



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**MAKEUP EXAMINATION-JAN 2023**

**Date:** 30-01-2023

**Time:** 01:00 PM to 04:00 PM

**Course Code:** PET2014

**Max Marks:** 100

**Course Name:** Geophysical Methods for Oil and Gas Exploration

**Weightage:** 50%

**Program** : B.Tech.

**Instructions:**

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) All the questions are compulsory.

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries TEN marks.**

**(2Qx10M=20M)**

1. Identify the **True** or **False** statements.

- a) Fan filtering removes the effect of earth filtering
- b) Stacking is the process of increasing Signal to Noise ratio
- c) Migration is the process of reconstructing the seismic section
- d) Collecting all the traces with a common midpoint forms a common midpoint gather
- e) Fresnel Zone is the indicator of vertical resolution
- f) Earth act as a band reject for seismic filter for seismic wave that travel through it.
- g) In seismic surveying, the energy contained in the ray increases due to geometrical spreading of the energy
- h) If  $R$  or  $R' = 1$ , all the incident energy is transmitted
- i) Display or collection of one or more seismic traces is termed as shot gather
- j) It is difficult to relate acoustic impedance to a tangible rock property. But in general, harder the rock, the higher its acoustic impedance

(C.O.No.3) [Knowledge]

2. Answer any five of the following:

- I. Define Active seepage and Passive seepage
- II. Define zone of maximum disturbance
- III. Define any Two principles of stratigraphy
- IV. Define Paleontology and Palynology
- V. Identify the difference between Type -I and Type -II Kerogen
- VI. Define Diagenesis and Metagenesis

(C.O.No.2) [Knowledge]

## Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(4Qx10M=40M)

3. (a) "In case of dipping reflectors, the record surface departs from the reflector surface and thus causes the distorted picture of the reflector geometry". Comment on the above statement.
- (b) "Synclines within which the reflector curvature exceeds the curvature of the incident wave front are represented on non-migrated seismic sections by a 'bow-tie' event". Identify the reason behind the statement given with illustration. (C.O.No.4) [Comprehension]
4. (a) Magnetic surveying is rapid and cost-effective technique and represents one of the most widely used geophysical methods. Explain the other applications of magnetic surveying in brief.
- (b) Before the interpretation of gravity survey, it is necessary to correct for all variations in earth gravitational field which do not result from differences of density in underlying rocks. This is referred as gravity reduction. Describe any two methods of reduction to the geoid. (C.O.No.3) [Comprehension]
5. (a) Modern instruments capable of rapid gravity measurements are known as gravity meters or gravimeters. On the basis of the statement given above, identify the advantages of LaCoste and Romberg gravimeters in opposition to early gravimeters.
- (b) "Curie depth explains the depth at which the ferromagnetic substance becomes paramagnetic at a particular temperature". Using the statement given, describe how the magnetic properties change in shallow and deeper basement cases. (C.O.No.3) [Comprehension]
6. Reflection and Transmission coefficients are expressed in terms of energy.
- (a) Using these two, how is it possible to identify whether the energy is reflected or transmitted?
- (b) In the case of dipping reflectors, the record surface departs from the reflector surface; i.e., it gives a distorted picture of the reflector geometry. Identify and explain a method to remove the distorting effect of dipping. (C.O.No.4) [Comprehension]

## Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TWENTY marks.

(2Qx20M=40M)

7. a) Identify, interpret and explain Figure 1 through Figure 4 provided below. [5 Marks]
- b) Reflection surveys are normally designed to provide a specified depth of penetration and a particular degree of resolution of subsurface geology in both vertical and horizontal dimensions. How is it possible to get higher resolution of subsurface geology in both dimensions? Prepare a note on various parameters that can also be adjusted. [15 Marks] (C.O.No.4) [Application]

