

**SEMESTER-WISE COURSE STRUCTURE FOR THE TWO YEARS P.G. PROGRAMMES IN
GOVERNMENT AUTONOMOUS COLLEGE ROURKELA**

**EFFECTIVE FOR THE STUDENTS ADMITTED TO THE FIRST YEAR
POST GRADUATE COURSE DURING THE SESSION 2023-24 AND ONWARDS**

Department of Geography

Semester	Paper	Course Title	Credits	Marks		
				Mid Sem.	End Sem.	Total
I	AECC-I	Entrepreneurship Development	2	20+20(assign ment)	60	100
	101	Advanced Geomorphology	4	20	80	100
	102	Geographical Thought	4	20	80	100
	103	Population Geography	4	20	80	100
	104	Geography Of India	4	20	80	100
	105	Cartographic Technique (Practical-I)	2		50	50
	106	Cartographic Technique (Practical-II)	2		50	50
	Total Credit /Marks for First Semester			22		
II	AECC-II	Environmental Studies And Disaster Management	2	20+20(assign ment)	60	100
	201	Climatology	4	20	80	100
	202	Economic Geography	4	20	80	100
	203	Statistical Methods in Geography	4	20	80	100
	204	Fundamentals of GIS and Remote Sensing	4	20	80	100
	205	Remote Sensing(Practical)	2		50	50
	206	Geography Of Odisha (Practical)	2		50	50
	Total Credit /Marks for Second Semester			29		
III	IDC	(for non-core students)	3	20+20(assign ment)	60	100
	301	Oceanography	4	20	80	100
	302	Social and Cultural Geography	4	20	80	100
	303	Settlement Geography	4	20	80	100
	304	Remote Sensing and Image Processing	4	20	80	100
	305	Field Survey(Practical-I)	2		50	50
	306	Field Survey(Practical-II)	2		50	50
	307	MOOC's one paper from Swayam or others	3		-	-
Total Credit /Marks for Third Semester			26			600
IV	401	Regional Development and Planning	4	20	80	100
	402	Environmental Geography	4	20	80	100
	403	Disaster Management	4	20	80	100
	404	Project (Project Work (50)+ Viva (30)+ Presentation (20))	4	50+30+20		100
	405	Statistical Method in Geography-I (Practical)	2		50	50
	406	Statistical Method in Geography-II (Practical)	2		50	50
	Total Credit /Marks for Fourth Semester			20		
Total Credit			90			2300

**One Non-credit course will be taken by the students during the 2 year of study
NCC/NSS/Sports/Yoga/Gardening/ Socially Useful Productive Work (SUPW)**

IDC – Inter Department Course or Open Elective

N.B. :- The mark distribution of AECC and IDC is 40 marks (20 marks Mid-Sem + 20 marks assignment) + 60 marks End-Sem.

Members:

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Chairman:  19.7.23

**SEMESTER-WISE COURSE STRUCTURE FOR THE TWO YEARS P.G. PROGRAMMES IN
GOVERNMENT AUTONOMOUS COLLEGE ROURKELA**

**EFFECTIVE FOR THE STUDENTS ADMITTED TO THE FIRST YEAR
POST GRADUATE COURSE DURING THE SESSION 2023-24 AND ONWARDS**

Department of Geography

Semester	Paper	Course Title	Credits	Marks		
				Mid Sem.	End Sem.	Total
I	AECC-I	Entrepreneurship Development	2	20+20(assign ment)	60	100
	101	Advanced Geomorphology	4	20	80	100
	102	Geographical Thought	4	20	80	100
	103	Population Geography	4	20	80	100
	104	Geography Of India	4	20	80	100
	105	Cartographic Technique (Practical-I)	2		50	50
	106	Cartographic Technique (Practical-II)	2		50	50
	Total Credit /Marks for First Semester			22		
II	AECC-II	Environmental Studies And Disaster Management	2	20+20(assign ment)	60	100
	201	Climatology	4	20	80	100
	202	Economic Geography	4	20	80	100
	203	Statistical Methods in Geography	4	20	80	100
	204	Fundamentals of GIS and Remote Sensing	4	20	80	100
	205	Remote Sensing(Practical)	2		50	50
	206	Geography Of Odisha (Practical)	2		50	50
	Total Credit /Marks for Second Semester			22		
III	IDC	(for non-core students)	3	20+20(assign ment)	60	100
	301	Oceanography	4	20	80	100
	302	Social and Cultural Geography	4	20	80	100
	303	Settlement Geography	4	20	80	100
	304	Remote Sensing and Image Processing	4	20	80	100
	305	Field Survey(Practical-I)	2		50	50
	306	Field Survey(Practical-II)	2		50	50
	307	MOOC's one paper from Swayam or others	3	-	-	-
	Total Credit /Marks for Third Semester			26		
IV	401	Regional Development and Planning	4	20	80	100
	402	Environmental Geography	4	20	80	100
	403	Disaster Management	4	20	80	100
	404	Project (Project Work (50)+ Viva (30)+ Presentation (20))	4	50+30+20		100
	405	Statistical Method in Geography-I (Practical)	2		50	50
	406	Statistical Method in Geography-II (Practical)	2		50	50
	Total Credit /Marks for Fourth Semester			20		500
	Total Credit			90		2300

One Non-credit course will be taken by the students during the 2 year of study
NCC/NSS/Sports/Yoga/Gardening/ Socially Useful Productive Work (SUPW)

IDC -- Inter Department Course or Open Elective

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GEOGRAPHY P – 101
Advanced Geomorphology

Credit =4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any):

Basic knowledge of Geomorphology

Aim of the Course:

This is to train students in relevant topics of Advance Geomorphology covering its theoretical and practical aspects in order to use the understanding developed in spatial planning and management activities.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Review, interpret and describe different perspectives in Geomorphology (Unit 1- OBE level to be achieved – Apply)
 - II. Review, interpret, discuss, relate and critic different fundamental concepts of Geomorphology (Unit 2 & 3 - OBE level to be achieved – Analyse)
 - III. Identify, relate and evaluate the application of understanding developed in Unit 1, 2 and 3 for specific planning and management areas (Unit 4 - OBE level to be achieved – Evaluate)
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Course Contents:

Unit 1. Perspectives in Geomorphology

Evolution of Geomorphological thoughts and ideas: A general review; Historical Benchmarks in Geomorphology; Progress of Geomorphology in India;
Concepts of scale: spatial, temporal, equilibrium and threshold; Morphogenetic regions;
Approaches to Geomorphology: Structural, climatic, applied and systems approach.
Principles of landform classification: Genetic and hierarchical.

(Covers OBE level – Remember, Understand and Apply)

Unit 2. Fundamental Concepts – I

Earth - A brief review of basics: Origin (Big-bang theory); shape, size and movements of earth; Age (geological history and clock), structure and composition (crust, mantle and core); Location of a place on earth; Rock and Minerals

Forces that produce landforms: Geomorphic process: Endogenetic and Exogenetic forces

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Fundamental Concepts – II

Movement of crust: Continental Drift Theory (A. Wegner); Plate tectonics theory; Mountain building theory (comparative assessment of Kober's and Jeffrey's)

Theories of Isostasy (comparative assessment of Airy, Pratt and Heiskanen)

Geomorphic Cycle and Land Forms; Weathering – concept, controlling factors and types; Erosion – concept, Cycle of erosion (Davis's model, Penck's model), interruptions in cycle and rejuvenation of cycle;

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

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Unit 4. Applied Geomorphology in –

- Water and coastal management
- Mineral exploration and engineering related works
- Regional planning and urbanisation
- Hazard and disaster management

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Reading List

1. Allison, R. (2002). *Applied Geomorphology: Theory and Practices*, Wiley Europe,
 2. Bunnnett, R.B. (1965), *Physical Geography in diagrams*, Orient Longman Limited
 3. Bridges E. M., 1990: *World Geomorphology*, Cambridge University Press, Cambridge.
 4. Christopherson, Robert W., (2011), *Geosystems: An Introduction to Physical Geography*, 8Ed., Macmillan Publishing Company
 5. Gautam, A (2010): *Bhautik Bhugol*, Rastogi Publications, Meerut
 6. Hails, J.R. *Applied Geomorphology*, Elsevier, Amsterdam, 1977
 7. Kale V. S. and Gupta A., 2001: *Introduction to Geomorphology*, Orient Longman, Hyderabad.
 8. Kenneth, J.G. and Lewin, J. (2014). *The Basics of Geomorphology: Key Concepts*, SagePublications, <http://dx.doi.org/10.4135/9781473909984>
 9. Selby, M.J., (2005), *Earth's Changing Surface*, Indian Edition, OUP
 10. Skinner, Brian J. and Stephen C. Porter (2000), *The Dynamic Earth: An Introduction to physical Geology*, 4th Edition, John Wiley and Sons
 11. Singh, S. (2009): *Physical Geography*, Prayag Pustak, Allahabad
 12. Starhler & Strahler: *Advanced Physical Geography*. John Wiley, New York
 13. Thornbury W. D., 1968: *Principles of Geomorphology*, Wiley.
 14. Wooldridge & Morgan (1968) – *Principle of Geomorphology*.
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GEOGRAPHY P- 102

Geographical Thought

Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any):

Basic understanding of Geographic concepts.

Aim of the Course:

To provide basic conceptual understanding of evolution of Geographical concepts and approaches.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Understand the evolution of the philosophy of Geography (Unit 1: OBE level to be achieved – Understand)
- II. Compare different approaches to study geographical phenomena (Unit 3: OBE level to be achieved – Analyse)
- III. Analyse the contemporary socioenvironmental issues in geographical perspectives (Unit 3: OBE level to be achieved – Analyse)

Course Contents:

Unit 1. Introduction

Meaning, Philosophy & Purpose of Geography; Place of Geography in classification of science. Changing paradigm – Environmental determinism, Possibilism, Aerial differentiation, Spatial Organization.

Dualism- Systematic vs Regional, Physical vs Human
Human-Environment Interaction;

(Covers OBE level – Remember and Understand)

Unit 2. Contribution of different school of thought Geographic knowledge in ancient & medieval period. Contribution of German and French School.

