

Question Bank: Ductile Structural Geology, 3rd Year

Q.1) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

- 1- Cylindrical fold is a fold in which a straight hinge line parallels the median line.
- 2- The dip isogons are weakly convergent in Class 2 folds (Ramsay's classification).
- 3- Shear Folding results from minute displacements along closely-spaced fractures.
- 4- Both limbs of the overturned fold dip in the same directions at different angles.
- 5- Harmony of folding is equal to the ratio of the depth of folding to the amplitude.

Q.2) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

- 1- Drape folds and Parasitic folds are two types of the minor folds.
- 2- During passive folding the layering of a material has mechanical significance.
- 3- Volume Loss Folding in which lines perpendicular to the layer before folding remain so after folding.
- 4- If vergence of a fold directed towards SW, the sense of the tectonic transport of the same fold is SW.
- 5- In the flexural-slip folding, there is no interlayer slip takes place at the inflection point of a folded layer.

Q.3) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

- 1- In the exploration of petroleum, the seismic method has been utilized to determine force.
- 2- The gentle limb of the fold is direction of the fold vergence.
- 3- Sheath folds in a shear zone are another natural example of flexural folding.
- 4- Mechanical stratigraphy simply implies that the rock consists of layers that respond mechanically differently to homogeneous strain.
- 5- Flexural slip folding might occur instead of orthogonal flexure if the layer is less competent or if the layer has a strong planar mechanical anisotropy.

Q.4) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

- 1- Bending may occur during the development of structural terrace over fault blocks.
- 2- Most folds in the Zagros belt are formed by bending.
- 3- If the folds differ in wavelength and shape along the enveloping surface or die out in this direction they are said to be disharmonic.
- 4- *Strain analysis is determination of the movement paths that rocks have taken during transformation from the undeformed to the deformed rocks.*
- 5- *Dynamic analysis is the development of an understanding of stress and its relation to deposition.*

Q.5) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

- 1- *Syn-formational structures formed at the same time as the material that will form the rock.*
- 2- *Post-formational structures formed before full lithification, but after initial deposition.*
- 3- *Rock mechanics deals with the flow of rocks.*
- 4- *Increase in confining pressure increases the extension.*
- 5- *The plastic deformation is less common near the surface of the earth.*

Q.6) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

1. *Isoropic material is rocks whose mechanical properties were uniform in all directions.*

2- *Fold profile is the direction of younging along the enveloping surface of a fold.*

3- *Enveloping surface is the surface that joins the adjoining/successive lines of inflection of a folded surface.*

4- *Median surface are the tangent planes (two surfaces) to successive fold hinge zones.*

5- *Fold width is the distance between hinge points on a folded surface.*

Q.7) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong. Write correct answer in the brackets.

1- if the axial surface of a fold dips 69°NE, the hinge line of the same fold is trending SW.

2- Folding angle ϕ (phi) is the angle between the two tangents to the folded surface.

3- According to Fleuty (1964), if the dip of axial surface of a fold = 87° and plunge of hinge line of same fold = 4°, the fold is called recumbent fold.

4- Interlimb angle is the supplement of the folding angle ($i = 160^\circ + \phi$).

5- Isogons are parallel to the outer arc in the class 2.

Q.8) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

1- In Class 1A, the smallest distance (t & T) between two surfaces is at hinge.

2- In Class 1B, t remains constant throughout the fold T is a minimum at the hinge.

3- The Class 1B folds are often called parallel folds or concentric folds.

4- The class 1Ct is a maximum at the hinge, and -T is a minimum at the hinge

5- Class 2 folds are often called similar folds.

Q.9) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

1- Structural terrace is a fold pair with two long planar inclined limbs connected by a relatively short horizontal limb.

2- Parasitic folds occurring on the limbs or hinge of a larger fold.

3- Higher-order folds are sometimes called minor fold because they are related to a larger structure.

4- The axial surface of a set of high-order folds defines the folds of the next lower order.

5- Based on the Ramsay's rule, the geometrical relation between hinge line of minor fold with the hinge line of their associated major fold are divided.

Q.10) Respond to the following statements with true or false, and correct the underlined word(s) if they are wrong.

1- Drag folds are those folds that develop in an competent bed.

