification techniques, Accuracy Assessment, Area calculations, Change Detection in land use pattern	25	15

Reference Books:

1. Thomas M. Lillesand and Ralph W. Kefer, Remote Sensing and Image Interpretation, John Wiley & sons, New York, 1994.
2. Luder D: Aerial Photography Interpretation: Principles and Application, McGraw Hill, New York, 1959.
3. Pratt W.K. Digital Image Processing. Wiley, New York, 1978
4. Slocum, T. (2003). Thematic Cartography and Geographic Visualization. Upper Saddle River, New Jersey: Prentice Hall. ISBN 0-130-35123-7. Wilford, John Noble (2000). The Mapmakers. Vintage Books. ISBN 0-375-70850-2.
5. Luder D: Aerial Photography Interpretation: Principles and Application, McGraw Hill, New York, 1959.

Supplementary:

1. American Society of Photogrammetry : Manual of Remote Sensing. ASP Falls Church, V.A. 1983.
2. Barrett E.C. and L.F. Curtis : Fundamentals of Remote Sensing and Air Photo Interpretation, Mcmillan, New York, 1992.
3. Compbell J. : Introduction to Remote Sensing, Guilford , New York, 1989.
4. Curran, Paul J : Principles of Remote Sensing, Longman, London, 1985.
5. Hord R.M. : Digital Image Processing of Remotely Sensed Data, Academic, New York, 1989.
6. Luder D: Aerial Photography Interpretation: Principles and Application, McGraw H ill, New York, 1959.
7. Pratt W.K. Digital Image Processing. Wiley, New York, 1978.

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3. https:// grindgis.com/ gis/differences -between-remote-sensing-and-gis
4. https:// www.researchgate.net/ publication/ 311577535_Remote_Sensing_and_Geograph ical_Information_System_GIS_and_Its_Applicationn_in_Various_Fields
5. http:// www.ai.soc.i.kyoto -u.ac.jp/ field_en/english_textbook/RemoteSensing_1 .
6. https:// www.iwmi.cgiar.org/assessment/ files/word/ Workshops/ILRI - March/Presentations/Atsmachew.pdf

ELECTIVES
Course Title: Basics of Research Methodology
Course Code: PG.GEG.E11
Marks: 50
Credits: 2

Prerequisite Courses: Nil

Course Objectives:

1. To familiarize students with basic of research and the research process.
2. To enable the students in conducting research work and formulating research synopsis and report.
3. To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the Research problem.

Course outcome:

After successful completion of the course the students will be able to

Co1 : Understand some basic concepts of research and its methodologies
Co2 : Identify appropriate research topics ,
Co3 : Select and define appropriate research problem and parameters.
CO4 : Critically assess review of Literature .
CO4: Formulate a project proposal , write a research report and dissertation.

Unit	Topic	Sub topic	Marks	No.of lectures
1	Introduction to Research	Research and its types, Research process and steps,Essential components of Literature Review, definition ofproblem, Objectives & strategies of research, Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses.	10	8
2	Methods of data collection	Types of data collection and classification, designingquestionnaires and schedules, digital organization of data,preprocessing.	10	7
3	Sampling and Hypothesis testing	Probability sampling, random sampling, systematicsampling, stratified sampling and cluster sampling Nonprobabilitysampling, quota sampling Hypothesis – Qualities of a good Hypothesis – Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.	20	10
4	Report Writing And use of soft wares	Pre writing considerations, Format of report writing,Abstract Writing, Synopsis Writing, Thesis writing,Chapterization, Format of publications in research journals Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of	10	5

		Plagiarism		

References

1.Garg.B.L., Karadia, R., Agarwal,F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers, New Delhi

2. Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, Wiley India, New Delhi.

2. Montgomery, Douglas C. &Runger, George C. (2007), 3/e, Applied Statistics &Probability for Engineers ,Wiley India, New Delhi.