Contribution of British and American School.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Contemporary Trends

Quantitative Revolution in Geography
Behaviouralism, Humanism & Radicalism
Structuralism & Post Structuralism; Modernism & Postmodernism

(Covers OBE level – Remember, Understand, Apply and Analyse)

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Unit 4. Future of Geography

Changing nature, concepts, approaches & methodologies of geography in globalizing world;
Progress in Indian Geography;
Contribution of Indian Geographers

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Arentsen M., Stam R. and Thuijjs R., 2000: *Post-modern Approaches to Space*, ebook.
 2. Bhat, L.S. (2009) *Geography in India (Selected Themes)*. Pearson
 3. Bonnett A., 2008: *What is Geography?* Sage.
 4. Clifford, N.J (2002) – The Future of Geography, *GEOFORUM*, Vol.33, pp 431-436
 5. Dikshit R. D., 1997: *Geographical Thought: A Contextual History of Ideas*, Prentice– Hall India.
 6. Hartshorn R., 1959: *Perspectives of Nature of Geography*, Rand MacNally and Co.
 7. Holt-Jensen A., 2011: *Geography: History and Its Concepts: A Students Guide*, SAGE.
 8. Johnston R. J., (Ed.): *Dictionary of Human Geography*, Routledge.
 9. Johnston R. J., 1997: *Geography and Geographers, Anglo-American Human Geography since 1945*, Arnold, London.
 10. Kapur A., 2001: *Indian Geography Voice of Concern*, Concept Publications.
 11. Martin Geoffrey J., 2005: *All Possible Worlds: A History of Geographical Ideas*, Oxford.
 12. Peet, R. 1978. *Radical Geography*. London: Methuen.
 13. Peet, R. 1998. *Modern Geographical Thought*. London: Blackwell.
 14. Soja, Edward 1989. *Post-modern Geographies*, Verso, London. Reprinted 1997: Rawat Publ., Jaipur and New Delhi.
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GEOGRAPHY P- 103

Population Geography

Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

To provide basic conceptual understanding of demographic concepts, population theories and policies.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Understand of nature, scope and evolution of population geography (Unit 1: OBE level to be achieved – Understand)
 - II. Understand, discuss and discover different sources of population data to study population. (Unit 1: OBE level to be achieved – Apply)
 - III. Describe and discuss different aspects of population dynamics & population-resource interactions. (Unit 3: OBE level to be achieved – Analyze)
 - IV. Compare population problems and policies of developed and developing countries (Unit 4: OBE level to be achieved – Analyze)
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Course Contents:

Unit 1. Defining the field and Data Sources:

Nature and scope of population geography.
Sources of population data; Population data from UN publications.
Population data sources in India-Census, National Sample Survey; Unique Identification Scheme (UID) & National Population Register (NPR).

(Covers OBE level – Remember and Understand)

Unit 2. Population-Resource Relationship:

World distribution of population; Factors affecting population distribution. World population growth and density.
Population-Resource Regions of the world.
Malthus theory of Population.

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Population dynamics:

Determinants, measures and theories of fertility Determinants and measures of Mortality and Morbidity Determinants, measures and theories of Migration Demographic transition theory

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(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Population problems, Prospects and Policies:

- Changing Population composition (age, sex & occupation) and its socioeconomic implications.
- Population problems of developed and developing countries.
- Causes and consequences of Aging.
- Population policies of developed and developing countries with a special focus on India.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Barrett H. R., 1995: *Population Geography*, Oliver and Boyd.
2. Bhende A. and Kanitkar T., 2000: *Principles of Population Studies*, Himalaya Publishing House.
3. Chandna R. C. and Sidhu M. S., 1980: *An Introduction to Population Geography*, Kalyani Publishers.
4. Clarke J. I., 1965: *Population Geography*, Pergamon Press, Oxford.
5. Hassan, M.I. 2020 : *Population Geography: A Systematic Exposition*, Routledge, New York.
6. Jones, H. R., 2000: *Population Geography*, 3rd ed. Paul Chapman, London.
7. Lutz W., Warren C. S. and Scherbov S., 2004: *The End of the World Population Growth in the 21st Century*, Earthscan
8. Newbold K. B., 2009: *Population Geography: Tools and Issues*, Rowman and Littlefield Publishers.
9. Pacione M., 1986: *Population Geography: Progress and Prospect*, Taylor and Francis.
10. Wilson M. G. A., 1968: *Population Geography*, Nelson.
11. Panda B P (1988): *Janasankhya Bhugol*, M P Hindi Granth Academy, Bhopal
12. Maurya S D (2009) *Jansankhya Bhugol*, Sharda Putak Bhawan, Allahabad
13. Chandna, R C (2006), *Jansankhya Bhugol*, Kalyani Publishers, Delhi

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GEOGRAPHY P-104

Geography of India

Credit = 4

(F.M. = 100 (Mid Term: 20 + Term End: 80)

Prerequisite Course / Knowledge (If any):

Basic understanding about India would be helpful.

Aim of the Course:

is to provide essential and advanced understanding of Geography of India that could be used in analyses during simultaneous modules.

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

- I. Recall, describe, locate and summarise Physiographic and climatic characteristics of India (Unit1 - OBE level to be achieved – Understand)
- II. Review, summarise and relate social characteristics of India (Unit2 - OBE level to be achieved – Apply)
- III. Review, identify and breakdown resources of India (Unit3 & 4 - OBE level to be achieved – Analyze)

Course Contents:

Unit 1. Physiographic and climatic characteristics of India

Physiographic division of India;
Soil types and distribution;
Vegetation - types and distribution in India;
Climatic characteristics of India, Monsoon mechanism in India

(Covers OBE level – Remember and Understand)

Unit 2. Social composition of India

Population; distribution and growth and associated basic characteristics; Social composition of India: Religion, Language; Tribe; Caste system in India Settlement Pattern – urban and rural

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Mineral resources and industries in India

Distribution, pattern and utilization of coal, Iron ore, Bauxite, Petroleum, Natural gas Major Industries - Iron and Steel, Aluminum Industry, Automobile, Cotton Textile Industry

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Agricultural resources in India

Production and distribution of rice, Wheat, Cotton;
Agro-climatic region of India

(Covers OBE level – Remember, Understand, Apply and Analyse)

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Reading List -

1. Deshpande C. D., 1992: India: A Regional Interpretation, ICSSR, New Delhi.
 2. Johnson, B. L. C., ed. 2001. Geographical Dictionary of India. Vision Books, New Delhi.
 3. Mandal R. B. (ed.), 1990: Patterns of Regional Geography – An International Perspective. Vol. 3 – Indian Perspective.
 4. Sdya Suk Galina and P Sengupta (1967): Economic Regionalisation of India, Census of India
 5. Sharma, T. C. 2003: India - Economic and Commercial Geography. Vikas Publ., New Delhi.
 6. Singh R. L., 1971: India: A Regional Geography, National Geographical Society of India.
 7. Singh, Jagdish 2003: India - A Comprehensive & Systematic Geography, Gyanodaya Prakashan, Gorakhpur.
 8. Spate O. H. K. and Learmonth A. T. A., 1967: India and Pakistan: A General and Regional Geography, Methuen.
 9. Tirtha, Ranjit 2002: Geography of India, Rawat Pubs., Jaipur & New Delhi.
 10. Pathak, C. R. 2003: Spatial Structure and Processes of Development in India. Regional Science Assoc., Kolkata.
 11. Tiwari, R.C. (2007) Geography of India. Prayag Pustak Bhawan, Allahabad
 12. Sharma, T.C. (2013) Economic Geography of India. Rawat Publication, Jaipur
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Cartographic Techniques-I (Practical)

Credit = 2

F.M. = 50

Prerequisite Course / Knowledge (If any):

Basic understanding of mapping would be helpful.

Aim of the Course:

is to provide essential cartographic skills to the students and educate them in effective map-making as per the requirement.

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

- I. Understand, explain and relate the need, scientific bases, characteristics and types of map-making (Unit1 - OBE level to be achieved – Apply)
- II. Interpret, relate, compare, differentiate and examine different fundamentals of mapping (Unit 2 - OBE level to be achieved – Analyse)
- III. Create maps as per audience's requirement after evaluating and synthesizing the available information (Unit 3 - OBE level to be achieved – Create)
- IV. Interpret Maps (Unit 4-OBE level to be achieved -Analyse)

Course Contents:

Unit 1. Overview of Cartography

Need and scientific basis of map-making (Cartography); History of Cartography
Types of maps – brief review of general-purpose map and thematic maps (Choropleth, Isopleth, Chorochromatic, proportional symbol, dot maps including multiple dots, flowmaps, and cartograms);
Basic elements of map
Use of Diagrams in Geography - Climograph, Hydergraph, and Ergograph

(Covers OBE level – Remember, Understand and Apply)

Unit 2. Fundamentals of Map-making

The reference system – Geographic Coordinate system; Datum;
Map projections: need, properties (four distortions –direction, distance, shape and size) and classification;
Key projections (brief review): Conical projection (one standard & two standard parallels), Cylindrical Projection (Equal Area), Gromonic projection, Universal Transverse Mercator's projection (UTM).

Record & Viva would carry 20 % of marks

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Reading List

1. Anson R. and Ormelling F. J., 1994: *International Cartographic Association: Basic of Cartographic Vol.* Pregmen Press.
2. Gupta K. K. and Tyagi V. C., 1992: *Working with Maps*, Survey of India, DST, New Delhi.
3. Kraak M.-J. and Ormeling F., 2003, 2020: *Cartography: Visualization of Geo-Spatial Data*, Prentice-Hall.
4. Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
5. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>
6. Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
7. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
8. Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
9. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
10. Bhopal Singh R L and Dutta P K (2012) *Prayogatama Bhugol*, Central Book Depot, Allahabad

Online Resource:

1. Commonwealth of Australia on behalf of ICSM, 2021. *Fundamental of Mapping* [online]. Available at - <https://www.icsm.gov.au/education/fundamentals-mapping> [Accessed on: 11/06/2021]
 2. Gimond, Manuel, 2021. *Intro to GIS and Spatial Analysis* [online]. Available at - <https://mgimond.github.io/Spatial/index.html> [Accessed on: 11/06/2021]
 3. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>
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Cartographic Techniques-II (Practical)

Credit = 2

F.M. = 50

Prerequisite Course / Knowledge (If any): Basic understanding of mapping would be helpful.

