## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
### End Semester Examination, May 2019

**Course: Exploration Geophysics**                    **Semester: IV**
**Program: B.Tech. GIE, GSE, Mining Engineering**     **Time 03 hrs.**
**Course Code: PEGS 2007**                            **Max. Marks: 100**

**Instructions: All questions are compulsory in all the sections, however, internal choices are given in Q 6 (Section B) and Q 10 (Section C).**

### SECTION A

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Outline steps for optimizing spatial resolution for any geophysical survey. | **04** | **CO1** |
| Q 2 | Calculate anomaly at point A (0, 60, 0) due to a buried sphere of density $\rho = 0.5 g/cm^3$, has a radius of 50m and has center at point C (40, 30, 150). | **04** | **CO2** |
| Q 3 | From well logs, the following P-wave velocities were determined: Sandstone 4.3 km/s, Water 1.5 km/s, Gas 0.3 km/s, Shale 2.4 km/s. Compute the average P-wave velocity in the water-saturated reservoir having 15% porosity. | **04** | **CO5** |
| Q 4 | Explain the cause of Geomagnetism. | **04** | **CO4** |
| Q 5 | Discuss about types of spread used in a seismic survey. | **04** | **CO6** |

### SECTION B

| Q 6 | Differentiate between working principle of Fluxgate and Cesium Vapor Magnetometers. **OR** Explain magnetism in rocks. | **10** | **CO4** |
|---|---|---|---|
| Q 7 | a) Compute apparent resistivity for a sounding survey if a current of 30mA passed through current electrodes separated by a distance of 60 m and a voltage of 6V measured across the potential electrodes separated by 20 m having same center as that of current electrode. | **05** | **CO3** |
| | b) Calculate geometric factor for the arrangement given in **figure 1** below and identify the name of this arrangement. | **05** | |

**Figure 1**
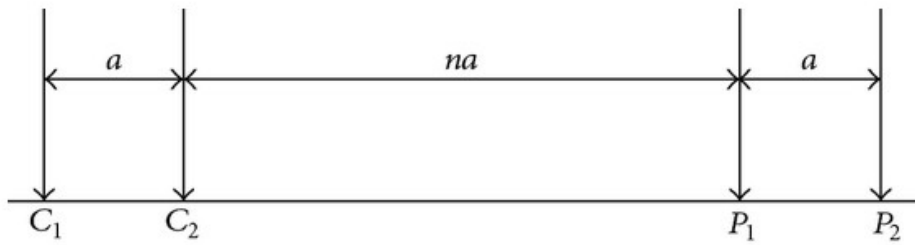
| Q 8 | Discuss variation caused in amplitude of seismic waves under different circumstances. | 10 | CO5 |
|---|---|---|---|
| Q 9 | Describe magnetic data acquisition and processing (data reduction). | 10 | CO4 |
| | **SECTION-C** | | |
| Q 10 | A seismic data acquisition company carried out seismic survey over an area, and observed variation in the velocity in three different layers as 4.1km/s, 6.8km/s and 3.5km/s respectively. Consider the amplitude of incident wave as unity and density of all the layers as 2700kg/m$^3$, depth of first and second interfaces are 400m and 1300m respectively and that there is no geometrical spreading, attenuation, or scattering. Construct the seismic record of amplitude versus time of the arrival of first three waves in the geophone. **OR** Describe in detail about: a) Types of seismic waves and their properties. b) What will be S-wave velocity of a medium having a Poisson's ratio and a P-wave velocity of 0.5 and 3 km/s respectively? **c)** Different factors that affect seismic velocities | 20 / 10 / 05 / 05 | CO5 |
| Q 11 | Construct a survey design for acquisition of 3D seismic data on land. | 20 | CO6 |