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3 (Sem-6/CBCS) GLG HE 2

2023

**GEOLOGY**

(Honours Elective)

Paper : GLG-HE-6026

**(Introduction to Geophysics)**

Full Marks : 60

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

1. Choose the correct option :  $1 \times 7 = 7$

(a) Gal, the unit used in gravity measurement is equal to

~~(i)  $1 \text{ cm/s}^2$~~

(ii)  $1 \text{ m/s}^2$

(iii)  $0.1 \text{ cm/s}^2$

(iv)  $0.1 \text{ m/s}^2$

Contd.

(b) Magnetic permeability ( $\mu$ ) and susceptibility ( $k$ ) are related as

(i)  $k = 1 + 4\pi\mu$

(ii)  $k = 1 - 4\pi\mu$

(iii)  $\mu = 1 - 4\pi k$

~~(iv)~~  $\mu = 1 + 4\pi k$

(c) Which one of the following is not an electrical geophysical method ?

~~(i)~~ Resistivity

(ii) Self potential

(iii) Electromagnetic

(iv) Induced polarization

(d) Seismic velocity ( $v$ ) and formation density ( $\rho$ ) are related as

(i)  $v \propto \rho$

~~(ii)~~  $v \propto 1/\rho$

(iii)  $v \propto \sqrt{\rho}$

(iv)  $v \propto 1/\sqrt{\rho}$

(e) Latitude correction of magnetic data is maximum at latitude of

~~(i)~~  $0^\circ$

(ii)  $30^\circ$

(iii)  $45^\circ$

~~(iv)~~  $90^\circ$

(f) Electromagnetic skin depth is  
( $\rho$  = resistivity,  $f$  = frequency)

(i)  $500\sqrt{f/\rho}$

(ii)  $500\sqrt{\rho/f}$

~~(iii)~~  $500\sqrt{\rho f}$

(iv)  $500\sqrt{\rho}$

(g) Hydrophone is used in

(i) Gravity survey

~~(ii)~~ Magnetic survey

(iii) Seismic survey

(iv) Resistivity survey

2. Answer the following questions :  $2 \times 4 = 8$

(a) Define reflection and transmission coefficients in seismic studies.

(b) What are reference spheroid and geoid ?

(c) What do profiling and sounding mean ?

(d) What are regional and residual anomalies ?

3. Write short notes on the following :  $5 \times 3 = 15$   
(any three)

~~(a)~~ Gravity data corrections

- (b) Wenner and Schlumberger arrangements of resistivity method
- (c) Marine seismic survey
- (d) Active and passive geophysical methods
- (e) Airborne geophysical surveys

4. Answer **any three** of the following :

10×3=30

- (a) Write about the role and importance of seismic method in oil and gas exploration.
- (b) Discuss about the design and execution of geophysical survey with a suitable example.
- (c) What physical parameters are investigated in gravity, magnetic, seismic and resistivity surveys ? How do these physical parameters provide information about subsurface strata ?
- (d) Discuss the significance of geophysical surveys in mineral (ore) exploration.
- (e) Describe different electrical geophysical methods.
- (f) How does geophysical methods help resolve geological problems ?