2- Folds modified by a later fold phase are known as fold system and the resulting patterns are referred to as fold interference patterns.

3- Fold profile groups of folds that formed at approximately the same time interval and under similar kinematic conditions.

4- Type 2 is also called a “dome-and-basin” structure in which Both the axial surfaces and the hinge lines of the two generations are perpendicular.

5- The vergency of folding is equal to the ratio of the depth of folding (D) to the half-wavelength ($\lambda/2$):
 $H=2D/\lambda$.

Q.11) Complete these sentence with the correct structural word(s)

- 1- Class 1B folds of Ramsay 1967 are called folds.
- 2-The concept of vergence may be applied to folds.
- 3- Extensional structures are resulting in of a region.
- 4- Two of symmetrical folds are equal in length.
- 5- According to Fleuty (1964), if the dip of axial surface of a fold = 81° and plunge of hinge line of same fold = 9° , the fold is called fold.

Q.12) Are these sentences right (/) or wrong (X)? Correct the underlined word(s) in these sentences, if they are wrong.

- 1- Tectonic transport direction of most folds in the Zagros Fold and Thrust Belt (ZFTB) directed towards NE.
- 2-The vergence of an symmetric fold can be used as an indication of the sense of tectonic transport associated with development of the fold.
- 3-Dynamic analysis is the development of an understanding of stress and its relation to deposition.
- 4-Post-formational structures formed at the same time as the material that will form the rock.
- 5-Rheology deals with the flow of rocks.

Q.13) Select the correct answer for each of following:

- 1- Plunging fold is a fold whose axis hinge line is
A- horizontal B- inclined C- horizontal & inclined D- all of them
- 2- The dip isogons are in Class 1B folds (Ramsay's classification).
A- weakly convergent B- strongly convergent C- divergent D- moderately convergent
- 3- If the axial surface of a fold dips 79° NE, the hinge line of the same fold is trending
A- NE B- SW C- NE to SW D- none of them
- 4-..... structures formed after the rock has fully formed.
A- syn-formational B- penecontemporaneous C- post-formational D- all of them
- 5- If direction of the vergence of a fold is NW, therefore the sense of tectonic transport for the same fold is
A- NE B- SE C- SW D- none of them

Q.14) What are differences between:

- 1- parallel fold and similar fold.
- 2- harmonic fold and disharmonic fold.
- 3- hinge line and crest line.
- 4- passive fold and active fold.

Q.15) Talk briefly about:

- 1- Boudin.
- 2- Orthogonal flexure folding.
- 3- Fold vergence.
- 4- Flexure slip folding.

Q.16) Draw with labelling these structures:

- 1- Fleuty's classification
- 2- Orthogonal flexure folding.
- 3- Flexure slip folding.

Q.17) Draw with labelling these structures:

- 1- Box fold and chevron fold.
- 2- Thick skinned tectonic.
- 3- Thin skinned tectonics.

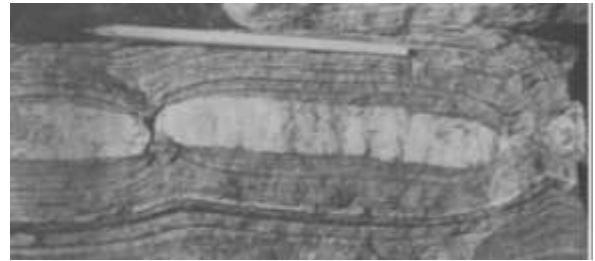
Q.16) What are differences between:

- 1 – Monocline and structural terrace.
- 2- Symmetrical fold and asymmetrical fold.
- 3- Drag and parasitic folds.

Q.17) What are Minor structures associated with orthogonal model?

Q.18) From given figure/photo answer these questions.

- 1-What is a structure that appear in this figure?
- 2- This structure formed by a process called
- 3-This structure is segmented as a result of

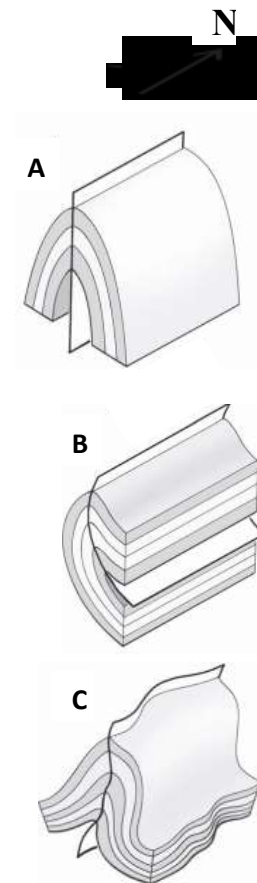


Q.19) The figures A, B, and C are anticlinal folds with their north direction. Answer these questions: 1- Describe geometry of the axial surface in the fold C.

