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DEBRA THANA SAHID KSHUDIRAM SMRITI MAHAVIDYALAYA

(Autonomous)

P.O.- CHAKSHYAMPUR , DIST.- PASCHIM MEDINIPUR PIN:-7221124 , WEST BENGAL, INDIA

DEPARTMENT OF GEOGRAPHY

4 years Major and Minor course

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Syllabus Framework for the Semester-I (Major & Minor)

Level	YR.	SEM	CourseType	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	Total
B.Sc. (Hons.)	1st	I	SEMESTER-I							
			Major-01	UG/I/GEO/4/MJ-1	T: Geotectonics and Geomorphology (Theory) P: Geotectonics and Geomorphology (Practical)	4	3-0-1	15	60	75
			SEC-01	UG/I/GEO/4/SE-1P	P: Basics of Computer and GIS	3	0-0-3	10	40	50
			AEC	AEC01	Communicative English -1 (*common for all programmes*)	2	2-0-0	10	40	50
			MDC	MDC01	Multidisciplinary Course -01 (*to be chosen from the list*)	3	3-0-0	10	40	50
			VAC	VAC 01	ENVS (*common for all programmes*)	4	2-0-2	50	50	100
			Minor-01 (Disc.-I)	UG/I/GEO/3/MI-1T	T: Fundamentals of Earth System Science *(To be taken by students of other Disciplines)*	4	3-0-1	15	60	75
			Semester-I Total			20				400

CC = Core Course, AECC = Ability Enhancement Compulsory Course, GE = Generic Elective , SEC = Skill Enhancement Course DSE = Discipline Specific Elective, CA= Continuous Assessment, ESE= End Semester Examination, TBD=To be decided, CT = Core Theory, CP=Core Practical, L = Lecture, T = Tutorial, P = Practical, MIL = Modern Indian Language, ENVS = Environmental Studi

Syllabus for the Semester-I (Major) Theory (for 4 years Course)

Paper:- UG/I/GEO/4/MJ-1 Credits:-4 Full Marks:-75

Geotectonics and Geomorphology (Theory)

Course Learning Outcomes:

This paper focuses on the tectonic evolution of the Earth along with methods of dating rocks and studying Earth's interior. It includes the concept of isostasy and the formation of landforms through tectonic processes like drifting, spreading, folding, and faulting. Students learn about various geomorphic processes such as weathering, erosion, and deposition by rivers, glaciers, and winds. The role of geological structures in shaping landforms is discussed in different structural settings. Various models of landscape development are introduced and critically assessed. Practical work involves construction of scales, identification of rocks and minerals, and interpretation of geological maps and sections.

Paper:- UG/I/GEO/4/MJ-1T Geotectonics and Geomorphology (Theory) 3 Credits/40 marks

Course contents:

1. Geological time scale: Tectonic and biological history of Earth; Dating of Rocks: absolute and relative dating. Earth's interior with special reference to seismology. Isostasy: Models of Airy and Pratt
2. Continental Drift; Plate Tectonics: Processes along different margins and resulting landforms. Types of Fold and Fault; Sea floor spreading
3. Geomorphic processes and resultant forms: Weathering, Mass wasting, River, Glacier and Wind. Structural impact on landforms: Drainage and landform development on Horizontal, Homoclinal, Folded and Faulted structure.
4. Cyclic and Non-cyclic models of landscape evolution: Views of Davis,Penck, King,Chorley, Schumm and Hack

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Suggested Reading:

- Bloom A. L., 2001: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, Third edition , New Delhi.
- Maity, Ramkrishna, Geotectonics and Geomorphology: An Insight into Process-form Relationship. Nabodaya Publications, Kolkata. ISBN 978-81-961853-2-9
- বসু ,মাইতি ; আধুনিক ভূমিরূপ বিজ্ঞান (ভূ -গঠন ও বিবর্তন) নবোদয় পাবলিকেশন.
- Bridges E. M., 1990: World Geomorphology, Cambridge University Press, Cambridge.
- Christopherson, Robert W., (2011), Geosystems: An Introduction to Physical Geography, 8 Ed., Macmillan Publishing Company
- Kale V. S. and Gupta A., 2001: Introduction to Geomorphology, Orient Longman, Hyderabad.
- Knighton A. D., 1984: Fluvial Forms and Processes, Edward Arnold Publishers, London.
- Selby, M.J., (2005), Earth's Changing Surface, Indian Edition, OUP
- Skinner, Brian J. and Stephen C. Porter (2000), The Dynamic Earth: An Introduction to physical Geology, 4th Edition, John Wiley and Sons
- Thornbury W. D., 1969: Principles of Geomorphology, Wiley.

Paper:- UG/I/GEO/4/MJ-1P **Credit:-1** **Full Marks:-20**

Geotectonics and Geomorphology(Practical)

Course contents:

1. Graphical construction of scales
2. Characteristics of Rocks and minerals and their identification:
3. Geological Maps: Reading and Construction map; Concept of Scale (Linear, comparative, diagonal and vernier) Understanding topography, structure, relation between topography and structure, geological succession and geological history through construction of geological section on horizontal, homoclinal, folded and faulted structure.

Suggested Readings:

- R.P.Misra; Fundamentals Of Cartography; Concept Publishing Company Pvt.Ltd. ,New Delhi - 110059.
- R.L.Singh, Rana P.B.Singh; Elements Of Practical Geography; Kalyani Publishers,New DelhiLudhiana.
- Sankar Adhikari Honours Beboharik Bhugal Dove Publishing House Kolkata

Skill Enhancement Course (SEC) for 4 years Course

Paper:- UG/I/GEO/4/SE-1P **Credits: -3** **Full Marks:-50**

SEC-1 P: Basics of Computer and G.I.S (Practical)

Course Learning Outcomes:

The course builds foundational knowledge of computers, including software, file handling, and internet use. It trains students in word processing, spreadsheets, and presentation tools for academic and professional tasks. Learners understand the concept and applications of GIS, including spatial data formats and structures. Practical skills include map geo-referencing and data handling using basic GIS tools. Overall, students gain essential digital and geospatial skills for further academic or field-based work.

