

Md. Al
20.10.2022

A. Abdul Paday...
20.10.22

DEPARTMENT OF APPLIED PHYSICS

Sem. II Examination, AY: 2022, AP 425: EXPLORATION GEOPHYSICS-II
Answer any five (5) Questions, answer at least one question from Group I,
Maximum marks: 50, Time: 3 hours

Group I: D.C. Electrical Resistivity Surveys

- Q.1. (a) Illustrate with sketches: the Equipotential and Current flow lines in the subsurface as conceptualized in the D.C. Electrical Resistivity surveys.
- (b) For a conductor of limited size, define its Resistivity (in ohm-m), where D.C. current of strength I (amp.) flows through it, V (volt) = Voltage, q = cross-section (m²), l = length. What is Conductivity?
- © What is the order of Resistivity (in ohm-m) for three most common sedimentary rocks: Sandstone, Limestone & Shale?
- (d) State and explain the Archie's empirical relation for a completely saturated rock.
- [2+2+3+3 = 10 marks]

- Q.2. (a) What are the differences between Electrical Profiling (Constant Separation Traversing) and Vertical Electrical Sounding?
- (b) Give sketches to illustrate the Wenner and Schlumberger Arrays in Electrical Sounding surveys. Use graph sheet for sketches.
- (c) Discuss their respective merits?
- [2+6+2 = 10 marks]

Group II: Seismic Exploration Surveys

- Q3. Explain, with sketches, the following in seismic exploration: (a). Spherical Waves and their Geometric Spreading, (b). Seismic wave-front and Ray path, (c). Time-Distance Curve. Use graph sheet to support the answer.
- [3+3+4 = 10 marks]
- Q4. Give an account on the following Seismic Energy sources: (a) VIBORSEIS used in land areas, and (b) AIR-GUN in offshore seismic exploration. Give sketches where necessary.
- [5+5 = 10 marks]
- Q5. Write explanatory notes on: (a) GEOPHONE used in seismic exploration on land areas, and (b) HYDROPHONE in offshore seismic exploration. [5x2 = 10 marks]
- Q6. Briefly explain the following in seismic exploration: (a). Dix-formula, (b) Normal Move-Out, and NMO correction. [4+6 = 10 marks]
- Q7. Explain the followings in seismic exploration with illustrative sketches; use graph sheet where necessary: (a) Common Shot Gather, (b) Common Depth-Point (CDP) Gather, (c) Merits for CDP? [4+4+2 = 10 marks]

To: Mr. S. Ampana,
Exam Co-ordinator/AP

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M. Tech. (Ex. Gph.), Sem. II Examination, A.Y. 2022,

MEG 558: GEOPHYSICAL PROSPECTING-I, Maximum marks: 50, Time: 3 hours

Answer any five Questions, at least one from each Group. Use graph sheet for sketches.

Group -I

1. Discuss the following in Aeromagnetic field surveys: (a) Navigation and Position-fixing and (b) Data recording by flying the magnetometer in a 'Bird'. Give sketches, where necessary.
(5+5 = 10 marks)
2. Explain the working principle of Flux-Gate Magnetometer. What is its reading accuracy?
(9+1 = 10 marks)
3. Discuss with suitable sketches the usefulness of qualitative interpretation of aeromagnetic anomalies in: (i) mineral prospecting and for (ii) geological mapping?
(10 marks)

Group II

4. Discuss any two of the following techniques in gravity interpretation: (i) Regional-Residual anomaly separation by polynomial trend-surface fitting, (ii) Second vertical derivatives of gravity anomaly map, (iii) Regional - Residual separation of gravity anomalies by Griffin's method. Give sketches in support of the answer.
(5x2 = 10 marks)
5. Discuss any two of the following techniques for density determination in geophysical exploration: (i). Nettleton's method, (ii) by Gravity measurements in mining shafts, (iii) Density determination by Borehole Gravimeter measurements. Give sketches in support of the answer.
(5x2 = 10 marks)
6. (i) What are the conditions of two-dimensionality in gravity interpretation?
(ii) Explain, with sketches, the Polygonal method for 2D-gravity interpretation as proposed by Talwani et al. (2+8 = 10 marks)

Group III

7. Briefly explain the origin of the following self-potential in mineralized belts: (i) Electrokinetic potential, (ii) Electrochemical potential and (iii) Mineral potential. Give illustrative sketches to support the answer. (10 marks)
8. Explain with suitable sketches the Potential Gradient and Potential Amplitude Techniques in Self-potential field surveys in ore exploration.
(5x2 = 10 marks)