

## The Open University of Sri Lanka



B.Sc. Degree Programme (Level – 05)

**Final Examination – Fundamentals of Geophysics**

**PHU 3159/PHE 5159**

Date: 13<sup>th</sup> June 2007

**Duration: 2 and half Hours**  
From 13.30 hrs - 16.00hrs

Answer **FIVE (04)** questions **SHORT ANSWERS ARE PREFERRED**. Answers should be illustrated with sketch maps and diagrams where appropriate.

1. (a) State the Law of Universal Gravitation
- (b) What is a gravity anomaly? a positive gravity anomaly? a negative gravity anomaly?
- (c) Name the reasons why the actual value of  $g$  measured at a particular place is not the same as the theoretical value.
- (d) State the discoveries of some geologically important bodies/structures using the method of Gravity anomaly
  
2. (a) Define: conductivity, resistivity, apparent resistivity
- (b) What are the units for resistivity? Give a formula for resistance.
- (c) When a current is passed through the ground, what effects do bodies of different conductivity produce?
- (d) Explain methods of vertical electrical sounding (VES).
  
3. (a) What is geochronology?
- (b) What is radioactivity? What changes take place during radioactive decay? Define half life, parent element, daughter element.
- (c) How can natural radioactivity be used in geophysical exploration?
  
4. (a) What is ground penetrating radar?
- (b) Discuss the basic principles behind the ground penetrating radar
- (c) What are the advantages and limitations of ground penetrating radar?

5. (a) Describe the characteristics of different types of waves generated in an earthquake. Explain the nature of their propagation in different parts of the earth.
  - (b) Briefly explain how you would locate an earthquake using travel times of S and P waves.
  - (c) What are the processes that seismic waves undergo when they interact with subsurface geological strata? Explain how these are used to investigate the interior of the earth.
  - (d) Describe in detail how refraction profiles are produced, and what information could be obtained from them in exploration geophysics.
  - (e) Show graphically the kind of time/distance graph that would be produced where velocity increases continuously with depth.
6. (a) How is the earth's magnetic field generated? Explain the elements of the earth's magnetic field with illustrated diagrams.
  - (b) Describe the relationship between magnetic induction  $\mathbf{B}$  and the magnetic field strength  $\mathbf{H}$  in a ferromagnetic material using the hysteresis loop.
  - (c) What are the different types of magnetism found in material? Give examples of substances having each type of magnetism.
  - (d) Define magnetic susceptibility. How can magnetic susceptibility data be used to determine bedding or foliation directions in rock samples?
  - (e) What are magnetic prospecting methods most commonly used for? Explain different types of magnetic surveys and instrumentation used in exploration geophysics.
7. (a) Describe two commonly used Global Coordinate Systems for navigation and positioning.
  - (b) Describe the technical theory behind the functioning of NAVSTAR GPS system.
  - (c) Discuss general and special features of NAVSTAR GPS constellation.
  - (d) Describe the L1 and L2 carrier signals used by NAVSTAR GPS satellites.
  - (e) Describe the technique known as Differential GPS (DGPS)