Aim of the Course:

is to provide essential cartographic skills to the students and educate them in effective map-making as per the requirement.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Understand, explain and relate the need, scientific bases, characteristics and types of map-making (Unit1 - OBE level to be achieved – Apply)
- II. Interpret, relate, compare, differentiate and examine different fundamentals of mapping (Unit 2 - OBE level to be achieved – Analyse)
- III. Create maps as per audience's requirement after evaluating and synthesizing the available information (Unit 3 - OBE level to be achieved – Create)
- IV. Interpret Maps (Unit 4-OBE level to be achieved -Analyse)

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Designing the map

Preparation before mapping: Audience, medium and purpose of the map; Steps in map production;

Basic elements of map: Major (main body of map), Marginal information (Graticules and Grids, legend/index, title, north arrow, scale, labels and map specifications)

Design principles: hierarchy and balance

Symbolization of data (Quantitative and Qualitative) using key components – Geometry (Point, line and Area) and Visual Variables (Shape, size, Hue and Value)

Final map layout: Cartographic considerations (placing major and minor components on map)

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Unit 4. Map Interpretation

Morphometric Analysis: Stream order, Sinuosity Index and Bifurcation Ratio; Drainage Density
Topographic & Weather Maps interpretation

(Covers OBE level – Remember, Understand and Apply)

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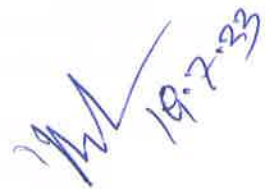
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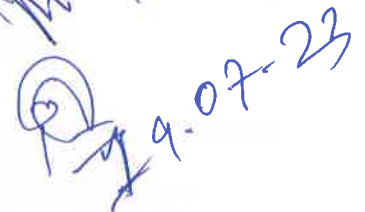
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GEOGRAPHY P- 201

Climatology

Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any): Basic knowledge of high school physics and math

Aim of the Course: It aims to provide students with an integrated knowledge on the Earth's climate, understanding of physical climate processes and principles and laws that govern climate.

Course Learning Outcome: After completion of this course, the students will able to:

- I. List the composition and structure of atmosphere; describe insolation and heat budget; explain the greenhouse effect, relate insolation and heat budget of an area. *(OBE level to be achieved – Remembering, understanding)*
- II. Tell reasons of spatial variation in temperature on earth surface, explain the reason of thermal inversion, apply the concept of thermal inversion for solving air pollution; apply the concept of insolation to temperature variations and analyze its impact on atmospheric variables like pressure and wind at different spatial scale. *(OBE level to be achieved – Remembering, understanding, applying)*
- III. Relate heat and water content through atmospheric process of evaporation, condensation, cloud formation; apply the concept of saturation and dew point in in humidity, compare the different types of humidity, classify and distinguish rain causing clouds and precipitation and rainfall. *(OBE level to be achieved – Remembering, understanding, applying, analyzing)*
- IV. Outline the different types of airmass; understand and compare the development and effect of extreme weather condition like cyclone, front; Appraise the use of different climate classification system *(OBE level to be achieved – Remembering, understanding, applying, analyzing, Evaluating)*

Course Contents:

Unit 1. Earth's atmosphere and heat budget

Composition & Structure of Atmosphere; Chemical Composition of Atmosphere-Homosphere & Heterosphere Insolation and Factors affecting distribution of insolation; Heat Budget of Earth

(Covers OBE level – Remember, Understand and Apply)

Unit 2. Temperature variation and its effect

Temperature and factors controlling distribution of temperature; Horizontal & Vertical Distribution of temperature, Cause and effect Temperature Inversion

Atmospheric pressure and its measurement, Horizontal distribution of pressure & pressure belt

Wind and its types, Planetary Wind, Effect of Coriolis force on wind, Jet stream, Monsoon.

(Covers OBE level – Remember, Understand, Apply and Analyse)

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Unit 3. Atmospheric water

States of water and latent heat, and Evaporation; Condensation;
Water Vapour - concept of saturation, Dew point, Humidity measurement, Absolute Humidity, relative Humidity, Specific Humidity
Classification of Cloud; Forms of precipitation; Types of Rainfall and its measurement

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 4. Applied Geomorphology in –

4.1 Meaning, properties and source of Air mass
4.2 Fronts, its Classification, development and effect
Origin, characteristics and effects of Tropical and Extra Tropical Cyclone
Climate classification basic, Koeppen's and Thornthwaite's Classification of Climate

(Covers OBE level – Remember, Understand, Apply and Analyse and evaluate)

Reading List

1. Barry R. G. and Carleton A. M., 2001: Synoptic and Dynamic Climatology, Routledge, UK.
2. Barry R. G. and Corley R. J., 1998: Atmosphere, Weather and Climate, Routledge, New York.
3. Critchfield H. J., 1987: General Climatology, Prentice-Hall of India, New Delhi
4. Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: The Atmosphere: An Introduction to Meteorology, Prentice-Hall, Englewood Cliffs, New Jersey.
5. Oliver J. E. and Hidore J. J., 2002: Climatology: An Atmospheric Science, Pearson Education, New Delhi.
6. Trewartha G. T. and Horne L. H., 1980: An Introduction to Climate, McGraw-Hill.
7. Lal, D S (2006): Climatology, Sharda Pustak Bhawan, Allahabad
8. Vatal, M (1986): Bhautik Bhugol, Central Book Depot, Allahabad
9. Singh, S (2009): Climatology, Prayag Pustak Bhawan, Allahabad

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GEOGRAPHY P– 202
Economic Geography
Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any):

Basic knowledge of economic development and natural resources

Aim of the Course:

to provide a critical understanding of resource available to be used by humans and how they can be conserved and managed sustainably.

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

- I. Review and understand the basics of Economic and Resource Geography (Unit 1- OBE level to be achieved – Understand)
- II. Describe, discuss and evaluate the concept of development and theory of localisation of economic activity. (Unit 2- OBE level to be achieved – Analyse)
- III. Describe and discuss different resource geography models and appraise, relate, compare, and differentiate them particularly the models related to natural resources (Unit 3- OBE level to be achieved – Analyse)
- IV. Appraise and Interpret different resources in terms of their conservation and management and summarise their challenges and sustainability (Unit 4- OBE level to be achieved – Evaluate)

Course Contents:

Unit 1. Basics of Economic Geography

Nature, Scope and Significance of Economic Geography Definition and Concept of Resources; Classification of Resources. Concept and types of economic activities;

(Covers OBE level – Remember and Understand)

Unit 2. Spatial patterns of Economic development

Factors affecting location of economic activities-Von Thunen's Agricultural Location Theory; Industrial Location Theory of Weber and Smith.
Economic Development: Concept and Indicators; Global Patterns of development- Classification of countries.
Rostow's stage model of economic growth
Environment vs Development Debate

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 3. Natural Resources: Use, Misuse and Future prospects

Models of Natural Resource Processes: Zimmermann's Primitive and Advance Models of Natural Resource Process, Kirk's Decision Model, Brookfield System Model.
Soil Resource; Water Resource; Forest Resource and Mineral Resources;
Impact of globalization on resources; Future Prospects of Natural Resources

(Covers OBE level – Remember, Understand, Apply and Analyse)

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Unit 4. Conservation and Management of Natural Resources

Meaning and Concept of Conservation of Natural Resources;
Models of resource management: Biophysical; Economic; Cultural models (Mitchell 1980)
Resource Conservation and Management Methods of Natural Resources- Soil Resource, Water Resource, and Forest Resource;
Sustainable Natural resource Management – History; Goals (emphasizing SDGs); Problems of Natural Resource Management in India.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Reading List

1. Alexander J. W., 1963: *Economic Geography*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Bagchi-Sen S. and Smith H. L., 2006: *Economic Geography: Past, Present and Future*, Taylor and Francis.
3. Coe N. M., Kelly P. F. and Yeung H. W., 2007: *Economic Geography: A Contemporary Introduction*, Wiley-Blackwell.
4. Eliot Hurst, M.E. (1972) *A Geography of Economic Behaviour: An Introduction*, Duxbury Press, California.
5. Gautam, Alka, (2013): *Geography of Resources*, Sharda Pustak Bhawan, Allahabad.
6. Guha, J.L. and P.R.Chattroj (1994) *Economic geography- A Study of Resources*, The World Press Pvt. Ltd. Calcutta
7. Gurjar, R.K. and Jat, B.C. (2012): *Sansadhan Bhugol*, Panchsheel Prakashan, Jaipur.
8. Haroon Mohamad. (2007) *Geography of Resources*, Vasundhara Parkashan, Gorakhpur (Hindi Edition)
9. Martin, R.H. and F.L. Warren. (1959) *Natural Resources*. McGraw Hill Book Co. London.
10. Maurya, S.D. (2015) *Economic Geography*. Parwalika Publications, Allahabad (Hindi Edition).
11. Mitchell B., 1997: *Resource and Environmental Management*, Longman Harlow, England.
12. Mitra, A. (2000): *Resource Studies*; Shridhar Publiders., Kolkata.
13. Negi, B.S. (2000) *Geography of Resources*, Kedar Nath and Ram Nath, Meerut
14. Owen, Oliver, S. (1971) *Natural Resource Conservation : A Ecological Approach*. McMillan New Delhi.
15. Ramesh, A. (1984) *Resource Geography (Ed.) R.P. Misra, Contribution to Indian Geography, Vol5*, Heritage Publishers, New Delhi.
16. Singh, A and Raja, M. (1982) *Geography of Resources and Conservation (Hindi Edition)* Pargati Parkashan, Meerut.

Online Resources

1. Mitchell, Bruce, 1980. *Models of resource management*, Sage Publication
2. United Nations, 2021. Sustainable Development Goals [online]. Available at: <https://sdgs.un.org/goals> [Accessed on 14th June 2021]

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GEOGRAPHY P– 203
Statistical Methods in Geography

Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any): Basic knowledge of statistics

Aim of the Course: is to provide an understanding on the statistical interpretation of diverse range of geographical data unfurl geographical patterns and relationships. And also enable students to derive a meaningful inference from the complex observations on the different dimensions of geographical studies.