3. Kothari C.K. (2014), 5/e, Research Methodology- Methods and Techniques ,New Age International, New Delhi.

4. Krishnaswamy, K.N., Sivakumar, AppaIyer and Mathiranjan M. (2006), Management Research Methodology; Integration of Principles, Methods and Techniques ,Pearson Education, New Delhi

5. Panneerselvam, R (2014) Research Methodology, PHI Pvt. Ltd, New Delhi.

6. Sinha, S.C. and Dhiman, A.K.(2002) Research Methodology, EssEss Publications. 2 volumes.

Course Title: Map Interpretation and Cartography

Course Code: PGM-GEG.12
Credits: 02
Marks: 50
Duration: 30 hrs
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Pre-requisite Courses: NIL

Course Objectives: To understand the basic of computer cartography, data processing and presentation of geographic data.

1. To introduce basics of Cartography and its importance in production of maps.
2. Emphasizes on map interpretations techniques
3. To demonstrate various methods of statistical analysis and the use of GIS in map making using
4. The course has a strong practical focus and students learn to evaluate, manipulate and interpret raster data sets in a GIS environment.

Course Learning Outcomes:

After successful completion of the course the students will be able to

CO1: Describe how maps are used in a variety of contexts.
CO2: Describe and apply the cartographic process to the production of several types of maps.
CO3: Define and explain important cartographic principles (e.g., scale, map projections, symbolization, data classification, map design, etc.) and apply these principles appropriately to the map production process.
CO4: Demonstrate the use of ArcGIS, Freehand, and other software for map design and production.

Unit	Topic	Subtopic	Marks	Lectures
1	Fundamentals of Cartography and Map Interpretation	Introduction to Cartography, Basics of Map, Fundamentals of direction, scale, types, sources. Elementary Geodesy: Coordinate systems and transformations. Spheroid and Geoid. Geocentric Datum, datum and map projections. 3D coordinates transformations Elements of map reading and Interpretation of Toposheets, Relief features and profiles. Reduction and enlargement of maps	25	15

2	Geographic Data Analysis and Management and Computer Cartography	Geographic Data analysis with Microsoft Excel :Central Tendency, Deviation, Data Skewness, Correlation analysis and Trends, Estimation using regression analysis, Time Series Analysis Concept of Database & Relationships, Database Management System, Queries and Report generation, Database organization rules Map making using computer graphics programs, Using Google Earth for mapping geographical features, Map Layouts	25	15

References:

Mandatory:

1. ESRI. 2004. ESRI Cartography: Capabilities and Trends. Redlands, CA. White Paper

Supplementary:

1. Imus, D. and Dunlavey, P. 2002. Back to the Drawing Board: Cartography vs the Digital Workflow. MT. Hood, Oregon.
2. Kraak, Menno-Jan and Allan Brown (2001): Web Cartography – Developments and prospects, Taylor & Francis, New York, ISBN 0 -7484-0869-X.
3. MacEachren, A.M. (1994). Some Truth with Maps: A Primer on Symbolization & Design . University Park: The Pennsylvania State University. ISBN.
4. Slocum, T. (2003). Thematic Cartography and Geographic Visualization. Upper Saddle River, New Jersey: Prentice Hall. ISBN 0-130-35123-7. Wilford, John Noble (2000). The Mapmakers. Vintage Books. ISBN 0-375-70850-2.
5. D.J. Unnwin& J.A. Dawson(1987): Computer Programming for Geographers, Longman, London.

Web references:

1. https://www.researchgate.net/publication/228775651_Computer_cartography_and_cartographic_knowledge
2. http://www.u.arizona.edu/~kbailey/GEOG416A/module1.htm
3. https://blogs.loc.gov/maps/category/history -of-gis-and-computer-cartography/
4. http://www.u.arizona.edu/~kbailey/GEOG416A/module1.htm
5. https://www.researchgate.net/publication/228775651_Computer_cartography_and_cartographic_knowledge

Course Title: Geography and Development Models
Course Code: PGM-GEG.C13
Credits: 02
Marks: 50
Duration: 30hrs
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Pre-requisite Courses: Nil

Course Objectives:

1. To enable students to understand the concept of sustainable development considering Norway and Bhutan as respective benchmarks for a sense of well-being and happiness.
2. This course focuses on introducing the concept of resource management and maintaining a balance between economic profit and environmental implications which is based on Model followed by Norway.
3. To introduce the concept of happiness as a qualitative component for people to lead fulfilled life as propounded by Bhutan, thereby valuing more than material wealth.

