2024

B.A./B.Sc.

Sixth Semester

DISCIPLINE SPECIFIC ELECTIVE – 4

PHYSICS

Course Code: PHD 6.21 (C)

(Physics of Earth)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) Mention some of the leading scientific theories regarding the origin of the universe and what evidence supports them? 6
   (b) Discuss the main differences between terrestrial and Jovian planets, in terms of their composition, structure, and other key characteristics. 5
   (c) If the Earth were perfectly spherical, would it precess? 3

2. (a) How is matter thought to have been formed in the Big Bang? 5
   (b) If you were located in a galaxy near the boundary of our observable Universe, would the galaxies in the direction of the Milky Way appear to be approaching or receding from you? Explain. 5
   (c) Discuss the critical density of the Universe. 4

UNIT–II

3. (a) How do mountain glaciers form and what role do they play in shaping the Earth's landscape? 6
   (b) Write the key benefits and challenges associated with harnessing geothermal energy for sustainable power generation. 5
   (c) Describe the various components of biosphere with suitable examples. 3

4. (a) Explain how river systems form. How do they contribute to shaping the geography, ecology, and human activities of the regions they traverse? 4+3=7
   (b) Discuss the different types of clouds and their formation. How do clouds impact weather patterns and climate? 4+3=7

UNIT–III

5. (a) Derive the apparent resistivity expression for a single current electrode placed under the ground. 6
   (b) How does the sea floor spreading process contribute to the understanding of plate tectonics and the Earth's dynamic crustal movements? 5
   (c) Based on the geographical distribution, how are volcanoes distributed on the globe? 3

6. (a) How is the Earth's heat budget balanced? What are the main processes involved in regulating the planet's temperature? 4+3=7
   (b) What insights into the recent climate change can we gain from studying paleoclimate records? 7

UNIT–IV

7. (a) Give a brief account on uniformitarianism and catastrophism. To understand the nature of operation of natural processes today, is it necessary to employ both the concepts of uniformitarianism and catastrophism? 5+2=7
   (b) Discuss the major milestone events that build the complex evolution of our planet earth. 7

8. (a) Name and briefly describe the five tectonic subdivisions of the Himalaya from North to South. 2+5=7
   (b) Explain how the law of superposition help to understand the relative ages of rock strata and the sequence of geological events. 7

UNIT–V

9. (a) What are the main causes of freshwater depletion worldwide? What strategies can be implemented to mitigate this and ensure sustainable water management? 4+3=7

(b) Discuss the effects of chemical pollution and describe the control measures of chemical pollution in water. 4+3=7

10. (a) How do ecosystems demonstrate both in terms of robustness and fragility in the face of environmental changes and disturbances? What factors contribute to their resilience or vulnerability? 3+3=6

(b) Discuss the main causes and consequences of biodiversity loss. 4

(c) What are the most common pollutants being added to the air in your area? What measures can be taken to reduce air pollution and improve the air quality? 4