Course Learning Outcome: After the completion of the course, student will be able to

- I. Show proficiency in interpreting geographical pattern of a data and apply basic data skills to organize, manage, and present data; Compare and make a rational choice amongst listed statistical sampling methods, data scaling based on the nature of data and purpose of study. *(OBE level to be achieved – Remembering, understanding, Applying)*
- II. Explain basic descriptive statistics to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data in geographical problems. *(OBE level to be achieved – Remembering, understanding, Applying)*
- III. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting; *(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating)*
- IV. Examine Test of Hypothesis for a population parameter; Demonstrate the practice of statistical thinking by taking a real-life problem; evaluate whether the procedure can be safely applied, explain the implications of statistical outcomes on the geographical study at-hand *(OBE level to be achieved – understanding, Applying, Analyzing, Evaluating)*
- V. Demonstrate ability to write reports of the results of statistical analyses (both descriptive and inferential) of geographic questions/problems/issues; Develop statistical software skills to solve geographical issues. *(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating, Creating)*

Course Contents:

Unit 1: Data and data sampling

Types of data, scale of data measurement, data presentation, Selection of class interval for mapping. Sampling techniques for geographical analysis; sample units and design, sampling frame and procedures, standard error and sample size, testing the adequacy of samples. Scaling techniques-rank score; Weighted score; Nearest-neighbour analysis. Drawing of histogram, Frequency curve, Frequency polygon, Bar diagram, Ogive using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 2: Measures of central tendency and dispersion

Measurement of Mean, Median and mode, Quartile.

Measurement of Range, quartile deviation, mean deviation,

Measurement of Standard deviation; coefficient of variation, Lorenz Curve and Gini's Coefficient; location Quotient. Graphical estimation and presentation of central tendency and dispersion using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying)

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Unit 3: Measurement of association

Forms of relation and measuring the strength of association, use of scatter diagram; Spearman's Rank Difference and Karl Pearson's Product Moment Correlation Coefficients, Coefficient of determination.

Regression analysis- regression equations, construction of regression line-interpolation, prediction, explanation; residual-statistical tests of significance of the estimates; computation of residuals

Drawing of scatter plot, Estimation of coefficient of correlation, coefficient of determination, fitting of regression line using statistical tool (Excel or SPSS)

OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. Statistical Test

Hypothesis Testing: Needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures, Contingency tables, Chi-square test, t-test, Analysis of Variance (ANOVA) and its estimation using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

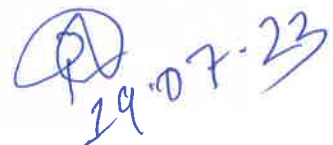
1. David, U. (1981): Introductory Spatial Analysis, Methuen, London.
 2. Ebdon, D. (1983): Statistics in Geography: A Practical Approach, Blackwell, London.
 3. Gregory, S. (1978): Statistical Methods and the Geographer (4th Edition), Longman, London.
 4. Gupta, S.P. (2010): Statistical Methods, Sultan Chand and Sons, Latest Edition
 5. Hammond, R. and McCullagh, P.S. (1974), Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.
 6. John P. Cole and Cuchlaine, King, A. M. (1968): Quantitative Geography, Wiley, London
 7. Mathews, J.A. (1987): Quantitative and Statistical Approaches to Geography, Practical Manual, Pergamon, Oxford.
 8. Pal, S.K. (1998): Statistics for Geoscientists; Techniques and Applications, Concept Publishing, New Delhi.
 9. Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient
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Fundamentals of Remote Sensing and GIS

Credit = 4

F.M. = 100 (Mid Term: 20 + Term End: 80)

Prerequisite Course / Knowledge (If any):

Basic knowledge of Remote Sensing and GIS

Aim of the Course:

is to train students in relevant topics of Remote Sensing and GIS covering its theoretical and practical aspects in order to use the understanding of basic principles of Remote Sensing, satellite image processing, Geographical Information System and its application to natural resource management.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. To learn the basic concepts of remote sensing, understand the fundamental concepts of satellites, platforms, resolution, sensors and its processes (Unit 1 and 2 OBE level to be achieved – Apply)
- II. To learn the concept of visual image interpretation and digital image processing (Unit 3 -OBE level to be achieved – Analyse)
- III. To understand the application of remote sensing and GIS in natural resource management (Unit 4 - OBE level to be achieved - Understand)

Course Contents:

Unit 1. Principles of Remote Sensing, Satellite and Sensors

Introduction to Remote Sensing: Fundamental Principle of Remote Sensing; Types of Remote Sensing; Advantages and limitations of Remote Sensing
Electromagnetic Radiation (EMR); Electromagnetic Spectrum; Energy interacts with the Atmosphere; Energy interacts with the Earth Surface; Spectral Reflectance Curve Platforms: Ground based platform; Aerial platform; Satellite platform
Satellite Orbits: Geostationary Satellites; Sun-synchronous Satellites
Resolution: Spatial Resolution; Radiometric Resolution; Spectral Resolution; Temporal Resolution
Multispectral Scanning: Across Track Scanning; Along Track Scanning
Data Reception, Transmission and Processing

(Covers OBE level – Remember, Understand and Analyse)

Unit 2. Image Interpretation and Digital Image Processing

Visual Image Interpretation; Elements of Visual Image Interpretation
Image Pre-processing: Radiometric correction; Geometric correction; Atmospheric correction
Image Enhancement: Filtering; Band Ratioing, Principal Component Analysis
Image Classification: Supervised Classification; Unsupervised Classification

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

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Unit 3. Remote Sensing Applications

Landuse and Landcover Mapping; Urban Sprawl Mapping

Agriculture: Crop Type Mapping and Inventory; Crop Monitoring and Damage Assessment

Forestry: Deforestation, Afforestation Mapping; Species Identification and Mapping; Forest Fire Monitoring and Mapping

Hydrological Mapping: Ocean and Coastal Area Monitoring and Mapping
Geology: Geological Mapping

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit-4. Introduction to Geographical Information System (GIS)

Definition of GIS; Components of GIS; Spatial and Non-Spatial Data; Digitization Raster and Vector

Data; Spatial Analysis; Spatial Statistics; GIS Applications Global Positioning System (GPS):

Concepts; GPS Positioning Types; GPS Systems

4.5. Multi Criteria Decision Making

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Reading List

1. Joseph, G. (2004) Fundamentals of Remote Sensing, Universities Press Pvt. Ltd
 2. Lillesand, T.M. and Kiefer, R.W. (2002) Remote Sensing and Image Interpretation, John Wiley and Sons, New Delhi
 3. Jensen, J.R. (2003) Remote Sensing of Environment: An Earth Resource Perspective, Pearson Education Pvt. Ltd
 4. Haywood, L. Comelius, S. and S, Carver. (1988) An introduction to Geographical information system, Addison Willey, New York
 5. Chrisman, N.R. (1997) Remote sensing and Geographical information systems
 6. Sabbins, F. F, (1987) Remote sensing: principles and interpretations, W.H. Freeman and Co, New York
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Remote Sensing and Geographical Information System Applications(Practical)

Credit = 2

F.M. = 50

Prerequisite Course / Knowledge (If any):

Basic knowledge of Remote Sensing and GIS

Aim of the Course: is to train students in relevant topics of Remote Sensing and GIS covering practical aspects in order to use the understanding of basic principles of Remote Sensing, satellite image processing, Geographical Information System and its application to natural resource management.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Overall understanding of potential of Remote Sensing, GIS and GPS
- II. Understanding of image interpretation and digital image processing
- III. Understanding of GIS analysis workflow and integrated applications in various domains of natural resource management

Course Contents:

Unit 1. Basics of Remote Sensing

Display of satellite images; Import and export of file; Layer stacking of image; Geo- referencing (map to image and image to map); Subset of image using AOI; Mosaic of images Radiometric correction of image; Geometric correction of image , Masking of image; Re-project of image

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 2. Digital Image Processing

Visual interpretation of satellite images
Image Enhancement: Radiometric Enhancement; Spectral Enhancement; Image Filtering; Band Ratioing, Principal Component Analysis, Unsupervised Classification of Image (K-Mean and Isodata); Supervised Classification of Image (Maximum Likelihood and Minimum Distance to Mean); Accuracy Assessment; Model making

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 3. Remote Sensing Application in Natural Resource Management

Land use and land cover classification
Forest Cover Classification and area estimation Agriculture mapping and acreage area estimation Forest Fire and Burnt Area Mapping
Flood Delineation and Mapping Coastal Erosion Mapping
Urban Sprawl Mapping

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Unit 4. Geographical Information System (GIS)

Geographic Data, Input, Storage and Editing: Spatial data and Non spatial data integration; Editing of data; Building of topology
Digitization: point, line and polygon; storage and manipulation of GIS data bases; vector and raster based models; presentation of GIS output.
Coordinate systems and map projections. Multi Criteria Decision Making.

