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**3 (Sem-6 / CBCS) GLG HE 2**

**2022**

**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) Acceleration due to gravity is maximum at the poles because of
- (i) polar ice caps
  - (ii) high density
  - (iii) excess mass
  - (iv) flattening of the earth

Contd.

(b) Electromagnetic survey gives better results

(i) if the top surface layer is more conductive

(ii) if the top surface layer is less conductive

(iii) if the top surface layer is highly magnetic

(iv) Does not depend on any physical parameter of the surface layer

(c) The latitude correction in gravity is maximum at

(i)  $0^\circ$

(ii)  $45^\circ$

(iii)  $60^\circ$

(iv)  $90^\circ$

(d) In seismic refraction method, the refracted waves are picked up by

(i) geophone

(ii) wave buoy

(iii) thermometer

(iv) cohesive soil

(e) The most suitable geophysical method for groundwater exploration is

(i) gravity method

(ii) electrical method

(iii) magnetic method

(iv) seismic method

(f) Terrane connection for gravity data is required due to

(i) topographic undulation about the datum

(ii) increase in densities of crustal rocks with depth

(iii) lateral density variations

(iv) vertical density contrast across Moho



- (g) The geoid can be defined as
- (i) an oblate spheroid that approximates the shape of the earth
  - (ii) the physical surface of the earth
  - (iii) an equipotential surface of gravity of the earth
  - (iv) None of the above

- (h) Which of the following corrections is always added during reduction of the observed gravity data ?

- (i) Terrane correction
- (ii) Latitude correction
- (iii) Free-air correction
- (iv) Bouguer correction

- (i) Giger-Muller counter is used in

- (i) electrical geophysical method
- (ii) resistivity geophysical method
- (iii) radiometric geophysical method
- (iv) None of the above

- (j) Which of the following base metals shows self potential when oxidised

- (i) Pyrite
- (ii) Sphalerite
- (iii) Chalcopryite
- (iv) All of the above

2. Answer the following questions : **(any four)**  
2×4=8

- (a) Write briefly on 'how geology can be interrelated with geophysics'.
- (b) Differentiate between positive and negative density contrasts.
- (c) Write a short note on magnetic data correction.
- (d) Explain the seismic reflection travel time.
- (e) State the differences between geoid and the reference sphenoid.
- (f) Give a brief account on ground-based geophysical survey.



(g) Write briefly on the principal of seismic refraction method.

(h) Draw the residual anomaly curve and give its interpretation.

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

(a) Free-air correction of gravity data.

(b) Self potential (SP) method of geophysical exploration

(c) Ground radiometric survey

(d) Application of geophysics in engineering geology

(e) Seismic noise

(f) Wenner method of resistivity survey

(g) Magnetic method of geophysical exploration

(h) Profiling and sounding techniques of geophysical exploration

4. Answer **any three** of the following questions :  
 $10 \times 3 = 30$

(a) Name the physical properties studied in geophysical exploration. Write in detail on seismic and magnetic methods of geographical prospecting.  $2 + 8 = 10$

(b) What are the types of electrical methods of geophysical exploration ? Elaborate on equipotential and resistivity method of exploration.  $2 + 8 = 10$

(c) Write a detailed note on seismic methods of geophysical exploration.

(d) Define different gravity anomalies. Illustrate on the corrections considered to rectify the gravity data.  $4 + 6 = 10$

(e) Give an account on geophysical field operations.

(f) Elaborate on radiometric survey.

(g) Explain the role of geophysics in ground-water exploration.

(h) Write briefly on regional and residual anomaly.