Course contents:

Unit- I : Basic Knowledge about Computer

1. Knowing computer: what is computer, basic application of computer, computer memory, concepts of hardware and software; operating system; running an application, viewing of file, folders and directories, creating and renaming of files and folders.
2. Understanding word processing.
3. Using spreadsheet: basics of spreadsheet; manipulation of cells; formulas and functions; editing of spreadsheet, printing of spreadsheet (MS Excel).
4. Concept of internet; application of internet; World Wide Web; email.
5. Google form generation, submission and data extraction
6. Making a small presentation: MS PowerPoint

Unit - II Basic Knowledge About G.I.S and its Application

7. Introduction to G.I.S
8. Spatial Data Representation (Raster and vector)
9. Data structure of G.I.S (Points, Lines and polygon)
10. Geo-referencing of Maps

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Suggested Readings:

- Bartee, Thomas C. (1977): Digital Computer Fundamental; McGraw Hill.
- Chauhan, S.; Chauhan, A. and Gupta, K. (2006): Fundamental of Computer; Firewall Media.
- Flake, L.J.; McClintock, C.E. and Turner, S. (1989): Fundamental of Computer Education; Wordsworth Pub. Co.
- Leon, A .and Leon,M.(1999): Introduction to Computer, USB Publishers' Distributors Ltd.
- Malvino, A.P. and Leach, D.P. (1981): Digital Principles and Appications; Tata McGraw Hill.
- Mano, Moris M. and Kime, Charles R. (2004): Logic and Computer Design Fundamental; Prentice Hall.
- Rajaraman, V. (2003): Fundamentals of Computer, Prentice Hall Publisher
- Sarkar, A. and Gupta, S.K (2002) Elements of computer Science, S Chand and Company, New Delhi
- Blissmer (1996): Working with MS Word; Houghton Mifflin Co.
- Johnson, Steve (2007): Microsoft Power Point 2007; Pearson Paravia Bruno.
- Leon, A .and Leon,M.(1999): Introduction to Computer, USB Publishers' Distributors Ltd.
- Leon, A. and Leon, M.(1999): A beginners Guide to Computers, Vikas
- Rajaraman, V. (2008): Computer Primer; Prentice Hall of India Pvt. Ltd.
- Sarkar, A. and Gupta, S.K (2002) Elements of computer Science, S Chand and Company, New Delhi
- Shepard, Aaron (2007): Perfect Pages; Shepard Publications.
- Tyson, Herbert L. (2007): Microsoft Word 2007 bible; John Wiley.
- Walkenbach, John (2007): Excel 2007 Bible; John Wiley
- Sankib Mazumdar Remote Sensing And G. I. S. Amar Pustakalay, Block 6,Stall 8 , Bankim Chatterjee
- Tanmoy Karon Remote Sensing And GIS Rupali Publication, Chandannagar
- Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman Ramote Sensing And Image Interpretation John Wiley & Sons(Asia) Pte. Ltd, (Singapore)
- V C Jha Geomorphology And Remote Sensing Acb Publications,Calcutta

Syllabus for the Semester-I 3 years Minor course

(Minor) Theory

Paper:- UG/I/GEO/3/MI-1T **Credits: -4** **Full Marks:-75**

Fundamentals of Earth System Science

Course Learning Outcomes:

This paper focus on the foundational knowledge of Earth's internal structure, plate dynamics, and geomorphic processes shaping landforms. It explains key hydrological concepts including the water cycle, runoff, infiltration, and groundwater storage. Atmospheric composition, energy balance, pressure systems, and tropical weather patterns are explored in climatology. Soil geography covers formation factors, profile types, properties, and erosion control methods. Students gain an integrated understanding of Earth's physical systems and their environmental interactions.

Course contents

1. **Geotectonics:** Earth's interior, Isostasy, Plate tectonics. Sea floor Spreading.
2. **Geomorphology: -** Geomorphic processes and resultant forms: Weathering, Mass wasting, River, Glacier andWind, Landscape evolution models of Davis, and Hack
3. **Hydrology: -** Hydrological Cycle. Hydrological Parameters: Run off, Infiltration and evapotranspiration.Occurrence and storage of Groundwater.
4. **Climatology:** -Composition and layering of the atmosphere. Factors of Insolation, Heat budget of the atmosphere. Pressure belts and general circulation in the atmosphere. Tropical cyclones. Monsoon Mechanism.
5. **Soil Geography:** -Factors of soil formation. Concept of Soil profile (Laterites and Podzols), soils. Physical and chemical properties: soil texture, structure, pH, organic matter and NPK. Soil erosion and its management.

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Suggestion Reading: -

- Bloom A. L., 2001: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, Third edition , New Delhi.
- Maity, Ramkrishna, Geotectonics and Geomorphology: An Insight into Process-form Relationship. Nabodaya Publications, Kolkata. ISBN 978-81-961853-2-9
- বসু ,মাইতি ; আধুনিক ভূমিরূপ বিজ্ঞান (ভূ -গঠন ও বিবর্তন) নবোদয় পাবলিকেশন.
- Bridges E. M., 1990: World Geomorphology, Cambridge University Press, Cambridge.
- Christopherson, Robert W., (2011), Geosystems: An Introduction to Physical Geography, 8 Ed., Macmillan Publishing Company
- Kale V. S. and Gupta A., 2001: Introduction to Geomorphology, Orient Longman, Hyderabad.
- Knighton A. D., 1984: Fluvial Forms and Processes, Edward Arnold Publishers, London.
- Selby, M.J., (2005), Earth's Changing Surface, Indian Edition, OUP
- Skinner, Brian J. and Stephen C. Porter (2000), The Dynamic Earth: An Introduction to physical Geology, 4th Edition, John Wiley and Sons
- Thornbury W. D., 1969: Principles of Geomorphology, Wiley
- Rafhik Ahamed . Abohaya O Jalabayu Bigan; Ghankosh Prakashani 38/2-K Bangla Bazzar,Dhaka 1100.
- Sandeep Kumar Choudhary; Soil Geography New Central Book Agency (Pvt) Limited,New Delhi
- Samir Adak,Sambhunath Singh Mura, Sulekha Adak Bhu-Jalabidya Tapati Publisher.
- Samir Adak, Mousam Majumder, Suparna Majumder, Mafizul Haque Bhu-Parichoy(3year's Pass Course) 4th Paper Tapoti Publisher, Tawn Colonichokh, Medinipur, Paschim Medinipur.
- Barry R. G. and Carleton A. M., 2001: Synoptic and Dynamic Climatology, Routledge, UK.
- Barry R. G. and Corley R. J., 1998: Atmosphere, Weather and Climate, Routledge, New York.
- Critchfield H. J., 1987: General Climatology, Prentice-Hall of India, New Delhi
- Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: The Atmosphere: An Introduction to Meteorology, Prentice-Hall, Englewood Cliffs, New Jersey.
- Oliver J. E. and Hidore J. J., 2002: Climatology: An Atmospheric Science, Pearson Education, New Delhi.