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(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Course Learning Outcomes:

After completion of this course successfully, the students will be able to:

- IV. To learn the concept of satellite data processing, image geometric correction, radiometric correction and its processes, digital image classification and accuracy assessment (Unit 1 and 2 OBE level to be achieved – Apply)
- V. To learn use of satellite image in different natural resource management (Unit 3 - OBE level to be achieved – Analyse)
- VI. To understand the application of GIS in spatial data analysis, modeling and management (Unit 4 - OBE level to be achieved - Understand)

Reading List

- 1. NY. Burrough P.A. (1986) Principles of GIS for land assessment. University press London
 - 2. Burrough, P.A. and McDonnell, R.A. (1998) *Principles of Geographic Information Systems*, Oxford University Press
 - 3. Chang, K-t. (2006) *Introduction to Geographic Information Systems*, Tata McGraw-Hill
 - 4. DeMers, M. (2009) *Fundamentals of Geographic Information Systems*, 4th Edition, JohnWiley & Sons.
 - 5. Heywood, I. Cornelius, S. Carver, S. (2011) *An Introduction to Geographic Information Systems*, 4th Edition, Pearson Education.
 - 6. Jensen, J.R. (2006) *Remote Sensing of the Environment: An Earth Resource Perspective*, 2nd Edition, Pearson Education
 - 7. Joseph, G. (2005) *Fundamentals of Remote Sensing*, Orient Blackswan.
 - 8. Lillesand, T.M., Kiefer, R.W. and Chipman, J.W. (2004) *Remote Sensing and Image Interpretation*, 5th Edition, Wiley.
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Geography of Odisha Practical

Credit = 2

F.M. = 50

Prerequisite Course / Knowledge (If any): Basic knowledge of Geography of Odisha

Aim of the Course:

is to train students in relevant topics of Geography of Odisha covering theoretical aspects in order to use the understanding of basic knowledge about Geography of Odisha and its Natural Resource Management.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. To learn the basic knowledge about Odisha Geography such as Physiography, Climate, Soil, Vegetation, Drainage System, Natural Hazards, Coastal Erosion (Unit 1 and 2 OBE level to be achieved – Apply)
- II. To learn the types of crops and its production, agricultural problems of Odisha (Unit 3 - OBE level to be achieved – Analyse)
- III. To learn the study of demography, Transportation and Tourism of Odisha ((Unit 4 - OBE level to be achieved – Analyse)

Course Contents:

Unit 1. Physiography of Odisha

Location
Physiography Divisions
Geology
Drainage Systems
Natural Hazards
Coastal Erosion

(Covers OBE level – Remember, Understand and Analyse)

Unit 2. Climate, Soil and Vegetation of Odisha

Climate
Soil
Natural Vegetation

(Covers OBE level – Remember, Understand and Analyse)

Unit 3. Agricultural Crops of Odisha

Production and distribution of Rice, Pulses, Oilseed
Agricultural Problems in Odisha

(Covers OBE level – Remember, Understand and Analyse)

Unit 4. Demography, Transportation and Tourist Spots of Odisha

Population Distribution; Population Growth
Urban Growth Development of Roadways
Major Religious, Cultural and Natural Tourist Spots in Odisha: Puri, Konark, Similipal and Humana

(Covers OBE level – Remember, Understand and Analyse)

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Reading List

1. Sinha, B.N. (2014) Geography of Odisha, National Book Trust Publication.
 2. Roy, G.C. (2006) Geography of Odisha, Kalyani Publication.
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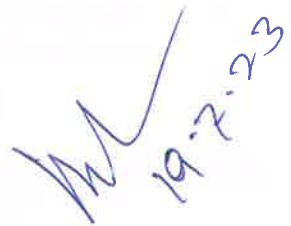
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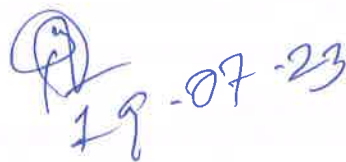
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GEOGRAPHY GEO P – 301

Oceanography

Credit = 4

F.M. = 100 (Mid Term: 20 + Term End: 80)

Prerequisite Course / Knowledge (If any): Basic knowledge of Oceanography

Aim of the Course:

is to train students in relevant topics of Oceanography covering its theoretical and practical aspects in order to understand different process in ocean water and its related studies.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Review, interpret and describe different perspectives of relief features of ocean basins (Unit 1- OBE level to be achieved – Apply).
 - II. Review, interpret, discuss, relate and critic different fundamental concepts of ocean temperature and salinity and its processes (Unit 2 - OBE level to be achieved – Analyse)
 - III. Identify the concept of understanding in oceanographic studies developed in Unit 2, 3 and 4
 - IV. Review, interpret and describe different perspectives in Oceanography (OBE level to be achieved – Apply).
 - V. Review, interpret, discuss, relate and critic different fundamental concepts of Oceanography covered in Unit 2 and 3 of this module (OBE level to be achieved – Analyse).
 - VI. Critically understand the oceanic environment and its different processes, study of marine environment in different dimensions (OBE level to be achieved – Understand)
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Course Contents:

Unit 1. Perspectives in Oceanography

Introduction to ocean and its relief features: A general view of ocean; Continental Shelf; Continental Slope; Deep Sea Plain; Mid Oceanic Ridges; Submarine Canyons; Sea Mounts; Sea Guyots

Bottom Relief of Ocean: Atlantic Ocean; Pacific Ocean; Indian Ocean

Ocean-Atmosphere Interaction: significance of ocean atmosphere interaction; coupling phenomenon; concept of boundary layers; ocean –atmosphere interaction near the tropics

(Covers OBE level – Remember, Understand and Analyse)

Unit 2. Fundamental Concepts – I

Ocean Temperature and Salinity: Factors affecting horizontal distribution of temperature of ocean water; Controlling factors of the density of ocean water

Factors controlling distribution of salinity; Horizontal and Vertical distribution of Salinity

(Covers OBE level – Remember, Understand, Analyse and Apply)

Unit 3. Fundamental Concepts – II

Tide: Concept of Tides; Types of Tide; Progressive Wave Theory on Tide; Equilibrium Theory on Tide

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Ocean Current: Concept of ocean current; Factors associated with ocean current; Currents of Atlantic Ocean; Currents of Pacific Ocean; Currents of Indian Ocean
Concept of El-Nino; La-Nino effects

(Covers OBE level – Remember, Understand, Analyse and Apply)

Unit 4. Perspectives in

Coral Reef: Coral reef; Types of Coral reef; Ideal Condition for the growth of Coral reef Theory of Coral reef: Subsidence theory of Darwin; Standstill theory of Murray; Coral Bleaching; Marine resource and its types

(Covers OBE level – Remember, Understand, Analyse, Apply and Evaluate)

Reading List

1. Davis, R.J.A. (1986) Oceanography: An Introduction to Marine Environments, Winc-Brown Publication, Iowa
 2. Sharma, R.C. and Vatal, M. (2018) Oceanography: Surjeet Publications, New Delhi
 3. Lal, D.S. (2008) Climatology and Oceanography, Sharada Pustak Bhawan, Allahabad, 2008
 4. Garrison, T.S. (2015) Oceanography: An Invitation to Marine Science, Cengage Publication
 5. Siddartha, K. (2016) Oceanography, *Kitab Mahal Publication*
 6. Singh, S. (2009) Physical Geography, Pravalika Publications, Allahabad
 7. Khullar, D.R. (2012) Physical Geography, Kalyani Publishers, New Delhi
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GEOGRAPHY P – 302

Social and cultural geography

Credit = 4

F.M. = 100 (Mid Term: 20+Term End:80)

Prerequisite Course / Knowledge (If any): None.

Aim of the Course: is to provide essential understanding of the social and cultural side of Geography with emphasis on India.

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

- I. Recognise, define and describe the evolution and relevance of Social Geography (OBE level to be achieved – Understand)
- II. Identify, summarise and compute elements of Social Geography with particular emphasis on India (OBE level to be achieved – Apply)
- III. Recognise, define and describe the evolution and relevance of Cultural Geography (OBE level to be achieved – Understand)
- IV. Identify, summarise and compute elements of Cultural Geography with particular emphasis on India (OBE level to be achieved – Apply)

Course Contents:

Unit 1. Social Geography- evolution and relevance

Definition: Nature and Scope and evolution of Social Geography;
Philosophical Bases of Social Geography (Positivism, Structuralism); Social Structure & Social Processes;
Concept of Social Space;

(Covers OBE level – Remember and Understand)

Unit 2. Elements of Social Geography (with emphasis on India)

Ethnicity, Tribe, Dialect, Language, Caste & Religion;
Socio-Cultural Regions of India;
Linguistic Elements in India.

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Cultural Geography- evolution and relevance

Definition: Nature and Scope and evolution of Cultural Geography;
Culture: Definition, Elements & Components;
Themes and Concepts in Cultural Geography: Culture Area, Cultural Region, Cultural Diffusion and Assimilation, Cultural ecology, Cultural Interaction, Cultural Landscape
Concepts of Culture – Traits, Diffusion, Acculturation;

(Covers OBE level – Remember and Understand)

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Unit 4. Components of Cultural Geography (with emphasis on India)

Types and Pattern of World Cultural regions;
Language, Religion, Ethnicity;
Cultures and cultural regions in India;
Ethnicities in India

(Covers OBE level – Remember, Understand and Apply)

Reading List

1. Ahmad, A. (1999). Social Geography. Jaipur: Rawat Publications.
 2. Crang, Mike (2013). Cultural Geography. London: Routledge.
 3. Dreze. Jean and A. Sen (2004). An Uncertain Glory: India and its Contradiction. New Delhi: Penguin India
 4. Eyles, John (1979). An Introduction to Social Geography, London: OUP
 5. Mitchell, D. (2000). Cultural Geography: A Critical Introduction, Oxford: Blackwell Publishers Ltd.
 6. Price, M., and M. Lewis (1993). "The Reinvention of Cultural Geography". Annals of the Association of American Geographers, 83 (1):1-17.
 7. Robertson, I. and Richards, P. (2003). (eds.): Studying Cultural Landscapes. London: Arnold
 8. Subbarao, Bendapudi (1958). The Personality of India, Faculty of Arts, Baroda: MS University
 9. Khilnani, Sunil (2004). The Idea of India. Delhi: Penguin India
 10. Thrift, Nigel (2005) Cultural Geography: Critical Concepts in the social Sciences. London: Routledge
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GEOGRAPHY P- 303

Settlement Geography

Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

is to provide a thorough understanding of settlements across the globe including their importance, trends and growth.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Recognize and state basic concepts of Settlement Geography (Unit 1: OBE level to be achieved – Remember)
 - II. Understand, discuss and describe fundamentals of Rural Settlement (Unit 2: OBE level to be achieved – Understand)
 - III. Understand, discuss and describe fundamentals of Urban Settlement (Unit 3: OBE level to be achieved – Apply)
 - IV. Review, understand, discuss and describe settlement hierarchies and policies (Unit 4: OBE level to be achieved – Analyse)
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Course Contents:

Unit 1. Introduction to Settlement Geography

Nature, scope, significance and approaches to study Settlement Geography; Development of Settlement Geography;
Theories of evolution of settlements and Geographical factors affecting growth of settlement distribution;
Types of Settlement: Rural and Urban Rural-urban dichotomy and continuum

(Covers OBE level – Remember)

