1.What does resistivity (ρ) represent in geophysical prospecting?
- The density of the medium
- The difficulty of current passing through a medium
- The temperature of the medium
- The elastic properties of the medium

2.What does the 'geometric factor' in a four-electrode resistivity measurement depend on?
- The resistivity of the electrodes
- The depth of the water table
- The positions of the electrodes on the ground
- The temperature of the soil

3.In electrical prospecting, what does the term 'penetration depth' refer to?
- The maximum depth of the borehole
- The depth of the Earth's core
- The depth at which magnetic anomalies are detected
- The depth at which the method can effectively investigate

4.Which law describes the relationship between voltage, current, and resistance?
- Gauss's Law
- Ohm's Law
- Newton's Law
- Hooke's Law

5.What is the geoid?
- An equipotential surface of Earth's gravitational field coinciding with mean sea level
- The Earth's actual physical shape including mountains and valleys
- The surface of the Earth's crust
- A hypothetical flat surface at sea level

6.Which factor is NOT corrected for in gravimetric surveys?
- Latitude and terrain effects
- Altitude variations
- The Earth's magnetic field
- Instrument drift

7.What is the main application of gravimetric surveys in mineral and oil exploration?
- **Monitoring surface temperature changes**
- Detecting density anomalies that may indicate ore veins or hydrocarbon deposits
- Mapping seismic fault lines
- Determining the chemical composition of underground minerals

8.Which seismic wave type is most responsible for earthquake damage?
- Body S-waves
- Body P-waves
- Love waves
- Rayleigh waves

9.Which of the following is NOT a type of seismic wave?
- S waves
- Love waves
- Rayleigh waves
- P waves

10.What is the typical duration of seismic waves recorded after an explosion during seismic prospecting?
- 30 seconds or more
- 1 to 2 seconds
- 4 to 5 seconds
- Immediately, within milliseconds

ELECTRICAL PROSPECTING METHODES

Filling the gaps:

a) Resistivity , Conductivity or Resistance

The constant of proportionality that expresses the difficulty of current passing through a medium is called [……].

b) Number of electrods , electrode separation or intensity of current

To increase the penetration depth of an electrical survey, the [……] is increased.

c) direct current , discontinuous current

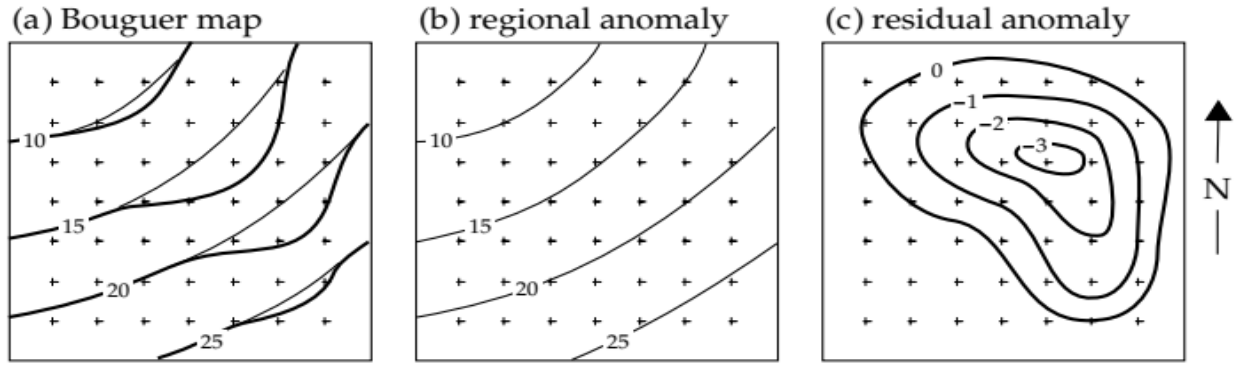
In electrical prospecting, [……] is often injected using two electrodes to measure subsurface properties.

d) resistivity , apparent resistivity or permeability

In a heterogeneous medium, the calculated resistivity is called [……].

e) Resistivity (ρ) is measured in [……..]. (unit)

GRAVIMETRIC PROSPECTING METHODES



Choose the correct answer:

- Total anomaly = Regional anomaly - Residual anomaly
- Total anomaly = Regional anomaly + Residual anomaly
- Total anomaly = Regional anomaly * Residual anomaly

SEISMIC METHOD

Filling the gaps with: **volume** or **shape**

a) Longitudinal waves (P waves) cause only a change in [……] as they propagate through a medium.
b) Transverse waves (S waves) cause a change in the [……] of the body as they propagate

Exercise 01

Given (field readings): $MN = 1.5$ m (fixed), current $I = 0.45$ A. Measurements at various $AB/2$:

$AB/2$ (m)	6	10	16	25	40	65
ΔV (mV)	28	26	24	25	32	45

Geometry factor (Schlumberger):

$$K = \pi \frac{AB^2 - MN^2}{2MN}, \quad AB = 2(AB/2).$$

Apparent resistivity: $\rho_a = K \frac{\Delta V}{I}$.

1) Compute ρ_a (rounded)

$AB/2$ (m)	AB (m)	K (.....)	ΔV (.....)	ρ_a (.....)
6	.....	.....	.....	.....
10	.....	.....	.....	.....
16	.....	.....	.....	.....
25	.....	.....	.....	.....
40	.....	.....	.....	.....
65	.....	.....	.....	.....
100	.....	.....	.....	.....

Exercise 02

A weathered layer has P-wave velocity $v_1 = 1500$ m/s.
The underlying bedrock has velocity $v_2 = 3000$ m/s.

Tasks

1. Is refraction possible (i.e., is $v_2 > v_1$)?
2. Compute the **critical angle** i_c (in degrees).

Exercise 03

In a seismic refraction survey, the following **first arrival times** are measured:

Distance x (m)	Time t (ms)
0	0
100	60
200	120

Assume that these arrivals are **direct waves in the first layer** (no refraction yet).

Tasks

1. Compute the **seismic velocity of the first layer**.
2. If another arrival appears later with an apparent velocity of **3000 m/s**, which one is faster: direct wave or refracted wave?

Exercise 04

1) Free-air anomaly from a single station

At latitude φ = 30°, elevation H = 850 m. Observed gravity $g_{obs} = 9.780820$ m·s^{-2}. Drift correction +0.10 mGal, tide −0.05 mGal. Compute the **free-air anomaly (FAA)**.

- Convert: $g_{obs} = 978082.0$ mGal
- Apply drift/tide: $g_c = 978082.0 + 0.10 - 0.05 = 978082.05$ mGal
- Normal gravity (Somigliana):
  $\gamma(30^\circ) = 978032.677[1 + 0.0053024 \sin^2 30^\circ - 0.0000059 \sin^2 60^\circ] = 979264.97$ mGal
- Free-air correction:
- FAA $= g_c - \gamma + \mathrm{FAC} =$ .....

2) Full Bouguer anomaly at low elevation

Same station as #1, density $\rho = 2.67$ g·cm^{-3}, terrain correction $TC = +6.8$ mGal. Find **Bouguer anomaly.**

BC= .....

$\Delta g\_B = \mathrm{FAA} - BC - TC =$ .....