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DEPARTMENT OF GEOGRAPHY

4 years Major and Minor course

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Syllabus Framework for the Semester-II (Major & Minor)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	Total
B.Sc. (Hons.)	1st	II	SEMESTER-II							
			Major-02	UG/II/GEO/4/ MJ-2	T: Climatology P: Climatology Lab (Practical)	4	3-0-1	15	60	75
			SEC-02	UG/II/GEO/4/ SE-2P	P: Coastal Management (Practical)	3	0-0-3	10	40	50
			AEC	AEC02	MIL-1 (common for all programmes)	2	2-0-0	10	40	50
			MDC	MDC02	Multidisciplinary Course -02 (*to be chosen from the list*)	3	3-0-0	10	40	50
			VAC	VAC 02	Value added Course 02 (to be chosen from the list)	4	4-0-0	10	40	50
			Minor-02 (Disc.-II)	UG/II/GEO/3/ MI-2T	T: Human Geography *(To be taken by students of other Disciplines)*	4	3-0-1	15	60	75
			Summer Intern	CS	Community Service	4	0-0-4	-	-	50
		Semester-II Total				24				400

CC = Core Course, AECC = Ability Enhancement Compulsory Course, GE = Generic Elective , SEC = Skill Enhancement Course DSE = Discipline Specific Elective, CA= Continuous Assessment, ESE= End Semester Examination, TBD=To be decided, CT = Core Theory, CP=Core Practical, L = Lecture, T = Tutorial, P = Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

Syllabus for the Semester-II (Major) Theory (for 4 years Course)

Paper:- UG/II/GEO/4/MJ-2 Credits:-4 Full Marks:-75

Climatology

Course Learning Outcomes:

This course provides an understanding of atmospheric composition, energy balance, and temperature variation. It enables students to explain weather phenomena such as condensation, precipitation, wind systems, and cyclones. Students analyze monsoon dynamics, global climate patterns, and climate classification systems. Practical skills include measuring weather elements, interpreting maps, and creating climate diagrams. Overall, the course develops both theoretical and practical knowledge of atmospheric processes and the climate system.

Paper: - UG/II/GEO/4/MJ-2T Climatology (Theory) 3 Credits/40 marks

Course contents:

Unit I: Elements of the Atmosphere

1.Nature, composition and layering of the atmosphere.

2. Insolation: Controlling factors. Heat budget of the atmosphere.

3. Temperature: horizontal and vertical distribution. Inversion of temperature.

4. Climate change: Greenhouse effect and global warming, Ozone depletion, climate change effect.

Unit II: Atmospheric Phenomena and Climate Classification

5. Condensation: Process and forms. Mechanism of precipitation: Bergeron-Findeisen theory, collision and coalescence theory. Forms of precipitation and global distribution.

6. Atmospheric Circulation : Planetary winds, jet streams, index cycle. El nino & Southern Oscillation.

7. Atmospheric disturbance: Tropical and mid-latitude cyclones, thunderstorms.

8. Monsoon circulation and mechanism with reference to India.

9. Climate classification after Thornthwaite (1995) and Koppen.

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Suggested reading:-

- Ahrens, C.D. 2012. Essentials of Meteorology: An Invitation to the Atmosphere. 9th ed, Cengage
- Learning.
- Barry, R.G., Chorley R.J. 2009. Atmosphere Weather and Climate. 9th ed, Routledge.
- Critchfield, H. J. 1983. General Climatology. Prentice Hall India (2010 Reprint).
- Dessler, A.E. 2021. Introduction to Modern Climate Change, 3rd ed, Cambridge University Press.
- Hidore, J.J., Oliver, J.E., Snow, M., Snow, R. 2020. Climatology: An Atmospheric Science, 3rd ed,
- Pearson.
- Lal, D.S. 2012. Climatology. Sharda Pustak Bhawan.
- Lutgens, F.K., Tarbuck, E.J. 1998. The Atmosphere: An Introduction to Meteorology, 9th ed, Prentice-Hall.
- Oliver, J.E., Hidore J.J. 2002. Climatology: An Atmospheric Science, Pearson Education India.
- Rohli, R.V., Vega, A.J., 2017. Climatology, 4th ed, Jones & Bartlett Learning.
- WEBSITES:
- India Meteorological Department: https://mausam.imd.gov.in
- Intergovernmental Panel on Climate Change: https://www.ipcc.ch
- World Bank Climate Change Knowledge Portal: https://climateknowledgeportal.worldbank.org
- World Meteorological Organization: https://public.wmo.int/en

Paper:- UG/II/GEO/4/MJ-2P **Credit:-1** **Full Marks:-20**

Climatology Lab (Practical)

Course contents:

1. Measurement of weather elements using analogue instruments: Mean daily temperature, air pressure, relative humidity and rainfall.
2. Components and Classification of Maps. Interpretation of a daily weather map of India (any two): Pre-Monsoon, monsoon and post monsoon.
3. Construction and interpretation of monthly rainfall dispersion diagram (quartile method). Seasonal water budget.
4. Construction and interpretation of hythergraph and climograph (after Taylor).
5. Laboratory Notebook and Viva-Voce (5 marks).

Suggested Readings:

- Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.
- Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd
- ed (2017 reprint), Alphaneumera-Kolkata.
- Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.
- Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.
- WEBSITES:
- India Meteorological Department: https://mausam.imd.gov.in
- Climatological tables of observatories of India:
- https://www.imdpune.gov.in/library/public/Climatological%20Tables%201991-2020.pdf

Skill Enhancement Course (SEC) for 4 years Course

Paper:- UG/II/GEO/4/SE-2P Credits: -3 Full Marks:-50

SEC-1 P: Coastal Management

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Course Learning Outcomes:

The course develops an understanding of coastal types, processes, and morpho-dynamic variables shaping coastal landforms. It enables students to evaluate the impacts of human activities and formulate sustainable coastal management strategies. Learners gain knowledge of coastal hazards and apply both structural and non-structural mitigation approaches. The course explains legal and policy frameworks like EEZ and CRZ in the Indian context. Practical components enhance skills in applying Remote Sensing and GIS in coastal analysis and project-based assessments.

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Course contents:

1. Coast: Definition, types. Coastal Process and forms. Coastal morpho-dynamic variables and their role in evolution of coastal forms.
2. Impacts and management of anthropogenetic activity: Fishing, mining, oil exploration, salt manufacturing, land reclamation and tourism.
3. Coastal hazards and their management using structural and non-structural measures: cyclone, erosion, flood, sand encroachment, dune degeneration, estuarine sedimentation and pollution
4. Principles of Coastal Zone Management. Exclusive Economic Zone and Coastal Regulation Zones with reference to India.
5. Application of Remote Sensing & GIS in coastal studies and management.