Unit 2. Rural Settlement

Site, location, types and pattern;
Morphology of rural settlement;
Rural House types: planned and architectural style in different geographical environment;
Types and pattern of rural settlements

(Covers OBE level – Remember and Understand)

Unit 3. Urban Settlement

Origin of the cities: Ancient and Medieval;
Industrial growth and urban expansion;
Functional classification of urban centres: Harris and Nelson
Functional classification of Indian cities: Ashok Mitra and others

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(Covers OBE level – Remember, Understand and Apply)

Unit 4. Settlement Hierarchy and Policies

Rural service centre;
Central Place theory (Christaller);
Theory of Losch and its application
Issues and policies of Settlements, settlement planning

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading List

1. Ambrose, Peter, Concepts in Geography Vol.-I Settlement Pattern, Longman 1970.
 2. Baskin, C., (Translator), Central Places in Southern Germany, Prentice-Hall Inc.
 3. Fyfe N. R. and Kenny J. T., 2005: *The Urban Geography Reader*, Routledge.
 4. Graham S. and Marvin S., 2001: *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, Routledge.
 5. Hall T., 2006: *Urban Geography*, Taylor and Francis.
 6. Haggett, Peter, Andrew D. Cliff and Allen Frey (editor), *Locational Models* Arnold Heinemann 1979.
 7. King, Leslie, J., *Central Place Theory*, Saga Publications, New Delhi 1986.
 8. Mayer, M. Harold and Clyde F. Kohn (editors), *Readings in Urban Geography*, Central Book Depot, Allahabad 1967.
 9. Nangia, Sudesh, *Delhi Metropolitan Region*, K.B. Publications, New Delhi 1976.
 10. Prakasa, Rao, V.L.S., *Urbanisation in India; Spatial Dimensions*, Concept Publishing Co., New Delhi 1983.
 11. Ramachandran, R., *Urbanisation and Urban Systems in India*, Oxford University Press, New Delhi 1992.
 12. Singh R.L. and Kashi, Nath Singh (editors), *Readings in Rural Settlement Geography*, National Geographical Society of India, Varanasi 1975.
 13. Sinha, VPN, Usha Verma and Anuradha Sahay, *Introduction to Settlement Geography*, Rajesh Publication, 2017. (ISBN 10: 938368433X / ISBN 13: 9789383684335)
 14. Srinivasan, K. and M. Vlassoff, (editors), *Population-Development Nexus in India: Challenges for the New Millennium*, Tata McGraw-Hill Publishing Co. Ltd., New Delhi 2001.
 15. Ucko, M.J., Ruth Tringham and G.W. Dimbleby (editors), *Man, Settlement and Urbanism*, Duckworth 1972.
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GEOGRAPHY P– 304

Remote Sensing and Image Processing

Credit = 4

F.M. = 100 (Mid Term: 20 + Term End: 80)

Prerequisite Course / Knowledge (If any):

Basic knowledge of remote sensing and statistics

Aim of the Course:

is to introduce fundamental and advanced tools and techniques for satellite image processing on digital platform. This includes basic understanding satellite image to information extraction, information analysis, and processing using various analytical tools.

Course Learning Outcome:

After the completion of the course, student will be able to

I. Understand the various satellite image format and preparation of color composite; Analyze and interpret remotely sensed satellite images to understand topographical and cultural variations on the Earth's surface.

(OBE level to be achieved – Remembering, understanding, Applying)

II. Understand, select and perform the required image pre-processing techniques needed for multi- date, multi-sensor and multi-resolution images to be used in a given geographical project.

(OBE level to be achieved – Remembering, understanding, Applying)

III. Understand, interpret and apply the various image processing techniques to improve the visual quality of satellite imagery; compare the different image processing techniques for their suitability for visual extraction of desired information from satellite image

(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating)

IV. Understand multi-dimensional feature space of satellite imagery; compare the various classification methods for their suitability for feature extraction; evaluate the accuracy of image classification; perform necessary post editing and estimate classification statistics for a given satellite imagery based geographical study

(OBE level to be achieved – understanding, Applying, Analyzing, Evaluating)

V. Demonstrate the ability to explain the spatial aspect of geographical issue and deliver a solution to the same using a remote sensing approach.

(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating, Creating)

Course Contents:

Unit 1: Satellite image and its interpretation

Remote sensing Introduction; Types of resolution; spectral response curve, Publicdomain satellite data sources, Satellite image format- BIL, BSQ, and BIP Formats.

Image processing display systems, Initial statistical extraction - univariate and multivariate statistics, histogram and its significance in remote sensing data.

Introduction to major software packages; Satellite image interpretation, Generating True, False and Pseudo Colour Composite, Interpretation keys.

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(OBE level to be achieved – Remembering, understanding, Applying)

Unit 2: Satellite data Preprocessing

Principles of Digital Image Processing: System Design Considerations; Pre-Processing of Satellite Image Source and correction of radiometric error, missing scan lines, desk tripping methods Source and correction of geometric error, geometric correction and registration Atmospheric correction, illumination and view angle effects.

(OBE level to be achieved – Remembering, understanding, Applying)

Unit 3: Spectral and Spatial enhancement
Introduction- Look-Up Tables, concept of spectral frequency and spatial frequency, point and neighborhood operation; local and global operations
Spectral enhancement Image reduction, image magnification, contrast enhancement; linear, non-linear enhancement
Spatial enhancement- Filtering—Low pass & High Pass and Directional/Non-Directional; edge detection filter, edge enhancement; linear, non linear, Low pass filters, high pass filters, edge detection filter.
Image transformation- Arithmetic operations' based image transforms, principle component analysis, discriminate analysis, density slicing, Fourier transforms, Fast Fourier frequency domain filters, spectral indices for important earth features,

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. Image transformation and Classification

Data Processing techniques, N-Dimensional Scatter plots, Spectral angle mapping, Spectral mixture analysis
Images classification methods, Unsupervised Classification- K-mean clustering, ISODATA; Supervised Classification- training sample selection, minimum distance classifier, parallelepiped classifier, centroid classifier, maximum likelihood method, Hybrid methods and decision - tree classifiers; Use of external data, contextual information, feature - sub- feature study.
Ground truth, Accuracy Assessment; post classification editing; Image Statistics Generation
Change detection - the nature of change detection, change detection algorithms, image differencing, and image rationing and classification comparisons.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

1. John R. Jensen, 1986, Introductory digital image processing - A Remote Sensing perspective, Prentice Hall.
2. Paul M. Mather, 1987, Computer Processing of Remote Sensed Images, John Wiley & Sons.
3. Rosenfeld A. and A.C. Kak, 1976, Digital Picture Processing, New York – Academic Press.
4. Pratt. W.K. , 1976, Digital Image Processing Wiley Intersciences.
5. Allen and Unwin Gibson, P.J. 2000: Digital Image Processing. Routledge Publication.
6. Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press
7. Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.
8. Nag P. and Kudrat M. 1998: Digital Remote Sensing. Concept Publication

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GEOGRAPHY P– 305

Field Survey Methods(Practical-I)

Credit = 2

F.M. = 50

Prerequisite Course / Knowledge (If any): Basic understanding of surveying and field requirements would be preferable.

Aim of the Course: is to provide essential field related skills to the students in order to take cutting-edge research of any problem in real world (preferably local at this education stage).

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

- I. Understand basics of field work and identify field techniques to be used (Unit 1 - OBE level to be achieved – Analyse)
- II. Compare, differentiate and evaluate which data to collect from field and how (Unit 2 - OBE level to be achieved – Evaluate)
- III. Assess, design and develop field reports after evaluating and synthesizing the available information (Unit 3 – OBE level to be achieved – Create)
- IV. Asses and synthesize the information collected during field work and summarise the outcome (Unit 4 – OBE level to be achieved – Create)

Course Contents:

Unit 1. Field Survey - basics

Basics of Field work: objective of field work (physical or socioeconomic), Identifying the case-studies and defining the field model (conceptual geographical model)

Identification of field techniques to be used:

Measurement – nature of measurement (nominal, ordinal, interval and ratio); Key aspects (validity, reliability, Precision and Accuracy)

Sampling – Key elements (Population, bias, sample size etc.); methods (simple random, stratified and systematic), errors

Practical: Study area is to be conveniently finalized as per the identified objective of field work for stressing on any local problem or any contemporary issue. Field model should be determined.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Unit 2. Collecting data from field

Data source and collection – primary and secondary;

Surveying (Physical) – Plane Table Survey; Prismatic Compass Survey; Theodolite, and Dumpy level; Global Positioning System (GPS)

Surveying (Socioeconomic) - Observation (Participants and non-participants), Questionnaire (Open, close, structured and non-structured) and interview (individual and focus groups)

Practical: Identify data source and collection methods as per the designed field model for the selected problem in unit 1. Collect data. Note: Field work must not exceed 7 days.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

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Reading List

1. Bhopal Singh R L and Duttta P K (2012) Prayogatama Bhugol, Central Book Depot, Allahabad
2. Rice, S. 2003. Ch 17: *Sampling in Geography*. In: Clifford, N., French, S., Valentine, G. (Eds) *Key Methods in Geography*, London: Sage Publication.
3. Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
4. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
5. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
6. Stoddard, R.H. 1982: *Field Techniques and Research Methods in Geography*, National Council for Geographic Education Pacesetter Series, Lonsbury/Sommers/Fernald.

Online Resources:

1. Brunet, R. 2001. *Models in geography? A sense to research*, CyberGeo, 204.
<https://doi.org/10.4000/cybergeo.4288>
2. Rana, L. 2021. *Models, Theory & Systems Analysis In Geography* [online]. Available at:
http://ags.geography.du.ac.in/Study%20Materials_files/Lalita%20Rana_SC.pdf
3. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>

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GEOGRAPHY P- 306

Field Survey Methods(Practical-II)

Credit = 2

F.M. = 50

Prerequisite Course / Knowledge (If any):

Basic understanding of surveying and field requirements would be preferable.

Aim of the Course:

is to provide essential field related skills to the students in order to take cutting-edge research of any problem in real world (preferably local at this education stage).