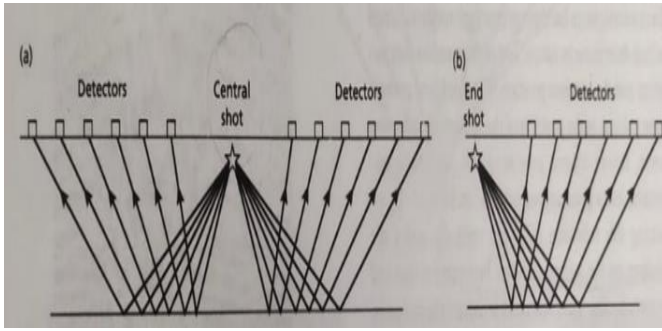


Figure 1

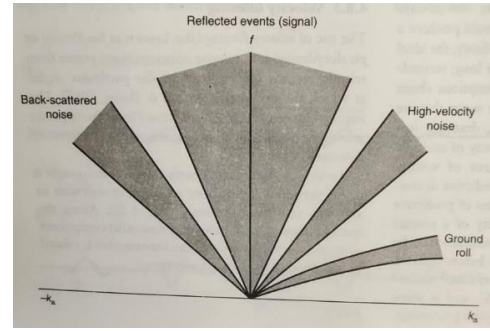


Figure 2

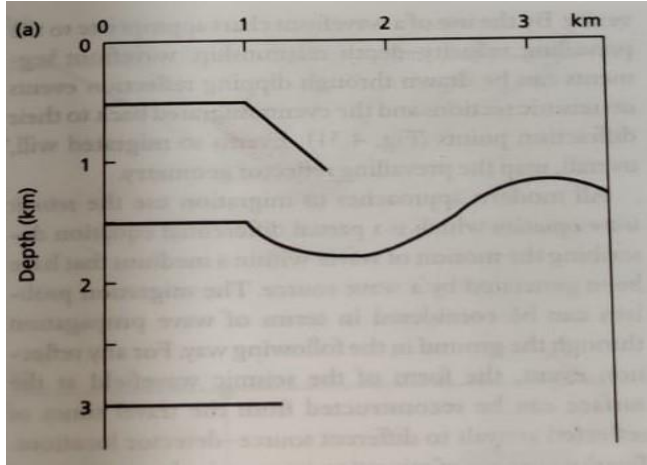


Figure 3

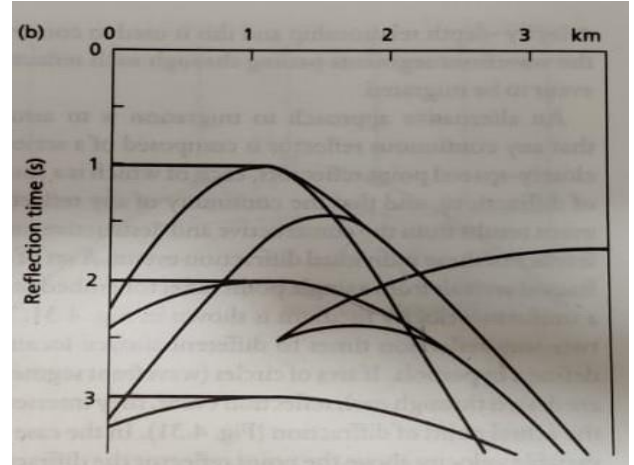


Figure 4

8. Figure X below plots the H/C ratio of kerogen versus the O/C atomic ratio. Prepare a note on the evolutionary pathway of kerogen followed by identifying the various components of the same. (C.O.No.1) [Application]

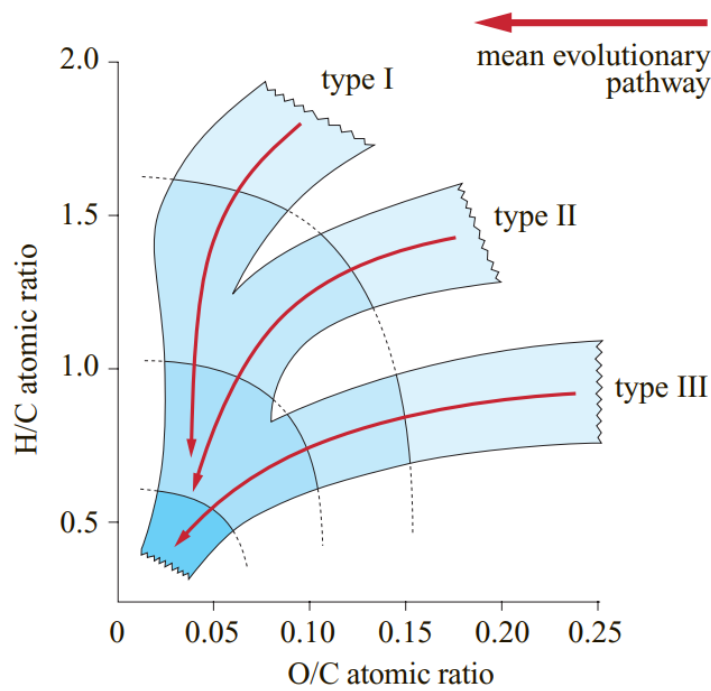


Figure X