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Suggested Readings:

- Carter, R.W.G (1988): Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines, Academic Press, London

- Dayer K.R. (1979): Estuary Hydrography, and Sedimentation, Cambridge Univ. Press, Cambridge.
- Devis R.A. (ed) (1978): Coastal Sedimentary Environmental; Springer-Verlag, New York.
- Harikawa , K. (1978): Coastal Engineering, Univ Of Tokyo Press, Tokyo.
- Inman, D.L. (1960): Shore Processes, Encyclopedia of Science & Technology, Mc Graw Hill, New York.
- Knight, B. and Philip, A. (1979): Estuarine and coastal Land reclamation and water storage, Saxon House.
- Laussn, E and Lato, I.(ed): Chemistry and Biochemistry of estuaries, Wiley, New York.
- Pethick, J. (2000): An Introduction to coastal Geomorphology, Arnold, London.
- Stanley, D.J. and Suist D.J.P.(ed)(1976): Marine Sediment Transport and environmental management;Wiley, NewYork.
- Wagret,P. (1968): Polderlands, Methuen, London

Syllabus for the Semester-II 3 years Minor course (Theory)

Paper:- UG/II/GEO/3/MI-2T **Credits: -4** **Full Marks:-75**

Human Geography

Course Learning Outcomes:

This paper introduces the nature and scope of human geography along with key approaches to its study. It explains the evolution of human societies and adaptations to varied environments. Students learn about population distribution, growth, and demographic transitions, with emphasis on India. It explores characteristics and patterns of rural and urban settlements and their classification. Learners develop an understanding of human-environment interaction and spatial organization of society.

Course contents

Unit I: Scope and Approaches

1. Elements of human geography: Nature, scope and recent trends.
2. Approaches to Human geography: Resource based, locational, landscape based, environmental.

Unit II: Social Geography

3. Evolution of human societies: Hunting and food gathering, pastoral nomadism, subsistence farming and industrial society.
4. Human adaptation to the environment: Santal, Lodha, Sabar
5. Evolution and characteristics of post-industrial urban societies

Unit III: Population Geography

6. Distribution, density and growth of population special references to India.
7. Demographic transition. Significance of demographic dividend.

Unit IV: Settlement Geography

8. Characteristics of settlements: Urban and Rural
9. Site, situation, types and patterns of rural settlements

Unit V: Urban Geography

10. Size-class classification of urban settlements after Census of India

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Suggestion Reading:-

- Ashok, A., Lakshiminath, P.V. 2018. Tribes of India, vol 1 &2, Telugu Akademia
- Bose, N.K. 2020. Tribal Life In India, 5th ed (updated by Tripathi, C.B.) National Book Trust.
- Chandna, R.C. 2016. Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers.
- Dorrel, D., Henderson, P. 2018. Introduction to Human Geography. University Of Georgia press. Fouberg
- E.H., Nash, A.B., Murphy, A.B., de Blij, H., 2015. Human Geography: People, Place and Culture, 11 th ed willy
- De Blij, H.J. and Murphy, A.B. 2002, Human Geography: Culture, society and space, 7th edition, John Willy and Sons, New York, 608p.
- Fellmann, J.D.,Getis, A., Getis, J., 2000, Human Geography- Landscape of Human Activity, McGraw Hill
- Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley
- Ghosh, S. 1998. Introduction to Settlement Geography, Sangam Books Ltd.
- Johnston R. J., (Ed.): Dictionary of Human Geography, Routledge.
- Knox, P.L., Marston, S.A. 2014. Human Geography: Places and Regions in Global Context, 6th ed, Pearson Education Limited
- Majumdar, P.K. 2013. India's Demography: Changing Demographic Scenario in India, Rawat Publications.
- Norton. W. (2001): Human Geography, 4th Edition Oxford University press, Oxford
- Paul., C., Crang, P., Goodwine, M.G. 2014, Introduction Human Geographies, 3rd ed, Routledge.
- Rubenstein, J.M. (2002), The Cultural Landscape, 7th edition, Prentice Hall, Englewood Cliffs
- Short, R.J. 2017. Human Geography: A Short Introduction, 2nd ed, Oxford University Press.
- Singh, R.Y., (2002). Geography of Settlements, Rawat Publications, Jaipur.

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DEPARTMENT OF GEOGRAPHY

4 years Major and Minor course

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Syllabus Framework for the Semester-III (Major & Minor)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	Total
B.Sc. (Hons.)	2nd	III	SEMESTER-III							
			Major-03	UG/III/GEO/4 /MJ-3	T: Human Geography P: Human Geography (Practical)	4	3-0-1	15	60	75
			Major-04	UG/III/GEO/4/ MJ-4	T: Statistical Methods in Geography P: Statistical Methods in Geography	4	3-0-0	15	60	75
			SEC	UG/III/GEO/4/S E-3P	P: Computer Programming (R/Python) (Practical)	3	0-0-3	10	40	50
			AEC	AEC03	MIL-3 (common for all programmes)	2	2-0-0	10	40	50
			MDC	MDC03	Multidisciplinary Course -03 (*to be chosen from the list*)	3	3-0-0	10	40	50
			Minor -3 (Disc.-I)	UG/III/GEO/3/ MI-3T	T: Contemporary Environmental Issues *(To be taken by students of other Disciplines)*	4	3-0-1	15	60	75
			Semester-III Total			20				375

CC = Core Course, AECC = Ability Enhancement Compulsory Course, GE = Generic Elective , SEC = Skill Enhancement Course DSE = Discipline Specific Elective, CA= Continuous Assessment, ESE= End Semester Examination, TBD=To be decided, CT = Core Theory, CP=Core Practical, L = Lecture, T = Tutorial, P = Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

Syllabus for the Semester-III (Major) Theory (for 4 years Course)

Paper:- UG/III/GEO/4/MJ-3 Credits:-4 Full Marks:-75

Human Geography

Course Learning Outcomes:

This paper focuses on the nature, scope, and key theoretical approaches of human geography. It examines the evolution of human societies and their adaptation to diverse environments, with a special focus on population trends, cultural regions, and settlement patterns in India. The practical portion emphasizes on the concepts and tools for assessing human development and gender equality through indicators such as HDI, GDI, GEM, and GGM. It also equips students to evaluate the socio-economic impacts of climate change and measure development using poverty indices. Additionally, students gain practical experience by interpreting topographical maps to identify settlement types and geographical features.

Paper: - UG/III/GEO/4/MJ-3T Human Geography (Theory) 3 Credits/40 marks

Course contents:

Unit I: Scope and Approaches

1. Elements of human geography: Nature, scope, and recent trends.
2. Perspective in the development of Human geography : Resource, locational, landscape, environment.
3. Evaluation of Humans: Concept of Race and Ethnicity.
4. Cultural regions of India: Language and Religion.

Unit II: Society, Demography and Ekistics

5. Evolution of human societies: Hunting and food gathering, pastoral nomadism, subsistence farming, and industrial society.