Course Learning Outcomes:
After successful completion of the course the students will be able to

CO1: Understand the concept of sustainable development in its holistic term.
CO2: Appreciate the Bhutanese and Norwegian model of development and the possibilities and challenges of replicating such approaches.
CO3: Evaluate different methods of development by taking case studies of countries of the world.
CO4: Formulate sustainable development models with examples of real world.

Unit	Topic	Sub-Topic	Marks	Lectures
1	Fundamental Concepts and Development to Sustainable Development	• Meaning of Social Well-being • Definition, Nature and Scope • Social Well-being and Geography • What is development • Concept of sustainable development • Distinction between development and sustainable development • Key concepts in sustainable development	25	15
2	The Bhutanese concept of Gross National Happiness as a new paradigm and The Norwegian Model of Sustainable Development	• Bhutan: The land, society, culture and values • Gross National Happiness (GNH): A radical departure from established norms of understanding and measuring development • Attempts in adaptations of GNH across sectors and cultures • The post-war development model and its limits • Norwegian Model of Sustainable Development	25	15

References:

Mandatory:

1. Colman Ronald (2009) Measuring Progress towards Gross National Happiness: From GNH indicators to GNH national accounts: Centre for Bhutan Studies and GNH , Thimpu (https://www.grossnationalhappiness.com/gross-national-happiness-practice-and-measurement/)
2. Hall Jon (2009)The Global Project on Measuring the Progress of Societies: A global movement for a global challenge:Centre for Bhutan Studies and GNH ,Thimpu
3. Marks Nic (2009) Creating National Accounts of Well-Being: A parallel process to GNH: Centre for Bhutan Studies and GNH , Thimpu (https://www.grossnationalhappiness.com/gross-national-happiness-practice-and-measurement/)
4. Burns George(2009)Gross Natural Happiness: Can we have both psychological and ecological wellbeing? Positive psychology as Change .John Wiley & Sons, New York.
5. _____(1987) Our Common Future: The Brundtland Commission Report, Oslo.

Supplementary:

1. Sustainable Development in Norway on the example of government pension fund global: (JulitaFiedorczuk)
2. Norway´s Strategy for Sustainable Development: (Norwegian ministry of finance)
3. The Norwegian Model of Sustainable Development: A Policy Oriented Capital Framework for Measurement and Policies: (Thorvald Moe)
4. The Global Goals for Sustainable Development: Challenges and possible implications for Norway (Arne Backer Grønningsæter and Svein Erik Stave)
5. A comprehensive resource development strategy: Norway's path to inclusive and sustainable development (Francis Dennig)

Web References:

1. https://sustainabledevelopment.un.org/content/documents/798bhutanreport.pdf
2. https://www.researchgate.net/publication/315267416_Sustainability_in_an_Emerging_Nation_The_Bhutan_Case_Study
3. https://www.nationalgeographic.com/travel/destinations/asia/bhutan/carbon-negative-country-sustainability/
4. http://www.grossnationalhappiness.com/books/
5. https://dergipark.org.tr/tr/download/article-file/701523

Course Title: Digital Image Processing
Course Code: PG.GEG.E14
Credits: 02
Marks: 50
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Prerequisite courses: Nil

Course objectives

1. Provide students with the state-of-art technical skills to build disaster and hazard applications.
2. To demonstrate various image processing tools and techniques for decision making.
3. This course helpful in mitigation strategies and preparedness plans. Real time geographic data can improve the allocation of resources for response. A GIS technology is much useful in modeling of disaster risks and human adaptations to hazards.
4. The course has a strong practical focus and students learn to evaluate, manipulate and interpret raster data sets in a GIS environment.

Course Learning Outcomes

Co:1- Be equipped with practical skills and the ability to apply their theoretical concept to design, perform experiments, analyze and interpret data and thus develop proficiency in lab management.

Co: 2- It provides decision support system in disaster management and making model reduce risk and Hazard. Students will handle different disaster project like Flood, land sliding, fire and drought.

Co: 3- To be able use these skills to identify and analyzed real world problem and preparing them for a successful career in geospatial industry and research institute.

Co: 4- Acquire of fundamental and advanced knowledge of the different aspect in Geoinformatics with the means ability to specialize in a specific field.