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

- I. Understand basics of field work and identify field techniques to be used (Unit 1 - OBE level to be achieved – Analyse)
- II. Compare, differentiate and evaluate which data to collect from field and how (Unit 2 - OBE level to be achieved – Evaluate)
- III. Assess, design and develop field reports after evaluating and synthesizing the available information (Unit 3 – OBE level to be achieved – Create)
- IV. Assess and synthesize the information collected during field work and summarise the outcome (Unit 4 – OBE level to be achieved – Create)

Unit 3. Field report writing

Text of the Report should ideally be divided into the following sections: Introduction and Statement of problem(s), Aim and Objectives, Materials and methods, Analysis and Results, Discussions, Conclusion, References/ Bibliography (API for Harvard Format) and Appendices (if any).

Practical: Perform the analyses from collected data and write a report with Figures and Tables captioned properly.

Note: Report should not exceed 5,000 words (max 15 pages excluding references).

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Unit 4. Final report

Seminar Presentation (based on socioeconomic survey) would carry 20% of total marks. Record & Viva would carry 20% of total marks

Note: Final copy of the report (along with soft copy) must be submitted to the department.

Reading List

1. Bhopal Singh R L and Dutta P K (2012) *Prayogatama Bhugol*, Central Book Depot, Allahabad
2. Rice, S. 2003. Ch 17: *Sampling in Geography*. In: Clifford, N., French, S., Valentine, G. (Eds) *Key Methods in Geography*, London: Sage Publication.
3. Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
4. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
5. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
6. Stoddard, R.H. 1982: *Field Techniques and Research Methods in Geography*, National Council for Geographic Education Pacesetter Series, Lonsbury/Sommers/Fernald.

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Online Resources:

4. Brunet, R. 2001. *Models in geography? A sense to research*, CyberGeo, 204.
<https://doi.org/10.4000/cybergeogeo.4288>
 5. Rana, L. 2021. *Models, Theory & Systems Analysis In Geography* [online]. Available at:
<http://ags.geography.du.ac.in/Study%20Materials%20files/Lalita%20Rana%20SC.pdf>
 6. Manson, S. M. (ed) (2017). *Mapping, Society, and Technology*. Minneapolis, Minnesota: University of Minnesota Libraries Publishing. URL: <https://open.lib.umn.edu/mapping>
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GEOGRAPHY P– 401
Regional development and planning

Credit = 4

F.M. = 100 (Mid Term: 20+Term End:80)

Prerequisite Course / Knowledge (If any): None.

Aim of the Course: is to provide essential understanding of the social and cultural side of Geography with emphasis on India.

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Recognise, define and describe the basic elements of Regional development and planning (OBE level to be achieved – Understand)
 - II. Outline, distinguish and relate theories, models and indicators of Regional Planning (OBE level to be achieved – Apply)
 - III. Examine planning regions with particular emphasis on India (OBE level to be achieved – Analyze)
 - IV. Examine, compare and explain different concepts and contemporary issues with particular emphasis on India (OBE level to be achieved – Analyze)
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Course Contents:

Unit 1. Basics elements

Concept of Planning; Types of Planning; Regional Planning; Region;
Types of Region;
Methods of Delineation of Different Types of Region.

(Covers OBE level – Remember and Understand)

Unit 2. Regional Planning Theories, models and indicators (With emphasis on India)

Growth Pole Theory;
Spatial Diffusion
Theory;
Cumulative Causative Model;
Human Development Index & its Indicators;
Regional Disparity in India;

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Planning Regions (With emphasis on India)

Planning Regions of India (Macro, Meso & Micro);
Planning for Command Area Development;
Watershed Management; Hill & Tribal Area
Development.

(Covers OBE level – Remember, Understand, Apply and Analyse)

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Unit 4. Concepts and contemporary issues (With emphasis on India)

Concept of Multi-Level Planning
Decentralised Planning;
People Participation in Planning Process;
Panchayati Raj System;

Environmental Issues in Regional Planning;
Sustainable Development Planning.

(Covers OBE level – Remember, Understand, Apply and Analyse)

Reading list

1. Chandana R.C. (2015); Regional Planning and Development, Kalyani Publishers, New Delhi.
2. Chand, M., & Puri, V. K. (1983). Regional Planning in India. New Delhi: Allied
3. Dawkins, D. J. (2003). Regional Development Theory: Conceptual Foundations, ClassicWorks, and Recent Developments. Journal of Planning Literature, 18 (2), 131-172.
4. Issard, W. (1956). Location and Space Economy. Massachusetts: MIT Press.
5. Hall, P. 2002. Urban & Regional Planning, Routledge Publication: London & New York. Available online at:
<http://www.pnu.ac.ir/portal/file/showfile.aspx?id=66559f80-6bb9-4498-b821-aff9faf455e9>
6. Issard, W. (1971). Methods of Regional Analysis : An Introduction to Regional Science. Cambridge: MIT
7. Maboguje, A. L., & Mishra, R. P. (1995). Regional Development Alternatives: International Perspectives. Nagoya: United Nations Centre for Regional Development Series (1-7), on Regional Development.
8. Mishra, R. P. (1992). Regional Planning: Concepts, Tools, Techniques and Case Studies. New Delhi (Revised Edition): Concept.
9. Mitra, A. (1968). Levels of Development in India, Census of India 1961. Monograph No.7.
10. Mohapatra, A. C., & Pathak, C. R. (2003). Economic Liberalisation and Regional Disparities in India. Shillong: Star Publication House.
11. Raza, Moonis. 1988. Regional Development, Heritage, New Delhi.
12. Sundaram, K. V. (1985). Geography and Planning. New Delhi: Concept. 10. Richardson, H. W. (1969). Urban and Regional Economics. London: World Univ Press.

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GEOGRAPHY P – 402

Environmental Geography

Credit = 4

F.M. = 100 (Mid Term: 20 + Term End: 80)

Prerequisite Course / Knowledge (If any): Basic knowledge of Environmental studies

Aim of the Course:

is to train students on fundamental issues that raised due to the intersection of geography and environmental science, with a precise focus on different geographical approaches, humans effect on physical environment and initiatives to control modification of environment.

Course Learning Outcome:

On completion of the course, student will able to

I. Tell the components of environment with their geographical aspect; interpret the historical geographical perspective on man-environment interaction, choose and compare the different geographical approach for complex environmental problems.

(OBE level to be achieved – Remembering, understanding, Applying)

II. Classify the source of major environmental pollutions, identify their effect; compare different pollution control measurements and decide the right way to control the pollution in a geographical set up.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

III. Recognize the role of global warming for climate change; show how these global environmental phenomena pose threat to sustainability; outline the actionable measurement that can be taken at local to global scale to combat the problem of climate change and global warming; Explain the cause and effect of natural hazards and its interlinkage with global environmental problem; Prepare an action plan for reducing the effect of natural disaster in different geographical set up.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

IV. Outline the various global initiatives towards making earth a sustainable planet by measurable actions of member nations; outline the various national laws for safeguards natural environment; Formulate the scope and procedures for assessing the environmental effect of any developmental project across its life cycle

(OBE level to be achieved – Remembering, understanding, Applying)

Course Contents:

Unit 1. Concept and approach to Environmental Geography

Fundamentals of environment; components of environment, Environmental Geography- Concept, Significance, objective and scope;

Man-environment relationship on historic perspective; Environmental deterministic approach; Possibilistic approach.

(OBE level to be achieved – Remembering, understanding, Applying)

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Unit 2. Environmental pollution

Sources and effect of Water Pollution. Water pollution control, Water Conservation Strategies;

Source and cause of Air pollution and impact on health; Measure to control air pollution

Sources, characteristics and control of Noise Pollution; solid waste pollution and its management.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 3. Environmental challenges

3.1 The concept of Climatic Change; Global Warming- cause, effect and remedies;

Natural hazards- Flood, Earthquake, Tsunami.

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. Environmental initiative and Legislation

Earth Summit 1992 and its subsequent proceedings such as Rio+10 and Rio+20

Wildlife protection act of India 1972, The environment protection act of 1986, National Environmental Tribunal Act of India 1995.

The concept, scope, procedure of Environmental Impact Assessment (EIA).

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

1. Chandna R. C., 2002: Environmental Geography, Kalyani Publication, Ludhiana.
2. Cunningham W. P. and Cunningham M. A., 2004: Principals of Environmental Science: Inquiry and Applications, Tata Macgraw Hill, New Delhi.
3. Goudie A., 2001: The Nature of the Environment, Blackwell Publication, Oxford.
4. Miller G. T., 2004: Environmental Science: Working with the Earth, Thomson BrooksCole, Singapore.
5. MoEF, 2006: National Environmental Policy-2006, Ministry of Environment and Forests, Government of India.
6. Odum, E. P. et al, 2005: Fundamentals of Ecology, Ceneage Learning India.
7. Singh S., 1997: Environmental Geography, Prayag Pustak Bhawan. Allahabad.
8. UNEP, 2007: Global Environment Outlook: GEO4: Environment for Development, United Nations Environment Programme.
9. Trivedy R. K., 2009: Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards, EM International, Pune
10. Shrivastava A.K., 2021: Text Book of Disaster Management, Scientific Publishers

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GEOGRAPHY P- 403

Disaster Management

Credit = 4

F.M. = 100 (Mid Term: 20+Term End: 80)

Prerequisite Course / Knowledge (If any): None.

Aim of the Course:

To provide basic conceptual understanding of disasters, approaches to Manage disasters in order to build skills to respond to disasters

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Recognize, discuss and distinguish basic elements and types of disasters (Unit 1: OBE level to be achieved – Understand)
 - II. Understand, discuss and discover cycle of disaster management (Unit 2: OBE level to be achieved – Apply)
 - III. Review and appraise measures for Rehabilitation, Reconstruction and Recovery (Unit 3: OBE level to be achieved – Analyze)
 - IV. Assess the role of information technology in disaster management (Unit 4: OBE level to be achieved – Evaluate)
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Course Contents:

Unit 1. Introduction

Concept of Hazard, Risk and Disaster;

Classification of Disaster;

Meaning and Dimensions of Disaster Management.

Major categories: Hydrological Disasters (Flood and Drought); Geological Disasters (Earthquakes and Landslides); Meteorological Disasters (Cyclone, Tidal waves); Manmade Disasters (Chemical disasters, Biological disasters, Radiological disasters, Nuclear disasters).

