

Total Pages—27 PG/IVS/GEO/403(A1, A2, B1, B2,
C1, C2, D1, D2, E1, E2,
F1, F2)/24
M.Sc. 4th Semester Examination, 2024

GEOGRAPHY

PAPER – GEO-403(A1,A2,B1,B2,
C1,C2,D1,D2,E1,E2,F1,F2)

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

*Candidates are required to give their answers in
their own words as far as practicable*

Spl. Paper : *Advanced Geomorphology*

PAPER – GEO-403 A.1

(Advanced Geomorphic Techniques)

[Marks : 20]

GROUP-A

Answer any **two** questions : 2×2

1. Define half-life of radioactive materials.
2. Define Froude number.
3. How does watershed differ from river basin ?
4. What is the geomorphic significance of Reynold number ?

GROUP-B

Answer any **two** questions : 4×2

5. How does stage-discharge relationship reveal flood susceptibility ?
6. Assess the importance of DEM in micro landscape analysis ?

7. How do you estimate bed-load of a river ?
8. Examine the empirical methods of stream-power estimation.

GROUP – C

Answer any **one** question : 8 × 1

9. Explain the procedure of absolute dating mentioning their specific areas of application.
10. Elucidate the data required for Manning's equation highlighting the methods of estimating them.

PAPER – GEO-403 A.2

(Applied Geomorphology)

[Marks : 20]

GROUP—A

Answer any **two** questions : 2×2

1. How far slope influences sewage treatment in urban management ?
2. What is the importance of Integrated River Basin Management ?
3. How does soil piping play a role in the collapsing process ?
4. Why is river basin considered a geomorphic unit ?

GROUP—B

Answer any **two** questions : 4×2

5. Identify the role of geomorphological knowledge in the prevention or reduction of bank erosion hazards.
6. Enumerate the role of geomorphology in drainage management of urban areas.

7. Discuss the application of geomorphology in EIA.
8. Justify the application of geomorphological knowledge in estimating the water budget within the river basin.

GROUP – C

Answer any **one** question : 8 × 1

9. Critically discuss the geomorphological significance of dam site selection at Farakka across the river Ganga and its current status.
10. How far geomorphic attributes are integrated in the management techniques applied for the coastal erosion hazard in the Digha coast.

[Internal Assessment – 10 Marks]

Spl. Paper : Coastal Management

PAPER – GEO-403 B.1

(Coastal Ecology and Hazards)

[Marks : 20]

GROUP – A

Answer any **two** questions : 2×2

1. Define mangrove dwarf.
2. Why does Mangrove occur within equatorial and tropical coast ?
3. Mention the supporting services provided by seaweeds.
4. Outline the functions and duties of NCCR for coastal studies in India.

GROUP-B

Answer any **two** questions : 4×2

5. Examine the plant-animal interaction in coastal dune system.
6. How do mangroves arrest coastal erosion ?
7. Why does primary productivity change across the dune ?
8. Elucidate the process of estimating shore line retreat from the data on sea level rise ?

GROUP-C

Answer any **one** question : 8×1

9. How do plants adapt on dune ? Explain with illustrations.
10. Illustrate the techniques to monitor coastal processes and major landforms.

PAPER – GEO-403 B.2

(Coastal Issues and Management)

[Marks : 20]

GROUP – A

Answer any **two** questions : 2×2

1. Identify the method of estimating population pressure along the coast.
2. Why is coastal resource management needed ?
3. Briefly mention the concept of ICZM
4. What is coastal eutrophication ?

GROUP – B

Answer any **two** questions : 4×2

5. Enumerate the role of coastal sand dunes in managing coastal floods.

6. Explain why the sea level rise has potential threat to the coastal urban areas.
7. Justify the necessary of coastal habitat restoration in mangrove wetlands.
8. Explain how the environmental regulations were violated by the coastal tourism process along the Mandarmoni coast.