No	Topic	Sub-Topic
1	Introduction to Digital Image Processing	• Visual perception, Image sensing and acquisition, • Digital Data Formats Image sampling and Quantization • Basic relationship between pixels. • Development, scope and fundamental steps involved in Digital Image Processing, components of Image Processing
2	Image Rectification and Multispectral Image Processing	• Radiometric and Atmospheric Correction • Geometric Correction, Ortho-rectification, calibration and rectification of photo and images, • Image enhancement in spatial domain and frequency domain, Filtering, Fourier Transform, Noise removal • Color Image processing, slicing, Image compression, dilation, Segmentation, Spectral rationing, density slicing and image fusion • Object recognition, classification, object recognition, feature extraction, accuracy, assessment, change detection Accuracy Assessment and integration with GIS

Reference Books:
Compulsory

1. Alexander, D. (1993). Natural disasters. UCL Press Ltd., University College London. 632.

Supplementary

1. Adler, R.F. and A.J. Negri, 1988. A satellite infrared technique to estimate tropical convective and stratiform rainfall. J. Appl. Meteorol., 27: 30-51.
2. Anagnostou, E.N., A.J. Negri and R.F. Adler, 1999. A satellite infrared technique for diurnal rainfall variability studies. J. Geophy. Res., 104: 31477-31488.
3. Barrett, E.C., (1996) The storm project: using remote sensing for improved monitoring and prediction of heavy rainfall and related events. Remote Sensing Reviews, vol 14, 282 pp.
4. Van Westen, C.J. (1993) Application of Geographic Information Systems to Landslide Hazard Zonation. ITC-Publication Number 15, ITC, Enschede, The Netherlands, 245 pp.
5. Pelling, M. (2003). The Vulnerability of Cities: Natural Disaster and Social Resilience, Earthscan, London.
6. Pike, R.J., (2000). Geomorphometry - diversity in quantitative surface analysis. Progress in Physical Geography 24 (1), 1-20.

Web references

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2) https://www.isprs.org/proceedings/xxxiii/congress/part7/1609_XXXIII-part7.pdf
3) https://www.isprs.org/proceedings/xxxiii/congress/part7/1609_XXXIII-part7.pdf
4) http://www.tric.u-tokai.ac.jp/ISPRScom8/TC8/TC8_CD/headline/JAXA_Special_Session%20-%206/JTS64_20100608144600.pdf
5) https://www.semanticscholar.org/paper/Role-of-Remote-Sensing-in-Disaster-Management-Nirupama-Simonovic/da84562b2057ca5866d933d47ee8815a06f0229c

SEMESTER IV
CORE
Course Title: Regional Planning and Development
Course Code: PGM-GEG.C8
Credits: 04
Marks: 100

Prerequisite Courses: NIL

Course Objectives:

1. To equip the students with the knowledge of regions: in terms of typology, functions and to prepare planning for the regions through the understanding of land, infrastructure, climate, etc
2. To understand the structure and nature of development and planning process and different levels.
3. To create an understanding of reserve utilization in terms of sustainable development.
4. To introduce the concepts and practices in regional planning and development.

Course Learning Outcomes:

After successful completion of the course the students will be able to

CO1: The students will able to understand regional planning and its importance to regional development.

CO2: The Students will able to differentiate types of regions in context of formal and functional regions for development purpose.

CO3: The Students will able to determine the importance of sustainable practices in regional planning and development.

CO4: The Students will able to support the concept of multi level planning and decentralized planning and the participation of people in planning process.

Unit	Topic	Subtopic	No. of hours	Marks
1	Concept and Types of regions	Regional concept in geography, conceptual and theoretical framework, merits and limitations for application to regional planning and development; changing concept of the region from an inter-disciplinary view-point, concept of space, area and locational attributes. Types of regions, hierarchy; special purpose region in the context of planning.	15	25
2	Regional study and Systematic Study	Physical regions, resource regions, regional divisions according to variations in levels of socio-economic development; Special purpose regions: river valley regions, metropolitan regions, Problem regions-hilly regions, tribal regions, regions of drought and floods.	15	25

