

Qualification test

GEOPHYSICS

II degree (MSc studies)

Exam subjects:

1. Gravity method
2. Magnetic method
3. Electrical and electromagnetic methods
4. Well logging methods
5. Seismic method

Gravity method.

1. Earth's gravity field
2. Normal gravity field and anomalies
3. Isostasy
4. Methodology of gravity survey..
5. Methods for determining the surface density
6. Qualitative interpretation of gravity anomaly
7. Quantitative interpretation of gravity anomalies
8. Gravity device and operation principles
9. Ambiguity of interpretation
10. Application of the gravity method in geology and engineering issues.

Sample exam questions:

1. What is the reason that the gravity force is different at the pole and the equatorial:
 - a) at the pole, the Newtonian Force has the least value
 - b) centrifugal force is zero at the equatorial
 - c) at the pole, the Newtonian force is maximum and centrifugal force is zero
 - d) at the equatorial, the Newtonian force is maximum and centrifugal force is zero

2. What is the Gravity Meter:
 - a) high-sensitivity dynamometer
 - b) high-sensitivity scale
 - c) high-sensitivity seismometer
 - d) high-sensitivity capacitor

Magnetic method

1. Magnetic susceptibility, magnetization, magnetic permeability
2. Earth's magnetic field, the main and normal field
3. Magnetic field variations.
4. Magnetic anomalies
5. Division of minerals and rocks due to magnetic properties
6. Magnetic device, operation principles and survey methodology.
7. Qualitative interpretation of magnetic anomaly
8. Quantitative interpretation of magnetic anomalies
9. Application of the magnetic method in geology and engineering issues
10. Paleomagnetism

Sample exam questions:

1. Agonic line is a line connecting the points of
 - a) the same value of magnetic inclination
 - b) the same value of magnetic induction
 - c) zero value of magnetic declination
 - d) zero value of agnetic inclination

2. Diamagnetics is the substance which :
 - a) magnetic permeability value is bigger then vacuum permeability value
 - b) magnetic permeability value is smallerthen vacuum permeability value
 - c) magnetic permeability value is almost the same as vacuum permeability value
 - d) magnetic permeability value is the same as vacuum permeability value

Electrical and electromagnetic methods

1. Characteristic of resistivity sounding and profiling
2. Quantitative interpretation of resistivity sounding curves (R.M.S, fastest drop method, Occam and LMA algorithms, interpretation ambiguity)
3. Magnetotelluric method assumptions and basic principles (depth range galvanic disturbance)
4. 2D center in the magnetotelluric method (magnetic and electric polarization)
5. Methodology of magnetotelluric survey.
6. Acquisition and processing of magnetotelluric data
7. Quantitative interpretation of magnetotelluric data and the issue of ambiguity of interpretation
8. Petrophysical parameters of rocks determining the depth range in the GPR method
9. Types of GPR antennas and its application
10. Basic procedures for GPR data processing

Sample exam questions:

1. What is the frequency of signal repetition in the apparatus in ProEx:
 - a) 10kHz,
 - b) 50kHz,
 - c) 100 lub 200kHz
 - d) 500kHz
2. The most commonly used reinforcement procedure in REFLEX is:
 - a) AGC,
 - b) energy decay,
 - c) gain function,
 - d) manual y-gain

Well logging methods

1. Classic, controlled and inductive resistivity profiling.
2. Measurement and application of resistivity imaging log
3. Chemical and physical processes are the basis for spontaneous potentials generation.
4. Determination of reservoir parameters from the Archie Laws
5. The acoustic (sonic) log.
6. in which rocks the natural gamma radiation occurs.
7. The nuclear logs to determine rock mass porosity.
8. What is it about GEM log
9. Which physical phenomena are considered in borehole NMR.
10. What is the definition of thin bed in well logging.

Sample exam questions:

1. What is the reason for performing a minimum of 3 resistivity profiling in well logging with probes of different radial ranges:
 - a) it is possible to calculate 3 different effective porosity values,
 - b) it is possible to determine whether the rock is porous and permeable and whether it is saturated with hydrocarbons or reservoir water,
 - c) it is possible to determine the 3rd value of the actual resistance of the formation
 - d) it is possible to measure 3. different values of porosity
2. Why comprehensive interpretation in borehole geophysics gives more reliable results than for individual profiling:
 - a) more parameters can be calculated than for the interpretation of individual profiles,
 - b) the results are affected by all profiling that takes part in the comprehensive interpretation,
 - c) in a comprehensive interpretation, we take into account the complex of parameters
 - d) in the comprehensive interpretation we take into account the most important parameters

Seismic methods

1. Methodology of seismic survey
2. Seismic noise classification, identification and removal.
3. Mathematical transformations used in seismic processing.
4. Procedures to improve vertical and horizontal resolution in seismic data processing.
5. Parameters of 2D i 3D fold survey
6. Type of velocity and methods of its determination.
7. Amplitude changes of the recorded seismic signal.
8. Horizontal and vertical resolution of seismic data.
9. Carbonate structures (reefs) in seismic record.
10. Basics of elasticity theory

Sample exam questions:

1. The smallest time thicknesses of the reef covering rocks are observed:
 - a) in basin zone of the reef
 - b) in basin and lagoon zone of the reef
 - c) in barrier zone of the reef
 - d) in lagoon zone of the reef
2. Radon parabolic transformation for the CMP collection allows for elimination:
 - a) multiple waves and diffraction waves
 - b) multiple waves and linear disturbances
 - c) wave shadow and multiple waves
 - d) wave shadow.