

## Quiz 4: Reservoir Geophysics and Deepwater Imaging (GPD 510)

Total points 11/20

Answer all questions

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✓ Check shot data can acts as a part of the following functions. \* 2/2

- Source close to wellbore ✓
- Geophone spacing large (~50–100 m) and irregular ✓
- Records first breaks only ✓
- Source signal not recorded and does not offer information about absorption (Q) loss

✓ A hydrocarbon reservoir may be defined by the basic parameters: \* 2/2

- A. Shape, size and thickness ✓
- B. Depth to reservoir top ✓
- C. GOC, OWC, OSC, GWC, etc. ✓
- D. Rock and fluid properties ✓



✗ The shale has a density of 2.2 gm/c<sup>3</sup>, a P-wave velocity of 3000 m/s, and a Poisson's ratio of 0.33. This shale overlies a brine-saturated sandstone with a density of 2.2 gm/c<sup>3</sup>, a P-wave velocity of 2500 m/s, and a Poisson's ratio of 0.33. Based on Hilterman approximation estimate  $R(\Theta)$  and interpret the valuation of  $R(\Theta)$ . \*

$R = 0.09 - 0.09 \sin^2 \theta + 0.09 \sin^2 \theta \tan^2 \theta$ , Here no difference in poisson ratio so hiltermann approximation will give  $R_p - R_s = 0$  and hence the ratio of P and s-wave velocities and their differences will be equal ✗

Correct answer

$R(\Theta) = -0.09 \cos^2 \Theta$ ; The reflection coefficient for this situation has a small negative value at normal incidence, which will decrease to 0 as the reflection angle increases

✓ Reef can be identified based on following characterizations, \* 2/2

✓ Reefs often have a mound shape. ✓

✓ Porous reefs often show a reflection void, or dimming. Dimming is caused by a smaller velocity contrast between shale and porous carbonate than between shale and tight limestone. ✓

✓ Reef edges often create diffractions that can be observed in unmigrated data. ✓

✓ Abrupt terminations of reflections often exist along the flanks of the reef. ✓

✗ How many types of unconformity are present? Mention the names of those classifications. \* 2/4

Three type, Angular unconformity, Non-conformity, Dis-conformity ✗

Correct answer

4, Nonconformity; Disconformity, Angular Unconformity, Paraconformity



✘ Which part of the reservoir volume can be estimated based on 3D surface seismic data \* 0/2

- Entire reservoir volume
- Areas (volumes) between well and sources ✘
- Volume of rock near the wellbore
- Multiple wellbore

Correct answer

- Entire reservoir volume

✘ The Gas cap drive in the reservoir can be defined as, \* 0/2

- Energy of compressed free gas cap overlying oil in reservoir
- Energy of dissolved gas in oil in oil reservoir ✘
- Energy from compressed gas in gas reservoirs.
- Energy derived from compaction of reservoir rock.

Correct answer

- Energy of compressed free gas cap overlying oil in reservoir



✓ Identify the correct statement, \*

2/2

- a. Positive  $R_o$ , high amplitude decreasing with offset; with Negative Gradient: Class 1 ✓
- b. Negative  $R_o$ , high amplitude increasing with offset; with Negative Gradient: Class 3 ✓
- c. Negative  $R_o$ , high amplitude decreasing with offset; with Positive Gradient: Class 4 ✓
- d. Only statement a is correct.

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