		Approaches to delineation of different types of regions and their utility in planning. Planning process – sectoral , temporal and spatial dimensions; short-term and long term perspectives of planning. Indicators of development and their data sources, measuring levels of regional development and disparities –A case study of India.		
3	Regional Development and Planning	Regional Policies in the Indian Five Year Plans, experience of Regional Planning in India Regional Development and Planning Strategies – Concentration versus dispersal (growth versus development)- case studies for plans of developed and developing countries, Regional development in India-problems and prospects.	15	25
4	Concept of Multi-level planning & decentralized planning	Concept of Multi-level planning; decentralized planning; peoples participation in the planning process; Panchayati Raj system; role and relationship of Panchayati Raj Institutions(Village Panchayat, Panchayat Samithi and Zilla Parishad) and administrative structure(Village, Block and District).	15	25
			60	100

References:

1. Ministry of urban and development plan formulation and implementation (URDPFI) guidelines,2014
2. Friedmann, J and Alonso, W. : Regional Development Policy – A case Study of Venezuela, M.I.T. Press Cambridhge, Mass, 1966.
3. Gosal, G.S. and Krishan, G. : Regional Disparities in Levels of Socio-Economic Development in Punjab, Vishal Publications, Kurukshetra, 1984.
4. Johnson, E.A.J. : The Organisation of Space in Developing Countries, Harvard University Press, Cambridge, 1970.
5. Kuklinski, A.R. (ed.): Growth Poles and Growth Centres in Regional Planning, Mouton, The Hague. 1972.
6. Kundu, A. and Raza, Moonis: Indian Economy-The Regional Dimension, Spectrum Publishers, New Delhi, 1982.

Supplementry references

- Losch, A.: The Economics of Location, University Press, Yale, New Haven, 1954.
- Misra, R.P. : Regional Planning: Concepts, Techniques and Policies, University of Mysore, Mysore, 1969.
- Misra, R.P. and Others (editors) : Regional Development Planning in India-A Strategy, Institute of Development Studies, Mysore, 1974.
- Myrdal, G.: Economic Theory and Under-Development Regions, Gerald Duckworth, London, 1957.
- Richardson, H.W. : Regional Economics, Weidenfeld and Nicolson, London, 1969.
- Sundaram, K.V.(ed.): Geography and Planning, Essays in Honour of V.L.S. Prakasa Rao. Concept Publishing Co. New Delhi, 1985.

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1. https://rdavisaphgfinal.weebly.com/nature-and-perspectives/types-of-regions
2. https://www.albert.io/blog/regions-ap-human-geography-crash-course/
3. http://www2.harpercollege.edu/mhealy/g101ilec/intro/int/g3intrfr.htm
4. https://www.brainkart.com/article/Approaches-to-the-Study-of-Geography_33741/
5. https://geographyandyou.com/regional-development-and-planning-in-india/
6. https://mitpress.mit.edu/books/regional-development-and-planning
7. https://journals.sagepub.com/doi/10.1177/016001760102400307

Course Title: Fundamentals of GIS

Course code PGM-GEG.C9

Credits: 2

Marks: 50

Duration: 30hrs

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Prerequisite courses: NIL

Course objective -

1. The course focuses on the fundamentals concept Geographical Information System, and Global Positioning System
2. Introducing the spatial data, non- spatial data, hardware and software used in collection, processing and analysis of geospatial data.

Course outcome:

After successful completion of the course the students will be able to

CO1: Students will demonstrate proficiency and conceptual understanding in using software and automated techniques to carry out thematic maps and analysis through a series of laboratory exercises and creation of reports.

CO2: Personal effectiveness and workplace competencies are practiced through engagement in discussion boards, following course guidelines, and interactions with the instructor and other students in the class.

CO3: To be able use these skills to identify and analyzed real world problem and preparing them for a successful career in geospatial industry and research institute.

CO4: Develop an tendency towards research through the compulsory internship in industry /research/ academic institutes which promote and inculcate professional ethics and code of practice among students, enabling them to work in a team with multidisciplinary approach

No	Topic	marks	Lecture
I	Introduction to GIS • History and development. • Components and Applications trends of GIS. • Spatial and non-spatial data • Data models: vector and raster • Data type, structure, Spatial and attribute, point, line, polygon-	25	**15**

	arc, nodes, vertices, and topology. Attribute data. • Data processing systems, input and output devices, editing and attributing and linking • Data sources		
II	Introduction to GPS • History of Positioning System GPS System Description, Error Sources & Receiver • Introduction to DGPS and Total Station, GPS Performance and Policy Applications • Introduction to open-source GIS	25	15

Reference book

Mandatory

1. Burrough, P.A. and McDonnell, R.A. (1998) Principles of geographical information systems. OxfordUniversity Press, Oxford, 327 pp.
2. Campbell, J.B. (2002). Introduction to remote sensing, 3rd ed., The Guilford Press. ISBN 1-57230-640-8.
3. Chang, K. (2007) Introduction to Geographic Information System, 4th Edition. McGraw Hill.