6. Human adaptation to the environment: Eskimo, Masai, Jarwa, Gaddi, Santhals.
7. Distribution, density, and growth of population in India; Demographic Transition Model.
8. Characteristics of settlements: Urban and rural.
9. Climate Change and human societies: Vulnerability, Exposure, Risk, Adaptation and Resilience

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Suggested reading

- Ashok, A., Lakshmaiah, P.V. 2018. Tribes of India, vol. 1 &2, Telugu Akademi.
- Bose, N.K. 2020. Tribal Life In India, 5th ed (updated by Tripathi, C.B.), National Book Trust.
- Chandna R.C. 2022. Geography of Population, Part 1: Concepts, Determinants and World Patterns,Kalyani Publishers.
- Dorrel, D., Henderson, P. 2018. Introduction to Human Geography. University of Georgia Press.
- Fouberg, E.H., Nash, A.B., Murphy, A.B., de Blij, H., 2015. Human Geography: People, Place, and
- Culture, 11th ed, Wiley.
- Ghosh S. 1998. An Introduction to Settlement Geography, Sangam Books Ltd.
- Gregory, D., Johnston, R., Pratt, G., Watts, K., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley-Blackwell.
- Knox, P.L., Marston, S.A. 2014. Human Geography, Places and Regions in Global Context, 6th ed, Pearson Education.
- Majumdar, P.K. 2013. India's Demography: Changing Demographic Scenario in India, Rawat Publications.
- Mercier, M., Norton, W. 2019. Human Geography, 10th ed, Oxford University Press.
- Paul, C., Crang, P., Goodwine, M.G. 2014, Introducing Human Geographies, 3rd ed, Routledge. Rubenstein J.M., 2018, Contemporary Human Geography, 4th ed, Pearson.
- Short, R.J. 2017. Human Geography: A Short Introduction, 2nd ed, Oxford University Press. Sing, R.Y. 2009, A Geography of Settlements, Rawat Publications.

Paper:- UG/III/GEO/4/MJ-3P **Credit:-1** **Full Marks:-20**

Human Geography (Practical)

Course contents:

1. Different approaches to measure Human Development: Income approach, welfare approach, Basic needs approach and capabilities approach.
2. Methods of assessing human development: Calculating and Mapping components of Human Development Index (HDI) and Gender Development Index (GDI), Methods to measure Poverty Index (Pv1 and Pv2), Measuring methods
3. Concept of Gender Empowerment Measure (GEM) and methods to measure GEM, Gender Equality and Inequality Indices, Women's Economic Opportunity Index (WEOI), Gender Gap Measure (GGM) index.

Suggested Readings:

- Papalia, D.E., Olds, S.W. and Feldman, R.D. (2006). Human development.9th Ed. New Delhi: Tata McGraw-Hill.
- Journal of Human Development and Capabilities, published by Taylor & Francis (Routledge), Print ISSN: 1945-2829
- Klasen, Stephan (2017): Working Paper UNDP's gender-related measures: Current problems and proposals for fixing them
- Economist Intelligence Unit, 2012, Women's Economic Opportunity Index 2012, EIU, August 23. Web Link:

Paper:- UG/III/GEO/4/MJ-4P **Credits:-4** **Full Marks:-75**

Statistical Methods in Geography

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Course Learning Outcomes:

This course introduces students to the basic statistical methods used in geographic analysis. It covers data types, measurement scales, sampling techniques, and frequency distributions, which help students understand the collection and organization of data. The course includes tools necessary for data analysis, such as measures of central tendency, dispersion, correlation, regression, and hypothesis testing. Students also explore the shape and behavior of data through skewness, kurtosis, and normal distributions. Through practical applications, students develop skills in analyzing and interpreting geographic data using statistical techniques.

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Paper:- UG/III/GEO/4/MJ-4T Statistical Methods in Geography (Theory) 1 Credits/20 marks

Course contents:

Unit I: Frequency Distribution and Sampling

1. Discrete and continuous data, population and samples, scales of measurement (nominal, ordinal, interval and ratio)
2. Collection of data and preparation of statistical tables.
3. Sampling: Need, types, significance, and methods of random, systematic and stratified sampling.
4. Theoretical distribution: Frequency, cumulative frequency, normal and probability.

Unit II: Numerical Data Analysis

5. Central tendency: Mean, median, mode, and partition values .
6. Measures of dispersion range, mean deviation, standard deviation, and coefficient of variation .

7. The shape of the distribution of data Skewness and Kurtosis; normal distribution-properties of normal distribution.
8. Association and correlation: Product moment correlation and rank correlation .
9. Regression: Linear and non-linear; Residuals; Time series analysis (moving average) .

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Suggested Readings:

- Acevedo, M.F. 2012. Data Analysis and Statistics for Geography, Environmental Science and Engineering, CRC Press.
- Harris, R., Jarvis, C. 2011. Statistics for Geography and Environmental Science, Prentice Hall.
- Mahmood, A. 1999. Statistical Methods in Geographical Studies, Rajesh Publications.
- McGrew Jr., J.C., Lembo Jr., A.J., Monroe, C.B. 2014. An Introduction to Statistical Problem Solving in Geography, 3rd ed, Waveland Press.
- Pal, S.K. 1998. Statistics for Geoscientists: Techniques and Applications, Concept Pub Co.
- Rogerson, P.A. 2015. Statistical Methods for Geography: A Student's Guide, 4th ed, Sage.
- Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.

Paper:- UG/III/GEO/4/MJ-4P **Credit:-3** **Full Marks:-40**

Statistical Methods in Geography (Practical)

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Course contents:

1. Frequency distribution and graphical construction: histogram, frequency polygon, frequency curve.
2. Measuring central tendency and dispersion.
3. Analysis of bivariate data: scatter diagram, regression line, and residual, Correlation Co- efficient (rank correlation-Spearman, product moment correlation-Karl Pearson).
4. Time series analysis
5. Hypothesis testing: Chi-square test and Student t-test.

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Suggested Readings:

- Acevedo, M.F. 2012. Data Analysis and Statistics for Geography, Environmental Science and Engineering, CRC Press.
- Harris, R., Jarvis, C. 2011. Statistics for Geography and Environmental Science, Prentice Hall.
- Mahmood, A. 1999. Statistical Methods in Geographical Studies, Rajesh Publications.
- McGrew Jr., J.C., Lembo Jr., A.J., Monroe, C.B. 2014. An Introduction to Statistical Problem Solving in Geography, 3rd ed, Waveland Press.
- Pal, S.K. 1998. Statistics for Geoscientists: Techniques and Applications, Concept Pub Co.
- Rogerson, P.A. 2015. Statistical Methods for Geography: A Student's Guide, 4th ed, Sage.
- Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.

