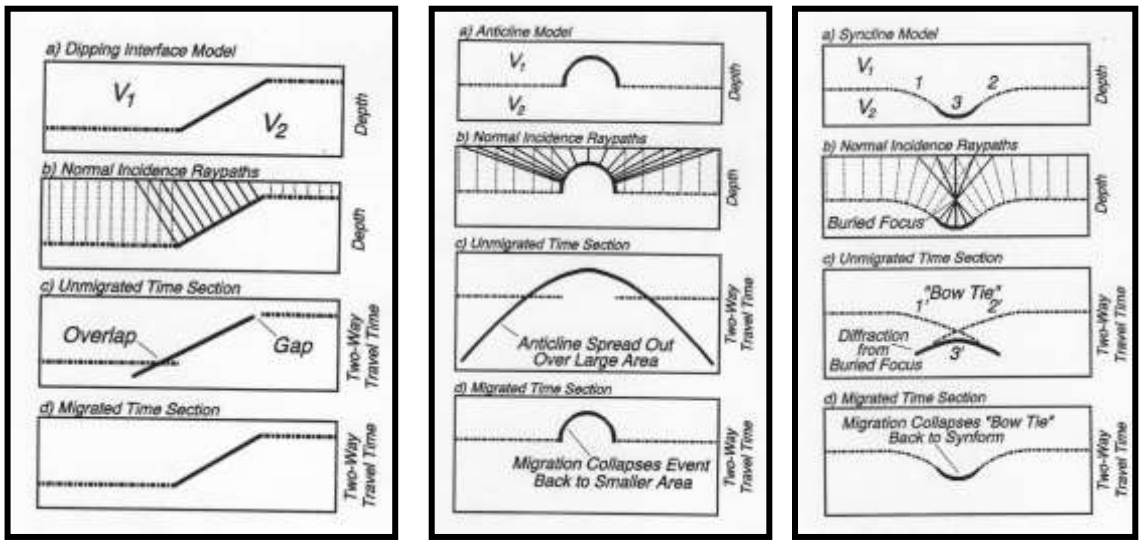
Banha University
Faculty of Science
Geology Department
3rd Year Geophysics

Date: Tuesday 08/01/2019
Subj.: Seismic processing and Marine Geo.
Subject Code: (G 353)
Time: 120 Minutes

Answer the following questions……..…… **(48 Marks)**

I- What is the Seismic migration process? Describe with neat sketches, (1) the planar-dipping reflector, (2) anticline and (3) syncline folds before and after migration process ……...…..…… **(11 Marks)**

Seismic migration is the process by which seismic events are geometrically re-located in either space or time to the location the event occurred in the subsurface rather than the location that it was recorded at the surface, thereby creating a more accurate image of the subsurface.



II- Differentiate between the onshore and offshore controlled seismic wave sources. ……. **(10 Marks)**

Seismic energy sources

There are different kinds of seismic sources in practice; in general we have to decide between impulsive sources and the vibroseis method or between terrestrial and marine sources.

- Shallow exploration on land: hammer on a plate, weight drops, specialized guns.
- Offshore: air guns, water guns and explosives.
- Deeper studies on land: vibroseis, conventional explosives, nuclear explosions.

III- Complete the sentences :……...…(13.5 Marks)

1- The interface between layers of contrasting acoustic properties is termed REFLECTOR.

2- The pulses produced by airguns and dynamites are MINIMUM phasing while which produced by vibroseis are ZERO phase.

3- Change in acoustic impedance is caused due to change in VELOCITY and DENSITY.

4- The object of seismic processing procedures is designed to: (1) ATTENUATE NOISES and (2) ENHANCE REFLECTED SIGNALS.

5- The number of traces that have been added together during seismic time stacking is called the FOLD.

6- FOUR-DIMENSION is to determine the changes occurring in the reservoir as a result of hydrocarbon production or injection of water or gas into the reservoir by comparing the repeated datasets.

IV- Chose the most accurate answer:……(13.5 Marks)

1- A seismic survey is conducted in a region with two layers. The upper layer is shale, with density 2.1 g/cm3, and seismic velocity of 2900m/s, and the lower layer is sandstone, with a density of 2.2 g/cm3, and a seismic velocity of 3000m/s. The reflection coefficient will be ……

a. Positive

b. Negative

c. Zero

2- Which of the following configurations will likely give rise to the strongest negative (-ve) reflection coefficient? (Assume layer 2 below layer).

a. $v1>v2$ & $\rho1<\rho2$

b. $v1<v2$ & $\rho1>\rho2$

c. $v1>v2$ & $\rho1>\rho2$

3- An abrupt change in the speed of seismic waves is an indication that the……

a. waves are going into a material with different properties

b. waves are passing through material of the same density

c. waves are passing through material of the same velocity

4- In Normal moveout corrections for several prominent reflections in a CMP gather. Commonly:

a. A deeper reflection is corrected for NMO with equal velocity to that used for a shallower event.

b. A deeper reflection is corrected for NMO with a lower velocity than that used for a shallower event.

c. A deeper reflection is corrected for NMO with a higher velocity than that used for a shallower event.

5- In multiples:

a. Long-path multiples are less obvious than most short-path multiples and are less easily removed by seismic processing.

b. Short-path multiples and long-path multiples are easily removed by seismic processing

c. Short-path multiples are less obvious than most long-path multiples and are less easily removed by seismic processing.

6- Normal moveout (NMO) correction is routinely applied to traces of each common-midpoint (CMP) gather before forming a stack section by:

a. Putting seismic reflectors in their correct location.

b. Adjusting the reflection time based on the hyperbolic travel time.

c. Delete the bad traces.

7- The geometry of an array (or geophone group) is designed to:

a. Cancel certain unwanted signals.

b. Enhance the reflected events.

c. Cancel certain unwanted signals and enhance the reflected events.

8- A single trace on a seismic section is a composite of the traces from a common midpoint gather which refers to:

a. Seismic traces acquired from a single shot.

b. Seismic traces that have a source and receiver symmetrically placed about a single location.

c. Seismic traces that are acquired with a constant source receiver separation.

9- …… seismic data applied to determination of sonic velocities of strata penetrated by hole.

a. One-dimensional

b. Two-dimensional

c. Four-dimensional

Best wishes
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