Supplementary

1. Curran Paul J Principles of Remote Sensing UK: ELBS,
2. Elangovan,K (2006) GIS: Fundamentals, Applications and Implementations. New India Publishing Agency, New Delhi.
3. Heywood, I., Cornelius, S., and Carver, S. (2006) An Introduction to Geographical Information Systems. Prentice Hall. 3rd edition.
4. *Jensen, J.R. (2000). Remote sensing of the environment: an Earth resource perspective. Prentice Hall. ISBN 0-13-489733-1.*
5. Thurston, J., Poiker, T.K. and J. Patrick Moore. (2003) Integrated Geospatial Technologies: A Guide to GPS, GIS, and Data Logging. Hoboken, New Jersey: Wiley.
6. Wise, S. (2002) GIS Basics. London: Taylor & Francis.

Web references

6) https://www.nrsc.gov.in/
7) https://www.iirs.gov.in/
8) http://www.undp.org/popin/wdtrends/wdtrends.htm
9) https://www.isprs.org/proceedings/xxxiii/congress/part7/1609_XXXIII-part7.pdf
10) http://www.tric.u-tokai.ac.jp/ISPRScom8/TC8/TC8_CD/headline/JAXA_Special_Session%20-%206/JTS64_20100608144600.pdf

11) https://www.semanticscholar.org/paper/Role-of-Remote-Sensing-in-Disaster-Management-Nirupama-Simonovic/da84562b2057ca5866d933d47ee8815a06f0229c

Course Title: Practical in GIS

Course code PGM-GEG.C10

Credits: 4

Marks: 100

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Prerequisite courses: NIL

Course objective -

1. The course focuses on hands on training of GIS software like ArcGIS, Qgis and Global Positioning System
2. Introducing the spatial data, non- spatial data, hardware and software used in collection, processing and analysis of geospatial data.

Course outcome:

After successful completion of the course the students will be able to

CO1: Students will demonstrate proficiency and conceptual understanding in using software and automated techniques to carry out thematic maps and analysis through a series of laboratory exercises and creation of reports.

CO2: Personal effectiveness and workplace competencies are practiced through engagement in discussion boards, following course guidelines, and interactions with the instructor and other students in the class

CO3: To be able use these skills to identify and analyzed real world problem and preparing them for a successful career in geospatial industry and research institute

CO4: Develop an tendency towards research through the compulsory internship in industry /research/ academic institutes which promote and inculcate professional ethics and code of practice among students, enabling them to work in a team with multidisciplinary approach

No	Topic	Marks	practical
I	**Spatial dada inputs** • **Digitization** • **Error identification** • **Types and sources of error**	12	30

	• **Correction editing and topology building**		
II	**Proximity, network point pattern and surface analysis** **GPS hands on field training**	**25**	**30**
II **Layout preparation** **Thematic maps** **III** **Spatial analysis** **IV** **GPS hands on field training**		**1** **1** **1**	

Reference book

Mandatory

4. Burrough, P.A. and McDonnell, R.A. (1998) Principles of geographical information systems. OxfordUniversity Press, Oxford, 327 pp.
5. Campbell, J.B. (2002). Introduction to remote sensing, 3rd ed., The Guilford Press. ISBN 1-57230-640-8.
6. Chang, K. (2007) Introduction to Geographic Information System, 4th Edition. McGraw Hill.