Skill Enhancement Course (SEC) for 4 years Course

Paper:- UG/III/GEO/4/SE-3P Credits: -3 Full Marks:-50

SEC-3: Computer Programming (R/Python)

Course Learning Outcomes:

This course learn to computer programming using either R or Python, depending on the available infrastructure. It aims to build foundational coding skills essential for analyzing geographic and geospatial data. Students will gain hands-on experience in writing code, working with various data structures, and applying data filtering and summarization techniques. The course also focuses on developing the ability to create visualizations and build regression models. Emphasis is placed on preparing students for advanced research in Geospatial Science, Earth and Atmospheric Sciences, and Human Geography. By the end of the course, students will be equipped to use programming tools effectively in academic and applied contexts.

Course contents:

1. Basics of computer programming: understanding the interface of programming languages such as R and Python.
2. Data structure in R/Python: array, vector, matrix, data frame, importing data in R/Python.
3. Functions in R/Python: the basic syntax of statistical functions, writing and using functions in R/Python
4. Data filtering and summary methods in R/Python: conditional functions, loop functions such as for and while loop for iterative calculation. Executing statistical tests in R/Python.
5. Building graphics in R/Python: creating histogram, scatterplot, boxplot, line plot; building a regression model, visualization data using R/Python.

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Suggested Readings:

- Tilman M. Davies. 2016. The book of R: A first course in programming and statistics. No Starch Press, US.
- Andy Field, Jeremy Miles, and Zoe Field. 2022. Discovering statistics using R. SAGE Publications India Pvt Ltd. India.
- Jared P. Lander. 2018. R for everyone: Advanced analytics and graphics. 2nd Edition. Pearson Education. India.
- Bharti Motwani. 2019. Data analytics with R. Wiley. India.
- Sandip Rakshit. 2017. R programming for beginners. McGraw Hill Education. India.
- Eric Matthes. 2016. Python crash course. No Starch Press, US.
- Paul Barry. 2016. Head-first Python, 2nd Edition. O'Reilly.
- William McKinney. 2017. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, O'Reilly Media.
- David Landup. 2021. Data Visualization in Python with Pandas and Matplotlib. Stack Abuse.
- Log2Base2 courses on python (https://log2base2.com/courses/python).
- Coursera. Data Analysis with Python (https://www.coursera.org/learn/data-analysis-with-python)
- Free codecamp. Data analysis with python (https://www.freecodecamp.org/learn/data-analysis-with-python/)
- Coursera. Data analysis with R-programming (https://www.coursera.org/learn/data-analysis-r?).

Syllabus for the Semester-III 3 years Minor course

(Minor Theory)

Paper:- UG/II/GEO/3/MI-3T **Credits:-4** **Full Marks:-75**

Contemporary Environmental Issues (Theory)

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This course provides a comprehensive understanding of contemporary environmental issues and their intersections with key social challenges. It explores topics such as climate change, pollution, human health, migration, and the gender-climate nexus. Students will gain foundational knowledge of climate science and the policies related to climate change adaptation. The course also examines the impacts of environmental pollution on health. It sheds light on how climate change influences migration patterns and exacerbates gender-based vulnerabilities. By the end, students will have a clearer perspective on the socio-environmental dynamics shaping today's world.

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Course contents:

1. Climate change: basic science and global scenario of climate change.
2. Climate change mitigation and adaptation policy
3. Pollution and environmental degradation, effect on human health with reference to air, water, soil and plastic.
4. Environmental refugee: migration-climate nexus.
5. Gender and climate change.

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Suggested Readings:

- IISD, UNITAR & UNEP (2009). IEA Training Material: Vulnerability and Climate Change Impact Assessment for Adaptation. (link)
- IPCC (2013). Climate Change 2013. The Physical Science Basis - Summary for Policymakers.
- OECD (2009): Guidance on Integrating Climate Change Adaptation into Development Co-operation. (link)
- UNEP (2009). Climate Change Science Compendium. (link)
- UNEP (2009). Climate in Peril, a Popular Guide to the Latest IPCC Report. (link)

- UNEP & UNDP (2011). Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners. (link)
- Global Gender and Climate Alliance (2016). Gender and climate change: A closer look at the existing evidence. (link)
- UN Women watch (2009). Women, gender equality and climate change. (link)
- Myers, N (2001). Environmental refugees; a growing problem of 21st century. (link)
- UNCHR, (2022). Climate Change, Displacement and Human Rights. (link)
- Brookings. (2019). The climate crisis, migration and refugees. (link)
- VK Ahlualia. (2014). Environmental Pollution and Health. TERI Press, New Delhi, ISBN:9788179934616.
- Frank R. Spellman. (2021). The science of environmental pollution. ISBN 9781032016832. CRC Press. Boca Raton

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DEPARTMENT OF GEOGRAPHY

4 years Major and Minor course

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Syllabus Framework for the Semester-IV (Major & Minor)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	Total
B.Sc. (Hons.)	2nd	IV	SEMESTER-IV							
			Major-5	UG/IV/GEO/4/ MJ-5	T: Soil and Biogeography P: Soil and Biogeography (Practical)	4	3-0-1	15	60	75
			Major-6	UG/IV/GEO/4 /MJ-6	T: Regional Development and Planning P: Regional Development and Planning	4	3-0-0	15	60	75
			Major-7	UG/IV/GEO/4 /MJ-7P	P: Techniques in Geography (Practical)	4	0-0-3	10	40	75
			AEC	AEC04	MIL-2 (common for all programmes)	2	2-0-0	10	40	50
			Minor-4 (Disc.-II)	UG/IV/GEO//MI-4P	P: Basic Techniques in Geography (Practical)	4	3-0-1	15	60	75
			Summer Intern.	INT		4	0-0-4	-		50
		Semester-IV Total				22				400
		Total of year-2				42				775

CC = Core Course, AECC = Ability Enhancement Compulsory Course, GE = Generic Elective , SEC = Skill Enhancement Course DSE = Discipline Specific Elective, CA= Continuous Assessment, ESE= End Semester Examination, TBD=To be decided, CT = Core Theory, CP=Core Practical, L = Lecture, T = Tutorial, P = Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

Syllabus for the Semester-IV (Major) Theory (for 4 years Course)

Paper:- UG/IV/GEO/4/MJ-5 Credits:-4 Full Marks:-75

Soil and Biogeography

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Course Learning Outcomes:

This course learn about foundational understanding of soil and biogeography, emphasizing both theoretical and practical aspects. Students learn about key soil properties, types, classification systems, and issues such as soil degradation and human impacts. It explores core biogeographic concepts including ecosystems, biomes, food chains, and energy flow, with a focus on major world biomes and regional concerns like habitat destruction in West Bengal. Practical components include hands-on analysis of soil properties and plant diversity using standard field and laboratory methods. The course equips students with essential skills to assess and interpret soil and ecological data.

