

MASTER OF SCIENCE EXAMINATION, 2018

(2nd Year, 1st Semester)

APPLIED GEOLOGY

Geophysical Exploration

Paper - XI

Time : Two hours

Full Marks : 50

Use separate answer script for each group.

GROUP - A (25 marks)

1. Answer any **five** questions from the following : 5x5=25
 - (a) A spherical body has varying density with its radius [$\rho = \rho(r')$]. Derive the following equation : $g_m = \frac{GM}{r^2}$, where g_m is the acceleration due to gravity at a point, r is the distance of that point from the center of the body, M is the total mass of the body. 5
 - (b) Define the term-Geoid. Describe its geometry with the help of a theoretical model. What is meant by geoid anomaly? 1+3+1
 - (c) Show that $U_L = -2 \log r$, where U_L is the normalized gravity potential at a point for an infinitely long cylindrical body, and r is the distance measured perpendicular to the axis of the cylindrical body. 5

(Turn over)

(2)

- (d) In an area there is a horizontal cylindrical body at a depth of z . The body has a length of L , and a radius of a . Find the gravitational acceleration, g on the surface measured at a horizontal distance of x , perpendicular to the body. 5
- (e) Derive an equation to show the gravity anomaly for a thin sheet of length L , and density ρ , located at a depth of h . The sheet is inclined at an angle of α . 5
- (f) A thick, horizontal sill of thickness, h occurs at a vertical depth of H . One side of the sill terminates against an inclined fault (dip- α). Determine the g value at a point on the surface above the sill as a function of horizontal distance (x). 5
- (g) Describe the different types of conductance for electric current in the Earth. Using a sketch explain how an ore body develops a self-potential electric field. 3+2
- (h) With the help of an illustration explain the theoretical principle of the general four-electrode methods. What is the fundamental difference between the Wenner and the Schlumberger configurations ? 3+2

(3)

GROUP - B (25 marks)

2. Answer any **five** questions : 5x5=25
- (a) Discuss those temporal variations of the Earth's Magnetic Field that affect the magnetic survey. 5
- (b) What does the magnetic anomaly look like if a magnetized sphere buried at the South Pole ? Explain with diagram. 5
- (c) What are the disadvantages of reflection methods in seismic survey ? 5
- (d) Describe the different magnetic fields observed on the surface of the earth. 5
- (e) What are the advantages of seismic methods in mineral exploration ? 5
- (f) Describe a Saturation Circuit Magnetometer with a schematic diagram. 5
- (g) Discuss about the characters of different seismic waves. 5
- (h) Describe the basic concept of reflection and refraction methods in seismic survey. 5
- (i) What are advantages and limitations of aeromagnetic surveying ? 5

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