(Covers OBE level – Remember and Understand)

Unit 2. Disaster Preparedness, Mitigation and Response

Concept and Nature of disaster preparedness;

Disaster Preparedness Plan.

Disaster Mitigation and Disaster Mitigation Strategies.

Disaster Response Plan, Role of Multiple Stakeholders in Disaster Response.

(Covers OBE level – Remember, Understand and Apply)

Unit 3. Rehabilitation, Reconstruction and Recovery

Damage Assessment, Reconstruction and Rehabilitation

Role of various government and non-governmental agencies in Recovery Measures.

(Covers OBE level – Remember, Understand, Apply and Analyse)

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Unit 4. Role of Information Technology in Disaster Management

Disaster management Information System;
Role of Geospatial Technologies;
Role of Communication in Disasters management –HAM radio, Satellite, Video Conferencing,
Electronics devices, social media.

(Covers OBE level – Remember, Understand, Apply, Analyse and Evaluate)

Reading list

1. Blaikie, P., Cannon, T., & Davis, I. (1994). At Risk: Natural Hazards, People's Vulnerability, and Disasters. London: Routledge.
2. Council, N. R. (2006). Facing Hazards and Disasters: Understanding Human Dimensions. Washington: National Academies Press.
3. Damon, P. Copola, (2006) Introduction to International Disaster Management, ButterworthHeinemann.
4. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
5. Documents, G. O. (Various Years). Vulnerability Atlas (2004), Disaster Management Act(2005), Disaster Management Policy (2009).
6. Flynn, S. (2007). The Edge of Disaster: Rebuilding A Resilient Nation. New York: RandomHouse.
7. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
8. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.
9. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. NewDelhi.
10. Pal, I., & Shaw, R. (2017). Disaster Risk Governance in India and Cross Cutting Issues, Singapore: Springer.
11. Paraswamam, S., & Unnikrishnan, P. V. (2000). India Disaster Report. New Delhi: Oxford.
12. Platt, R. H. (1999). Disasters and Democracy: The Politics of Extreme Natural Events. Washington: Island Press.
13. Quarantelli, E. (1998). What is a Disaster? Perspectives on the Question. London: Routledge.
14. Schneid, T., & Collins, I. (1998). Disaster Management and Preparedness. UNU-EHS. Various years. World Risk Reports. Washington: Lewis.
15. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At Risk: Natural Hazards, People's Vulnerability and Disasters (2nd Ed.). London and New York: Routledge
16. United Nations, 2021. Sustainable Development Goals [online]. Available at: <https://sdgs.un.org/goals>
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Prerequisite Course / Knowledge (If any):

Basic idea of research methods.

Aim of the Course:

is to provide essential research skills to the students in order to take cutting-edge research of any problem in real world (up to regional scale at this education stage).

Course Learning Outcomes:

After completion of this course, the students will be able to:

- I. Design a research project for any topic of choice (OBE level to be achieved – Analyse)
- II. Use understanding developed in different course to identify the methods to be used in designed research (OBE level to be achieved – Evaluate)
- III. Manage data and perform analyses under designed research (OBE level to be achieved – Evaluate)
- IV. Design and write report on the outcome and explain the limitations and future prospect of the research carried out (OBE level to be achieved – Create)
- V. Summarise and represent the research outcomes to audiences (OBE level to be achieved – Create).

Course Contents:

Unit 5. Dissertation

Time-line in phases

- i. 0-4 Weeks – Identification of the problem; literature review and conceptual model of research
- ii. 5-10 Weeks – Finalizing methods; data collection
- iii. 11-16 Weeks – Data analyses and results
- iv. 16- 20 weeks –Report writing; submission at the end of working day of 20th Week.

Note: Research progress should be reported at the end of each phase.

General Guide Lines:

→ The final report should cover the following structure:

- i. Introduction to the problem with Aim and objectives of the study
- ii. Literature review (aim and objective of study could also come here if not in previous section)
- iii. Material and Methods
- iv. Results
- v. Discussion
- vi. Conclusions
- vii. References/Bibliography

→ Report should be typed with 1.5 Line Spacing, Arial/ Times New Roman/ Calibri Font, and 12 Font Size (Table and Figure captions 11 Font Size).

→ The list of references should be given at the end in the API or Harvard format.

→ Every table, figure, photograph should have a caption and source (if any).

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→ The total word should not exceed 10,000 in number (maximum 50 including text, figures, tables, photographs, references and appendices.

Note: Computer typed Report duly endorsed by the Supervisor(s) is to be produced individually by the students. A soft copy should be submitted to department along with dissertation.

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

Unit 6. Seminar and Viva

The students will

- Present the research carried out in the departmental seminar.
- Face a Viva Voce based on their research.

(Covers OBE level – Remember, Understand, Apply, Analyse, Evaluate and Create)

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Sayid
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GEOGRAPHY GEO P – 405

Statistical Method in Geography-I (Practical)

Credit =2

F.M. = 50

Prerequisite Course / Knowledge (If any): Basic knowledge of statistics

Aim of the Course: is to provide an understanding on the statistical interpretation of diverse range of geographical data unfurl geographical patterns and relationships. And also enable students to derive a meaningful inference from the complex observations on the different dimensions of geographical studies.

Course Learning Outcome: After the completion of the course, student will be able to

- I. Show proficiency in interpreting geographical pattern of a data and apply basic data skills to organize, manage, and present data; Compare and make a rational choice amongst listed statistical sampling methods, data scaling based on the nature of data and purpose of study. *(OBE level to be achieved – Remembering, understanding, Applying)*
- II. Explain basic descriptive statistics to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data in geographical problems. *(OBE level to be achieved – Remembering, understanding, Applying)*
- III. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting; *(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating)*
- IV. Examine Test of Hypothesis for a population parameter; Demonstrate the practice of statistical thinking by taking a real-life problem; evaluate whether the procedure can be safely applied, explain the implications of statistical outcomes on the geographical study at-hand *(OBE level to be achieved – understanding, Applying, Analyzing, Evaluating)*
- V. Demonstrate ability to write reports of the results of statistical analyses (both descriptive and inferential) of geographic questions/problems/issues; Develop statistical software skills to solve geographical issues. *(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating, Creating)*

Course Contents:

Unit 1: Data and data sampling

Types of data, scale of data measurement, data presentation, Selection of class interval for mapping.

Sampling techniques for geographical analysis; sample units and design, sampling frame and procedures, standard error and sample size, testing the adequacy of samples.

Scaling techniques-rank score; Weighted score; Nearest-neighbour analysis.

Drawing of histogram, Frequency curve, Frequency polygon, Bar diagram, Ogive using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying)

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Unit 2: Measures of central tendency and dispersion

Measurement of Mean, Median and mode, Quartile.

Measurement of Range, quartile deviation, mean deviation,

Measurement of Standard deviation; coefficient of variation, Lorenz Curve and Gini's Coefficient; location Quotient.

Graphical estimation and presentation of central tendency and dispersion using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying)

Reading List

1. David, U. (1981): Introductory Spatial Analysis, Methuen, London.
2. Ebdon, D. (1983): Statistics in Geography: A Practical Approach, Blackwell, London.
3. Gregory, S. (1978): Statistical Methods and the Geographer (4th Edition), Longman, London.
4. Gupta, S.P. (2010): Statistical Methods, Sultan Chand and Sons, Latest Edition
5. Hammond, R. and McCullagh, P.S. (1974), Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.
6. John P. Cole and Cuchlaine, King, A. M. (1968): Quantitative Geography, Wiley, London
7. Mathews, J.A. (1987): Quantitative and Statistical Approaches to Geography, Practical Manual, Pergamon, Oxford.
8. Pal, S.K. (1998): Statistics for Geoscientists; Techniques and Applications, Concept Publishing, New Delhi.
9. Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient

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GEOGRAPHY GEO P- 406

Statistical Method in Geography-II (Practical)

Credit =2

F.M. = 50

Prerequisite Course / Knowledge (If any): Basic knowledge of statistics

Aim of the Course: is to provide an understanding on the statistical interpretation of diverse range of geographical data unfurl geographical patterns and relationships. And also enable students to derive a meaningful inference from the complex observations on the different dimensions of geographical studies.

Course Learning Outcome: After the completion of the course, student will be able to

- I. Show proficiency in interpreting geographical pattern of a data and apply basic data skills to organize, manage, and present data; Compare and make a rational choice amongst listed statistical sampling methods, data scaling based on the nature of data and purpose of study. *(OBE level to be achieved – Remembering, understanding, Applying)*
- II. Explain basic descriptive statistics to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data in geographical problems. *(OBE level to be achieved – Remembering, understanding, Applying)*
- III. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting; *(OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating)*
- IV. Examine Test of Hypothesis for a population parameter; Demonstrate the practice of statistical thinking by taking a real-life problem; evaluate whether the procedure can be safely applied, explain the implications of statistical outcomes on the geographical study at-hand *(OBE level to be achieved – understanding, Applying, Analyzing, Evaluating)*

Demonstrate ability to write reports of the results of statistical analyses (both descriptive and inferential) of geographic questions/problems/issues; Develop statistical software skills to solve geographical issues. (OBE level to be achieved – Understanding, Applying, Analyzing, Evaluating, Creating)

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Unit 3: Measurement of Association

Forms of relation and measuring the strength of association, use of scatter diagram; Spearman's Rank Difference and Karl Pearson's Product Moment Correlation Coefficients, Coefficient of determination.

Regression analysis- regression equations, construction of regression line-interpolation, prediction, explanation; residual-statistical tests of significance of the estimates; computation of residuals

Drawing of scatter plot, Estimation of coefficient of correlation, coefficient of determination, fitting of regression line using statistical tool (Excel or SPSS)

OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Unit 4. Statistical Test

Hypothesis Testing: Needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures

Contingency tables, Chi-square test, t-test, Analysis of Variance (ANOVA) and its estimation using statistical tool (Excel or SPSS)

(OBE level to be achieved – Remembering, understanding, Applying, Evaluating)

Reading List

1. David, U. (1981): Introductory Spatial Analysis, Methuen, London.
2. Ebdon, D. (1983): Statistics in Geography: A Practical Approach, Blackwell, London.
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Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient

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