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Paper:- UG/IV/GEO/4/MJ-5T Soil and Biogeography (Theory) 3 Credits/40 marks

Course contents:

Unit I: Soil Geography

1. Introduction to Soil geography: Definition, Factors of Soil formation.
2. Soil property and components: Texture, structure, moisture, pH, organic matter and NPK.
3. Origin and profile characteristics of lateritic, podsol, and chernozem soils.
4. Principles of soil classification: Genetic and USDA.
5. Concept of land capability and its Classification.
6. Soil erosion and degradation: Factors, processes and management measures. Humans as active agents of soil transformation.

Unit II: Biogeography

6. Concepts of biosphere, ecosystem, biome, ecotone, community, and ecology.
7. Concepts of trophic structure, food chain and food web. Energy flow in ecosystems.
8. Classification of world biomes (after Whittaker). Geographical extent and characteristics of tropical rain forest, savanna and hot desert.
10. Deforestation: Causes, consequences, and management.
11. Migration of animals due to habitat destruction in West Bengal with special references to elephant.

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Suggested reading

- Chapman J.L., Reiz, M.J. 1993. Ecology: Principle and Applications, Cambridge University Press.
- Chiras, D.D., Reganold, J.P. 2009. Natural Resource Conservation: Management for a Sustainable, Future, 10th ed, Pearson.
- Cox, B., Moore, P.D., Ladle, R. 2016. Biogeography: An Ecological and Evolutionary Approach, 9th ed, Wiley- Blackwell.
- Daji, J.A., Kadam, J.R., Patil, N.D. 1996. A Textbook of Soil Science, Media Promoters and Publishers.
- Dash, M.C. 2001. Fundamental of Ecology, 2nd ed, Tata McGrawHill.
- De, N. K., Ghosh. P. 1993. India: A Study in Soil Geography, Sribhumi Pub Co.
- Franzmeier, D.P., McFee, W.W., Graveel, J.G., Kohnke, H. 2016. Soil Science Simplified, 5th ed, Waveland Press.
- Gerrard, J. 2000. Fundamentals of Soils, Routledge.
- Huggett, R. 1998. Fundamentals of Biogeography, Routledge.
- Lomolino, M.V., Riddle, B.R., Whittaker, R.J. 2016. Biogeography, 5th ed, Oxford University Press.
- MacDonald, G. 2001. Biogeography: Introduction to Space, Time and Life, Wiley
- Morgan, R.P.C. 2005. Soil Erosion and Conservation, 3rd ed, Wiley-Blackwell.
- Santra. A. 2006. Handbook on Wild and Zoo Animals, International Book Distributing Co.
- Sharma, P.D. 2011. Ecology and Environment, Rastogi Publications.
- Singer, M., Munns, D.N. 2005. Soils: An Introduction, 6th ed, Pearson.
- Weil, R.R. and Brady, N.C. 2022. The Nature and Properties of Soil, 15th ed, Pearson.
- White, R. 2006. Principles and Practice of Soil Science: The Soil as a Natural Resource, Blackwell.
- Whittaker, R.H. 1975. Communities and Ecosystems, McMillan.

Paper:- UG/IV/GEO/4/MJ-5P **Credit:-1** **Full Marks:-20**

Soil and Biogeography (Practical)

Course contents:

1. Estimation of soil pH, organic matter, and NPK using field kit
2. Assessment of soil type by ternary diagram textural plotting
3. Assessment of Soil Texture using Sieve Method.
4. Species Diversity Measurements by Matrix Method, Shannon-Weiner Index, and Simpson's Index.

Suggested Readings:

- Stohlgren, T.J. 2007. Measuring Plant Diversity: Lessons from the Field. Oxford University Press.
- USDA: United States Department of Agriculture. 2014. Soil Survey and Laboratory Methods Manual, Soil Survey Investigations Report No. 51.
- Walters, M., Scholes, R.J. (Eds.) 2017. The GEO Handbook on Biodiversity Observation Networks, Springer International Publishing.
- Weil, R.R. and Brady, N.C. 2022. The Nature and Properties of Soil, 15th ed, Pearson.
- Xiao, M. 2009. Soil Testing Laboratory Manual, Bent Tree Press.

Paper:- UG/IV/GEO/4/MJ-6 **Credits:-4** **Full Marks:-75**

Regional Development and Planning

Course Learning Outcomes:

This course provides a conceptual and analytical understanding of regional development and planning, emphasizing both theoretical frameworks and practical applications. Students explore regional patterns in India, regional development models, and patterns of regional disparities. The course also examines the principles and methods of regional planning, including multi-level, centralized, and decentralized structures, with a focus on planning in specific regions such as hills and urban areas. Practical exercises include methods for identifying regions, measuring disparities, and assessing spatial disparities. Through hands-on learning, students gain the skills to interpret development patterns and engage in local planning processes.

Regional Development and Planning (Theory)

Paper:- UG/IV/GEO/4/MJ-6T **3 Credits/40 marks**

Course contents:

Unit I: Regional Development

1. Regions: Concept, types, and delineation
2. Theories and models for regional development: Growth Pole Model (after Perroux)
3. Growth Centre Model in Indian context: Rostow, Mydral.
4. Core Periphery Model (after) Friedman.
5. Regional disparities in India: Economic and social

Unit II: Regional Planning

5. Regional planning: Principles, objectives, and approaches
6. Types of planning: Temporal, sectoral, spatial, and non-spatial
7. Centralised and Decentralised planning. Multi-level planning in India.

8. Planning issues in hill area (as formal region) and city region (as functional region)

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Suggested Readings:

- Bhargava, G. 2001. Development of India's Urban, Rural, and Regional Planning in 21st Century: Policy
- Perspective, Gyan Publishing House.
- Chand, M., Puri, V.K. 2000. Regional Planning In India, Allied Publishers Ltd.
- Chandana, R.C. 2016. Regional Planning and Development, 6th ed, Kalyani Publishers.
- Glasson, J. 2017. Contemporary Issues in Regional Planning, Routledge.
- Gore, C. 2011. Regions in Question: Space, Development Theory, and Regional Policy, Routledge.
- Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human
- Geography, 5th ed, Wiley.
- Hall, P., Tewdwr-Jones, M. 2010. Urban and Regional Planning, Routledge.
- Higgins, B., Savoie, D.J. 2017. Regional Development: Theories and Their Application, Routledge.
- Kulshetra, S.K. 2012. Urban and Regional Planning in India: A Handbook for Professional Practitioners,
- Sage.
- Kumar, A., Meshram, D.S., Gowda, K. (Eds) 2016. Urban and Regional Planning Education: Learning for
- India, Springer.
- Misra, R.P. 1992. Regional Planning: Concepts, Techniques, Policies and Case Studies, Concept Pub Co.
- Ray, J. 2001. Introduction to Development & Regional Planning, Orient Blackswan.
- Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Regions and
- Nations, Princeton University Press.
- Wheeler, J.O., Muller, P.O., Thrall, G.I., Fik, T.J. 1998. Economic Geography, 3rd ed, Wiley.
- Willington D. E., 2008: Economic Geography, Husband Press.
- Wood, A., Roberts, A. 2010. Economic Geography: Places, Networks and Flows, Routledge.

