UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

SECOND SEMESTER EXAMINATION, MAY 2018

COURSE NO.: **GL 378**
COURSE NAME: **EXPLORATION GEOPHYSICS**
CLASS: **GL III** TIME: **3 Hours**

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

Question 1

Write short notes on the following:

a) Radiometric Survey
b) Electrical Resistivity Imaging (ERI)
c) Induced Polarisation (IP) Survey
d) Self-Potential (SP) Survey
e) Snell's law
f) Cross over distance
g) Geophone
h) Magnetic susceptibility
i) Induced magnetisation
j) Diurnal variation

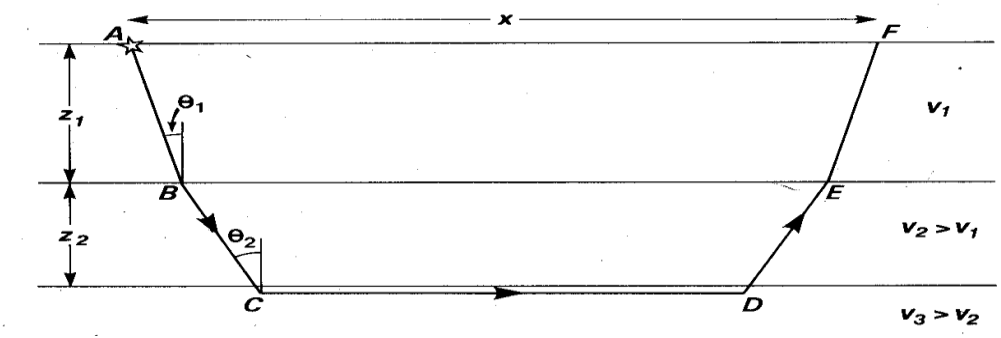
5 ***marks X 10 = 5 marks***

Question 2

a) If we have a two-layer situation where *V*1 = 1950 m/s and *V*2 = 3900 m/s (P-wave Velocities), Calculate the critical angle ***(4 marks)***

a) Give two advantages of the seismic geophysical methods over the other geophysical methods ***(6 marks)***

b) In the three layer shown below if x is the length of survey, T is the time required for the wave to reach F through ABCDEF. Find an expression for T ***(15 marks)***



Question 3

a) In the theoretical study of current flow in the earth, what assumptions are made about the properties of the earth? ***(5 marks)***

b) Distinguish between Horizontal Electrical profiling (HEP) and Vertical Electrical Sounding (VES) in resistivity measurements. ***(10 marks)***

b) An electric current I is injected into the Earth with a single electrode. The resistivity of the ground is ρ. It can be shown that the voltage at a distance r from the electrode is
$V(r) = I\rho/2\pi r$
A 4-electrode Wenner array is used with electric current injected at electrode C1 and withdrawn from the ground at electrode *C2*. A voltage of ΔV is measured between potential electrodes *P1* and *P2*

Show that the resistivity of the Earth is given by $\rho = 2\pi a\, \Delta V / I$ ***(10 marks)***

Question 4

a) List five corrections that can be made in a gravity survey? ***(5 marks)***

b) Table 1 gives data from a gravity survey. Assume the mean density of the ground is 2.67 gcm^{-3} and g_e as 978032 m Gal. Neglect Topographic reduction. Determine,

i. The Free Air Correction at station A
ii. The Bouger Correction at station B
iii. The Normal gravity at station C
iv. Free Air anomaly at station D
v. Bouger anomaly at station D ***(20 marks)***

Table 1: Gravity Data

Station	Latitude	Height(m)	Observed Gravity Reading, g_o (mgal)
A	7° 20′	250	978170.55
B	6° 30′	295	978262.42
C	8° 40′	160	978278.44
D	7° 30′	300	978322.09

Aid

$g_n = 978031.85\ (1.0 + 0.005278895\ \sin^2(lat) + 0.000023462\ \sin^4(lat));$
$g_{fa} = g_{obs} - g_n + 0.3086h;\ \ g_b = g_{obs} - g_n + 0.3086h - 0.04193r\,h$

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