Supplementary

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11. Thurston, J., Poiker, T.K. and J. Patrick Moore. (2003) Integrated Geospatial Technologies: A Guide to GPS, GIS, and Data Logging. Hoboken, New Jersey: Wiley.
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ELECTIVES

Course Title: Tourism Planning and Development
Course Code: PGM-GEG.E15
Credits: 02
Marks: 50
Duration : 30hrs
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Pre-requisite courses: NIL
Course objectives

1. Make students understand the basic knowledge and skills in tourism policy, planning, and development.
2. Intended to provide students with opportunities to review, analyze, and apply the application.
3. Theories, philosophies, principles, strategies, and approaches associated with tourism policy to be discussed.
4. Provide examples of tourism planning, and development at global, national, regional, and local/community levels.

Course Learning Outcomes :
At the end of this course, students will be able to:

1. Outline the tourism policy in planning and Development.
2. Simplify the various issues in tourism planning and development.
3. Categorize implementing of theories adopted in tourism planning.
4. Formulate policies for global to local level.

Unit	**Topic**	**Subtopic**	Lectures	Marks
I	Introduction to Tourism Development and trends Sustainable Tourism	Tourism development trends in India and worldwide. Important tourist circuits. Tourism and Sustainability, Present Scenario, Sustainable tourism development, Guidelines for sustainability strategy in tourism, Issues of sustainable tourism development.	15	25
II	Tourist profile of study area	South East Asia, Australia and Oceania, East Africa, Schengen zone, Caribbean, South America, North America Tourism Policies and Practices in: Case Studies: Norway, Bhutan, Sri Lanka, Egypt, Kenya, New Zealand, Switzerland, Mauritius, Turkey and Thailand	10	25

References:

Mandatory:

1. Buckley, R. (2003). *Case studies in ecotourism.* Cambridge, MA: CABI.
2. Conrady, R., & Buck, M. (Eds.). (2008). *Trends and issues in global tourism 2008.* Berlin, Germany: Springer.
3. Dredge, D., & Jenkins, J. (2007). *Tourism planning and policy.* Australia: John Wiley & Sons Australia, Ltd.
4. Edgell, D. L., Allen, M. D., Smith, G., & Swanson, J. R. (2008). *Tourism policy and planning: Yesterday, today and tomorrow.* Burlington, MA: Elsevier Inc.

Supplementary:

1. Godfrey, K., & Clarke, J. (2000). *The tourism development handbook.* New York: Continuum.
2. Inskeep, E. (1991). *Tourism planning: An integrated and sustainable development approach.* New York: Van Nostrand Reinhold.
3. Mason, P. (2003). *Tourism impacts, planning and management.* Burlington, MA: Elsevier Butterworth-Heinemann.

Web References:

1. https://www.tandfonline.com/doi/pdf/10.1080/14790530903522606
2. https://www.researchgate.net/profile/Lisa_Ruhanen/publication/37617335_Strategic_Planning_for_Local_Tourism_Destinations_An_Analysis_of_Tourism/links/0912f50e4386c91c28000000.pdf
3. https://www.researchgate.net/profile/Deborah_Kerstetter/publication/286153136_Relationship_Between_Carrying_Capacity_of_Small_Island_Tourism_Destinations_and_Quality-of-Life/links/5db099984585155e27f82913/Relationship-Between-Carrying-Capacity-of-Small-Island-Tourism-Destinations-and-Quality-of-Life.pdf#page=587
4. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.477.4384&rep=rep1&type=pdf

Course Title: Urban Development and Processes
Course Code: PGM-GEG.E16
Marks: 50
Credits: 2
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Pre-requisite courses: NIL

Course Objectives:
1. To establish a foundation to understand various dimensions of urbanization as a process.
2. To enable students to understand the various theories applied in urban studies.
3. To define and analyze current urban development issues

Course Learning Outcomes:
After successful completion of the course the students will be able to
CLO1: Understand various dimensions of urbanization as a process.
CLO2: Apply various theories in urban studies.
CLO3: Analyze & Evaluate various issues emerging due to urban development.
CLO4: Formulate or undertake mini research projects on specific issues of urbanization

Unit	Topic	Sub Topic	Lectures	Marks
1	Introduction to urban Geography and urban functional classification	Concept and processes in Urban Geography Nature, scope and Developmental models Brief history of Urbanisation of the world. Various approaches to classification, Urban function,Functional classification of towns and cities by C.D. Harris and H. J. Nelson	8	15
2	City Region	Urban Forms and Models– city and region (Peri Urban , rural – urban fringe , , suburb and satellite towns) Concepts of city region and various synonymous terms used. Criteria used to demarcate the city region, Nature of urban influence.	12	20
3	Emerging Urban Trends	Concept of Mega cities , Global Cities , and Edge cities Sustainable Cities Smart Cities, Urban Health, Urban Sanitation, Urban Shelter	10	15

		(in context Sustainable Development Goals) Climate Change and Mega Cities.		

