

M.A./M.Sc. 3rd Semester Examination, 2023

GEOGRAPHY

PAPER — GEOG-303

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

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

(Special Paper : Advanced Geomorphology)

PAPER — GEOG-303 A₁

(Process Geomorphology-I)

GROUP — A

Answer any **two** questions : 2 × 2

1. Define critical shear stress.

2. Define boundary condition.
3. What are the sources of channel-scale resistance ?
4. Why does river velocity increase from source to mouth ?

GROUP – B

Answer any **two** questions : 4 × 2

5. Elucidate with example the thresholded nature of geomorphic forms and processes.
6. How is slope stability associated to safety factor ?
7. Illustrate the classical down channel trends of fluvial forms and processes.
8. Describe the horizons of laterite soil.

GROUP – C

Answer any **one** question : 8 × 1

9. Explain the mechanism of drainage network development.
10. Describe the theories of floodplain development.

PAPER – GEOG-303 A₂

(*Process Geomorphology-II*)

GROUP – A

Answer any **two** questions : 2 × 2

1. What is frost heaving ?
2. Define cryoplanation.
3. What is the difference between valley glaciers and continental glaciers ?

4. Define outwash plain.

GROUP – B

Answer any **two** questions : 4 × 2

5. How are geomorphosites identified in a region of geomorphological diversity ?
6. Why is man considered an active geomorphic agent in the era of the Anthropocene ?
7. Give an account of the geomorphic implications of land use change.
8. Elucidate the human impacts on slope processes.

GROUP – C

Answer any **one** question : 8 × 1

9. Describe the favourable conditions for planation development and explain their roles in the long-term landform evolution.

10. Explain how landforms developed with sea level change in the Quaternary period, with special reference to the East Coast of India.

[Internal Assessment – 10 Marks]

(Special Paper : Coastal Management)

PAPER – GEOG-303 B₁

(*Coastal Processes*)

GROUP – A

Answer any two questions : 2 × 2

1. Define coast as a system unit.
2. Why does speed of wave vary according to depth of water ?
3. Define long-shore current.
4. How does rotating tide form ?

GROUP – B

Answer any **two** questions : 4 × 2

5. Examine the necessity of coastal study in the present context of global climate change.
6. Describe the nature of process-form interaction at coast.
7. Differentiate primary coast from secondary coast.
8. Describe different types of breaker.

GROUP – C

Answer any **one** question : 8 × 1

9. How does a wave change while travelling from deep sea to shallow water coast ?
10. Explain the formation of rip-cell circulation.

PAPER – GEOG-303 B₂

(*Coastal Environments : Focus on
Indian Regions*)

GROUP – A

Answer any **two** questions : 2 × 2

1. Is concrete embankment feasible for coastal Sundarban ?
2. What is the shore-face character of an alluvium coast ?
3. What is the significance of mangrove in coastal estuary ?
4. Define estuary hydrodynamics.

GROUP – B

Answer any **two** questions : 4 × 2

5. Write an account of the coastal erosion problems in West Bengal.

6. Briefly explain the problems associated with historical land reclamations in the Sundarban.
7. Identify the techniques for assessing coastal hazard zonation along the coasts.
8. Justify the prediction of climate change-induced coastal hazards for coastal management.

GROUP – C

Answer any **one** question :

8 × 1

9. Discuss how the morphodynamic behaviour of coastal systems modifies the coastal features on temporal and spatial scales with feedback mechanisms.
10. Describe the formations and features of carbonate platforms and beach rocks on the coral-fringed coasts of Andaman.

[Internal Assessment – 10 Marks]

(Urban Geography and Regional Planning)

PAPER – GEOG-303 C₁

(Foundation of Urban Geography)

GROUP – A

Answer any **two** of the following questions : 2×2

1. Define urban agglomeration.
2. Give a short note on the new town movement.
3. Mention any two characteristics of the Gated communities.
4. What is a green city ?

GROUP – B

Answer any **two** of the following questions : 4×2

5. Explain the processes of gentrification in an urban area.

6. Critically discuss the European and Anglo-American tradition in Urban planning.
7. Discuss in brief the components of the Urban Livability Index.
8. What are the salient features of National Urbanization Policy ?

GROUP – C

Answer any **one** of the following question : 8 × 1

9. Discuss in brief the trends and patterns of world urbanization in the pre and post Industrial Revolution phase.
10. Examine the role of urban ecology in urban planning and sustainability.

PAPER – GEOG-303 C₂

(Contemporary Urban Issues)

GROUP – A

Answer any two of the following questions : 2 × 2

1. What is gentrification ?
2. What is bio-methanation process ?
3. What do you mean by urban ecological footprint ?
4. Write a short note on urban homelessness.

GROUP – B

Answer any two of the following questions : 4 × 2

5. Mention some effective strategies for mitigating the urban heat island effect ?
6. Distinguish between basic and non-basic economic functions in the urban areas.
7. Highlight some key features of Smart City Mission initiative.

8. Discuss the challenges and opportunities of social diversity in the urban areas.

GROUP – C

Answer any one of the following question : 8 × 1

9. What are the primary goals of AMRUT and how does it differ from JNNURM ?
10. Briefly discuss the spatio-temporal characters of development of metropolitan cities in India after Independence.