GROUP – C

Answer any **one** question : 8 × 1

9. Explain the significance of coastal vulnerability assessment and ecosystem valuation in managing coastal changes.
10. Critically examine the application of Remote Sensing and GIS techniques in coastal management, with special emphasis on geomorphological micro-zonation and environmental zoning approaches.

[Internal Assessment – 10 Marks]

Spl. Paper : *Urban and Regional Planning*

PAPER – GEO-403 C.1

(Theoretical Bases of Urban Planning)

[Marks : 20]

GROUP – A

Answer any **two** from the following : 2×2

1. What do you understand by the top-down approach ?
2. Mention the role of NITI Aayog in the context of regional development in India.
3. Mention the major principles of regional planning in India.

4. How does the colonial past created a regional disparity in India ?

GROUP-B

Answer any **two** from the following : 4 × 2

5. Bring out the nature of conflicts and their impact in the forest-society interface with special reference to Paschim Medinipur district.
6. What are the main tenets of the theory of 'Development of underdevelopment' after Andre Gander Frank ?
7. Briefly describe the major thrust areas of regional planning in the last two five-year planning periods.
8. Explain the concept of balanced and unbalanced growth.

GROUP—C

Answer any **one** from the following : 8×1

9. Critically discuss the growth pole theory as proposed by Hirschman.
10. Give an account of the regional environmental issues with special reference to coastal hazards in Purba Medinipur.

PAPER — GEO-403 C.2

(*Planning for Urban Development*)

[Marks : 20]

GROUP—A

Answer any **two** questions : 2×2

1. How can pedestrian infrastructure reduce traffic congestion ?

2. What is the role of mass transportation in urban planning ?
3. What are the main factors contributing to the shortage of affordable housing in Indian cities ?
4. What is IDSMT approach in urban planning ?

GROUP—B

Answer any **two** questions : 4 × 2

5. What are the primary challenges faced by cities in managing urban traffic congestion ?
6. How does the Pradhan Mantri Awas Yojana (PMAY) contribute to urban housing in India ?

7. Write a short note on the real estate development in urban India.
8. How does rapid urbanization contribute to sanitation and drinking water supply challenges in Indian cities ?

GROUP – C

Answer any **one** question : 8 × 1

9. How does socio-economic factors influence urban solid waste generation ? Mention the key points for solid waste management rules, 2016.
10. Discuss the role of geospatial technologies to improve urban land-use planning and management.

[Internal Assessment – 10 Marks]

Spl. Paper : RS & GIS

PAPER – GEO-403 D.1

(Advanced Remote Sensing)

[Marks : 20]

GROUP – A

Answer any **two** from the following : 2×2

1. What is image hypercube ?
2. Distinguish between cross-polarisation and co-polarisation in RADAR remote sensing.
3. Write a short not on deskewing.
4. What is foreshortening in SLAR ?

GROUP – B

Answer any **two** from the following : 4×2

5. Write down the relative advantages and disadvantages of optical and microwave remote sensing.
6. What are the major applications of hyperspectral images ?
7. How does range-resolution differ from azimuth resolution ?
8. Write a brief note on the operational principles of LIDAR with suitable diagrams.

GROUP – C

Answer any **one** from the following : 8×1

9. How does radar interferometry enhance our ability to measure and monitor changes in Earth's surface over time ?

10. What are the major techniques used in digital image processing to enhance features, remove noise, and extract information from satellite imagery ?

PAPER – GEO-403 D.2

*(Advanced GIS and Application of
Remote Sensing)*

[Marks : 20]

GROUP – A

Answer any **two** questions : 2×2

1. What are the features of a vector-based spatial data ?
2. Write the difference between slope and gradient.

3. What is the purpose of SQL in data mining ?
4. What spectral bands are typically used for vegetation mapping ?

GROUP-B

Answer any **two** questions : 4×2

5. What is attribute data in GIS ? How is attribute data linked to spatial data in GIS ?
6. Briefly describe the estimation of slope from DEM data.
7. State the estimation process of soil moisture from optical image.
8. Describe the importance of spectral reflectance in remote sensing.