References:

1. Carter, Harold, 2002, "The study of Urban Geography", fourth edition, Oxford University press, New York,
2. Mandal, R.B.(2000) "Urban Geography", Concept publishing company, New Delhi,
3. Ramachandran(1997) Urbanization and Urban Systems in India , Oxford University Press, New Delhi
4. Siddhartha K and Mukherjee (2016)Cities,Urbanisation& Urban Systems : Kisalaya Publications , New Delhi .
5. Singh Anoop Kumar (2014) Fundamentals of Urban Geography , K.K. Publications, New Delhi

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Course Title: Advanced Coastal Geomorphology
Course Code: PGM-GEG.E17
Credits: 02
Marks:30
Duration: 30lectures of 1 hour each

Pre-requisite Courses:

- **Basic knowledge about Coastal geomorphic concepts**

Course Objectives:

5. To enable students to developan understandingand apply knowledge on coastal process,and shorelines.
6. A comprehensive coverage on current coastal issues.

Course Outcomes:

After successful completion of the course the students will be able to:
CLO1: Identify and explain the key terms, concepts of coastal geomorphology processes and pattern.
CLO2: To describe the different mechanism of sea level changes and its issues.
CLO3: Identify the causes and consequences of coastal fluvial dominated coral and coral reefs.
CLO4: Applying coastal geomorphology skills in Hazard management and planning.

Unit	Topic	Subtopic	Marks	Lectures
1	Coastal Processes	Waves: Definition, wave length, wave height, amplitude, depth, period, fetch, frequency, Types of waves, Process of shoaling , wave breakers Currents: Currents – and its types Tides: Equilibrium Theory of tides, semidiurnal, diurnal, spring, and neap tides. Amphidromic point, co – tidal lines, coastal tides, tides in bays and estuaries.	25	15
2	Applied Coastal Geomorphology	Current coastal issues: Sea level rise, Storm hazard management, Coastal erosion Wetlands, Kharlands, Estuarine reclamation, Salt intrusion and subsidence of coastal aquifers Coastal Zone Management Application of Remote Sensing and Geographic Information Systems in Coastal Zone Studies	25	15
		Total	50	30

References:

C. Mandatory:

1.Masselink G, Hughes M G (2003): Introduction to coastal processes and geomorphology, Arnold, London

2.Davis J L (1980): Geographical variation in coastal development, Longman, New York

Reference Books:

i. Embelton and Thornes (1979): Process in geomorphology, Arnold, London

ii. Kale, V. S. and Gupta A., (2001): Introduction to Geomorphology, OrientLongman, Hyderabad.

iii. Hails J and Carr A (1975): Nearshore sediment dynamics and sedimentation, Wiley, London

iv. Karlekar Shrikant (1993): Coastal geomorphology of Konkan, Aparna Publication, Pune

v. Pethick John (1984): An Introduction to coastal geomorphology, Arnold Heinemann, London

vi. Tooley M M and Shennan I (1987): Sea level changes, Basil Blackwell, Oxford, U K

Websites References:

1. coastal landforms | Description, Formation, & Types | Britannica
2. 202003261536149312bali_Coastal_landforms.pdf (lkouniv.ac.in)
3. https://cpb-eu-w2.wpmucdn.com/edublog.mgfl.net/dist/a/14/files/2015/05/Coastal-Processes-and-Landforms-1g2xo2k.pdf
4. https://link.springer.com/article/10.1007/s10498-015-9278-7
5. https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion?qt-science_center_objects=0#qt-science_center_objects
6. https://www.dplh.wa.gov.au/information-and-services/state-planning/coastal-planning-and-management/coastal-hazard-risk-management-and-adaptation-plan
7. https://www.dplh.wa.gov.au/getmedia/76fb800f-07ad-479a-8efc-50dc2d812448/GD_CST_coastal_hazard_risk_management-guidelines-July2019