Paper:- UG/IV/GEO/4/MJ-6P **Credit:-1** **Full Marks:-20**

Regional Development and Planning (Practical)

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Course contents:

1. Delineation of formal regions by weighted index method.
2. Delineation of functional regions by breaking point analysis.
3. Measurement of inequality by location quotient and Lorenz Curve.
4. Mapping of spatial distribution of regional disparity. (Local level in Rural and Urban area)

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Suggested Readings:

- Glasson, J. 2017. Contemporary Issues in Regional Planning, Routledge.
- Knowles, R, Wareing, J. 1990. Economic and Social Geography, Made Simple Books, Rupa.
- Mahmood, A. 1998. Statistical Methods in Geographical Studies, Rajesh Publication.
- Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera

Paper:- UG/IV/GEO/4/MJ-7P **Credits:-4** **Full Marks:-75**

Techniques in Geography (Practical)

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Course Learning Outcomes:

This course helps students develop practical skills in thematic cartography, traditional surveying methods, and modern geospatial technologies. It focuses on the visual representation of data using cadastral maps, thematic map making, and land use mapping. Through hands-on fieldwork, students use instruments such as prismatic compasses, dumpy levels, and theodolites for accurate measurements and mapping. The course also introduces map projections, geodesy, coordinate systems, GPS data collection, and basic GIS operations using open-source software. Overall, it equips students with the skills required for data acquisition and spatial analysis in geography.

Course contents:

Unit I: Thematic Cartography

1. Diagrammatic representation of data: Simple and composite line and bar graphs. Dots and Spheres, Proportional circle, Proportional Pie, Proportional Square, and Flow Chart.
2. Construction and interpretation of thematic maps: Dasymetric density map (Choropleth) and isopleth.
3. Chorochromatic map: Preparation of Land use map at cadastral level.

Unit II: Surveying Techniques and Mapping

1. Traverse Survey by Prismatic Compass (closed and open).
2. Levelling survey by Dumpy Level (collimation method and Rise-fall method) and contour survey by Dumpy level and Prismatic compass.
3. Determination of Height and distance by Theodolite (Base accessible and base Inaccessible) on same vertical plain.

Unit III: Geomatic and Geospatial Technology

1. Map projection: Polar Zenithal Gnomonic Projection, Cylindrical Equal Area Projection, and Simple Conical Projection (with one standard parallel), Mercator's projection.
2. Geodesy and Coordinate Systems: Concept of Geoid, ellipsoid and datum, Cartesian, and geographic coordinate system, UTM Grid System.
3. Digitization (Point, Line, Polygon) using open-source software (kml to shapefile).
4. GPS data collection, waypoint and route creation, data integration with GIS software, and real-world applications in surveying.

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Suggested Readings:

- Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.
- Basu, R., Bhaduri, S. (Eds) 2007. Contemporary Issues and Techniques in Geography, ProgressivePub.
- Bhatta, B. 2020. Remote Sensing and GIS, 3rd ed, Oxford Univ. Press.
- Kennedy, M., Kopp, S. 2001. Understanding Map Projections, Esri Press.
- Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O. 2011. Map Use: Reading, Analysis,Interpretation, 7th ed, Esri Press.
- Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.
- Pearson II, F. 1990. Map Projections: Theory and Applications 2nd ed, CRC Press.
- Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. 1995. Elements of Cartography,6th ed, Wiley.
- Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.
- Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.
- Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), Mcgraw-Hill Higher Education.
- Gupta K. K. and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, New Delhi.

Syllabus for the Semester-IV 3 years Minor course

(Minor Theory)

Paper:- UG/IV/GEO/4/MI-4P Credits:-4 Full Marks:-75

Basic Techniques in Geography (Practical)

Course contents:

1. Concepts of scale: linear scale, comparative scale, diagonal scale, vernier scale
2. Topographical map: system of topo map, content and significance of topo map
3. Surveying techniques: dumpy level and theodolite survey basics.
4. Map projection: fundamentals of map projection, developable surface, classification of projection, cylindrical equal area projection, simple conical projection with one standard parallel, polar zenithal projection.
5. Geospatial technology: basics of remote sensing and GIS, sensor resolutions, concept of digital image and image pixel, image interpretation keys, image correction and false color composite, concept of image classification, georeferencing, data models in GIS environment.

Suggested Readings:

- Sarkar, A. (2015) Practical Geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
- Saha P, Basu P. 2010. Advanced Practical Geography. Bookd and Allied Pvt. Ltd. Kolkata
- John R Jenson. 2013. Remote sensing of the environment: an earth resource perspective, Pearson Education India.
- George Joseph and C Jeganathan. 2018. Fundamentals of remote sensing (3rd edition), The Orient Blackswan, India.
- Lillesand, Kiefer, Chipman. 2011. Remote Sensing and Image Interpretation, 6ed (WSE), Wiley, India.
- John R. Jensen. 2017. Introductory Digital Image Processing: A Remote Sensing Perspective. Pearson Education, India.

- Change K. 2019. Introduction to Geographic Information Syatem, 9th Edition, McGrawHill Education, US.
- Kurt Menke. 2022. Discover QGIS 3.x - Second Edition (https://locatepress.com/book/dq32).
- Scott Madry. 2021. Introduction to QGIS (https://locatepress.com/book/itq) .
- Kurt Menke, GISP et al. 2016. Mastering QGIS - Second Edition (https://www.packtpub.com/big-data-and-business-intelligence/mastering-qgis-second-edition)
- Anita Graser. 2016. Learning QGIS - Third Edition (https://www.packtpub.com/big-data-and-business-intelligence/learning-qgis-third-edition)
- Alexander Bruy, Daria Svidzinsk. 2015. QGIS By Example (https://www.packtpub.com/application-development/qgis-example)
- Rüdiger Thiede, Tim Sutton, Horst Düster, and Marcelle Sutton. 2013. The QGIS Training Manual - A Comprehensive Introduction to Quantum GIS (http://locatepress.com/qtm)