

M. Sc. 1st Year 2nd Semester Examination 2022

Geography

Synoptic and Applied Climatology

Course Code: SC/GEOG/PG/CORE/TH/07

Paper: GEOG-C107T

Time: 2 Hours

Full Marks: 50

Answer one question from each unit

UNIT-I: Dynamics of Atmospheric Circulation

1. Illustrate the impact of primary, secondary and tertiary circulations of atmosphere within the tropical zone with specific examples. Calculate the Coriolis force of a moving air parcel at 30 ° latitude with a linear velocity of 20 m s⁻¹ considering the angular momentum of earth to be Ω kg m² s⁻¹. 8+2
2. How does the conservation of angular momentum and conservation of absolute vorticity influence the formation of Rossby waves? Explain why the value of the SALR varies in the atmosphere. 8+2

UNIT-II: Weather Disturbances and Hazards

3. Define emitted infrared flux of radiation. Explain the three theories of formation of a tornado from a mid-level meso-cyclone. What would be the aspect ratio, if an ideal thunderstorm Byers-Braham cell has a radius of 5 km and thickness of 10 km? 2+6+2
4. Mention the relationship between Saharan Air Layer and African Easterly Waves. Explain how the propagation of cold Rossby waves and warm Kelvin waves are related with the formation of Ekman spirals during different IOD phases. What is Bjerknes feedback mechanism? 3+5+2

UNIT-III: Climatic Changes, Policies and Mitigation

5. What is meant by millennial climate cycles? Discuss the anthropogenic factors of global warming in the context of global climate change. 3+7
6. What is COP21? Explain the Milankovitch cycle in the context of climate change. 3+7

UNIT-IV: Applied Climatology

7. Explain the phenomenon of urban heat island and the factors responsible for it. Define aerodynamic roughness length? What is growing degree day? 6+2+2
8. What is Grosswetterlagen (GWL)? Discuss NWP as a modern method of weather forecasting. Briefly mention the system of forecasting of SW monsoon by the IMD. 2+4+4