GROUP – C

Answer any **one** question : 8 × 1

9. Explain the process of overlay analysis in GIS and how it is used to identify spatial relationships and patterns.
10. Write the theoretical basics of K-mean clustering.

[Internal Assessment — 10 Marks]

Spl. Paper : *Spatial Analysis in Landscape Ecological Dynamics*

PAPER – GEO-403 E.1

(Landscape Ecology and Dynamics)

[Marks : 20]

GROUP – A

Answer any **two** questions : 2 × 2

1. What is the role of Fractal Geometry in landscape ecology.
2. Define the term landscape sensitivity.
3. Mention some GIS techniques for measuring the composition and configuration of the landscape.
4. What is meant by landscape dynamics ?

GROUP-B

Answer any **two** questions : 4×2

5. Explain the role of source-sink factors in species movement.
6. How does landscape fragmentation/ perforation occur due to anthropogenic drivers ?

7. Enumerate in brief, the role of topography for landscape pattern.
8. Briefly describe the principal areas of Aichi targets.

GROUP – C

Answer any **one** question : 8 × 1

9. Give an account of Driver-Pressure-State-Response model to assess human-environment systems.
10. Explain how scale-dependence is important in understanding disturbance dynamics and the effects of disturbances on a landscape. Consider both spatial and temporal scales.

PAPER – GEO-403 E.2

(Spatial Analysis, Landscape Modeling and Services)

[Marks : 20]

GROUP – A

Answer any **two** from the following :

1. What is meant by landscape metrics ? 2 × 2
2. Define bioaccumulation.
3. Name any two simulation models used in landscape ecology.
4. What are the impacts of deforestation on ecosystem services ?

GROUP – B

Answer any **two** from the following :

5. What is spatial modeling ? 4 × 2

6. Briefly discuss the patterns of landscape degradation due to urban sprawl.
7. What are the different types of Bio-indicators ?
8. Briefly explain the types of spatial analysis applied in landscape ecology.

GROUP—C

Answer any **one** from the following : 8×1

9. Give an account of the 'Bio-monitoring' and 'Bio-indicator measuring' techniques used in landscape ecological research.
10. Discuss the application of GIS techniques for landscape connectivity and corridor modeling.

[Internal Assessment — 10 Marks]

PAPER – GEO-403 F.1

[Marks : 20]

(Applied Climatology-1)

GROUP – A

Answer any **two** questions : 2×2

1. What are sea salt and non-sea salt fractions in rain water ?
2. What is crustal enrichment factor ?
3. What is transmittance ?
4. What are the sources of sulfate and nitrate aerosols ?

GROUP – B

Answer any **two** questions : 4×2

5. Describe the metrics of acidity and neutrality for rain water analysis.

6. How is boundary layer height estimated from observational data ?
7. Briefly describe the factors that affect the global water cycle.
8. Write a short note on the theoretical background for the estimation of aerosol optical depth.

GROUP – C

Answer any **one** question : 8 × 1

9. Discuss, how do the optical properties of aerosols and cloud affect the radiative transfer of energy in the atmosphere.
10. Discuss, the spectroscopic principle of measuring the concentration of ionic species in air samples.

PAPER – GEO-403 F.2

(*Applied Climatology-2*)

[**Marks : 20**]

GROUP – A

Answer any **two** questions : 2×2

1. What are the spatial resolutions of IMD gridded temperature and rainfall data ?
2. What is OLR ?
3. What is cloud effective radii ?
4. What is reanalysis data ?

GROUP – B

Answer any **two** questions : 4×2

5. Summarize the features of ECMWF and CRU reanalysis climate data.

6. State the implications of SPI in detecting the extreme weather events.
7. Briefly describe the cloud detection algorithm from satellite image.
8. What is monthly climatology of climate parameters? Write its implication in studying precipitation.

GROUP – C

Answer any **one** question : 8 × 1

9. Describe the role of aerosols in modulating cloud and precipitation.
10. Explain the theoretical basics of PSCF.

[**Internal Assessment – 10 Marks**]