[Internal Assessment – 10 Marks]

PAPER – GEOG-303 D₁

(*Physical Basics of Remote Sensing*)

GROUP – A

Answer any two of the following questions : 2 × 2

1. What is light ?
2. What is emissivity ?

3. What is atmospheric transmissivity ?
4. What is path radiance ?

GROUP – B

Answer any **two** of the following questions : 4×2

5. Write down the importance of thermal cross-over in thermal remote sensing.
6. Briefly describe the principle of DOS in atmospheric correction.
7. Which channel in the EMS would be appropriate to sense a forest fire having a temperature of 900 K ?
8. What is internal and external calibration in thermal remote sensing ?

GROUP – C

Answer any **one** of the following question : 8×1

9. Illustrate the atmospheric interaction with incoming solar radiation.
10. Explain the principles of sun-synchronous and geo-synchronous parking orbits of satellites with suitable graphics.

PAPER – GEOG-303 D₂

*(Photogrammetry, Aerial Photo and
Satellite System)*

GROUP – A

Answer any **two** of the following questions : 2×2

1. What do you mean by the subtractive colour ?
2. What is the differential parallax ?
3. Define principle point in an aerial photograph.
4. Mention at least two moderate resolution sensors of a satellite system.

GROUP – B

Answer any **two** of the following questions : 4×2

5. Explain the basic operational principles behind whiskbroom scanning mechanism and data collection process.
6. Write a short note on aerial photographic filters.
7. How does the process of flight planning for drone remote sensing missions impact the quality and efficiency of data collection ?
8. What are the primary steps involved in a typical photogrammetry workflow, from image capture to generating stereo models ?

GROUP – C

Answer any **one** of the following question : 8×1

9. How does the emulsion properties of a film affect the overall resolution of aerial images ?

What trade-offs exist between film speed and resolution in aerial photography, considering the need for both fine details and quick capture in dynamic environments ?

10. What role does geometric distortion play in creating or hindering accurate stereoscopic vision ? How can the post-processing methods mitigate such distortions for better stereo model ?

[Internal Assessment – 10 Marks]

(Landscape Ecology with Metrics
and Models)

PAPER – GEOG-303 E₁

(*Theories in Landscape Ecology*)

GROUP – A

Answer any **two** of the following questions : 2 × 2

1. Define Holon.

2. Differentiate Keystone species from endangered species.
3. Define source-sink functions in landscape ecology.
4. Make a comparison between obligated migration and facultative migration.

GROUP – B

Answer any two of the following questions : 4×2

5. Briefly discuss the gradient concept of landscape structure.
6. Explain the importance of scale in Landscape Ecology.
7. Elucidate the role of IALE in the development of the subject of Landscape Ecology.
8. Mention the salient features of the North American perspective on Landscape Ecology.

GROUP – C

Answer any **one** of the following question : 8×1

9. Give an account of the causes of landscape fragmentation and its impact on individual species' behaviour and movement.
10. 'Landscape conservation sets a new paradigm in biodiversity conservation' – Explain with suitable examples.

PAPER – GEOG-303 E₂

(*Metrics and Models in Landscape Ecology*)

GROUP – A

Answer any **two** of the following questions : 2×2

1. What is the difference between Ecotone and Ecotope ?
2. How do you define the term 'patch' in landscape ecology ?

3. Mention the indicators of landscape composition.
4. What do you mean by ecological threshold ?

GROUP – B

Answer any **two** of the following questions : 4×2

5. Enumerate the importance of Core Area Metrics in landscape analysis.
6. Explain the hierarchy pattern of Landscape Components
7. Edge effect is related to landscape fragmentation—Explain.
8. Identify the influence of spatial heterogeneity on the ecological processes of landscape mosaics.

GROUP – C

Answer any **one** of the following questions : 8×1

9. Discuss the use and importance of the Neutral Model in Landscape Ecology.
10. Examine the role of metrics and models for quantifying landscape structure and estimation of ecological quality.

[Internal Assessment – 10 Marks]

PAPER – GEOG-303 F₁

(*Climate System*)

GROUP – A

Answer any **two** of the following questions : 2 × 2

1. What are sensible and latent heat flux ?
2. What is a climate forcer ?
3. What is radiative forcing ?
4. Why smaller droplet needs larger supersaturation limit for growth ?

GROUP – B

Answer any two of the following questions : 4×2

5. What are the major optical properties of aerosols ?
6. Why the growth rate of smaller droplet is faster than larger droplet ?
7. Under atmospheric transmission of 1, what would be the likely temperature of the Earth's surface assuming a solar constant of 1368 W m^{-2} and an albedo of 0.3 ?
8. What are the first and second indirect effects of aerosols ?

GROUP – C

Answer any one of the following questions : 8×1

9. Explain the radiative transfer model for energy transmission through atmosphere.

10. Describe the physical process of formation of rain drop inside an ascending air parcel.

PAPER – GEOG-303 F₂

(*Statistical Climate*)

GROUP – A

Answer any **two** of the following questions : 2 × 2

1. What is IOD ?
2. What is a random walk model ?
3. What is a moving average process ?
4. What is the implication of unit root test ?

GROUP – B

Answer any **two** of the following questions : 4 × 2

5. Write a short note on Madden-Julian Oscillation.

6. Write a brief note on statistical downscaling of climate model data.
7. What is ACF in time series observation ? How does it estimated from a time series data ?
8. How does the factors in EOF tell the spatial structure of the variation in time series data ?

GROUP – C

Answer any **one** of the following questions : 8×1

9. Describe the estimation process of SOI. What is the effect of positive phase of SOI on Indian Summer Monsoon Rainfall ?
10. State the theoretical basics of empirical orthogonal function used on time series data in climate science.

[Internal Assessment – 10 Marks]