2- Describe geometry of the hinge line in the folds B and C.

3- Find dip angle and dip direction of the axial surface in the fold A.

4- Classify the folds A, B, and C based on curvature of axial surface and Cylindricity.

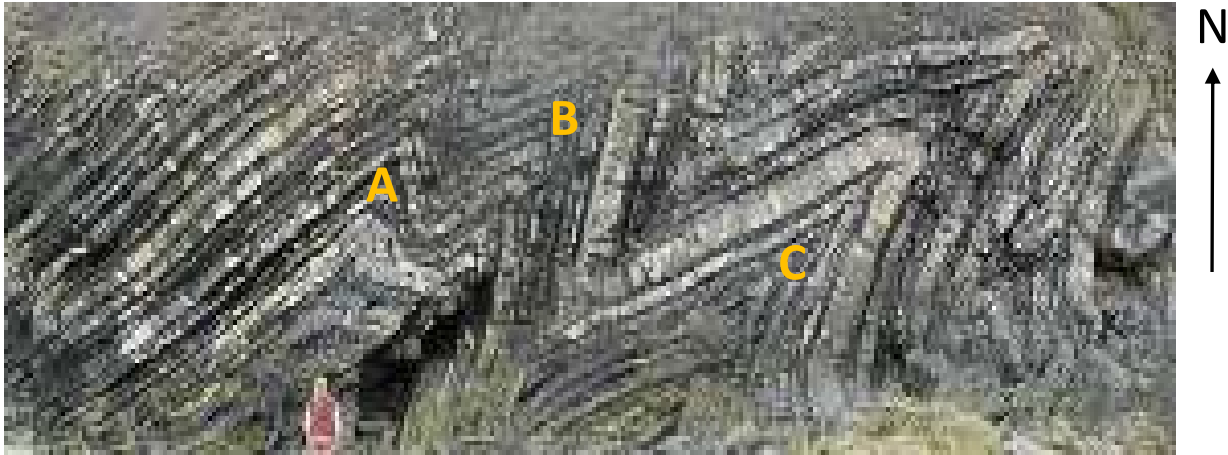


Q.20) Compare between boudin structures mullion structures.

Q.21) What's a harmony of folding? Talk about types of the harmony of folding.

Q.22) The field photo includes anticlinal folds which labeled with A, B and C. Answer these questions about these folds.

1- Draw trace of hinge surface, and find dip direction and amount of hinge surface in the fold A.



2- Determine the forelimb and backlimb in the fold C. Give reasons.

3- Mark and label inflection point and median line in the fold B.

Q.3) What are factors which controlling mechanical behavior of materials .

Q.24) Define: 1- Stress ellipsoid. 2- Deformations. 3- Rheology. 4- strain ellipsoid .

Q.25) Define: 1- Kink folds. 2- Pumpelly's rule. 3- Shear Folding. 4- Superposed folding.

Q.26) Explain this statement “using the terms anticline and syncline as synonyms for antiform and synform, is incorrect”.

Q.27) Interpret this statement “Orthogonal flexure should be characteristic of folds with low curvature in competent layers that are resistant to ductile deformation”.

Q.28) What are types Flexural folding?

Q.29) What are ideal fold geometries can result from volume loss folding?

Q.30) What are the difference between a passive fold and an active fold?

Q.31) How can you Calculate the amount of slip in the flexural-slip model?

Q.32) What's a homogenous flattening? How homogenous flattening affects the geometry of the folds.?

Q.33) Compare between a homogeneous deformation and heterogeneous deformation?

Q.34) Compare between a homogeneous strain and a heterogeneous strain.

Q.35) Compare between normal kink band and reverse kink band.

Q.36) What is the difference between a Synformal anticline and Antiformal syncline?

Q.37) What are the differences between box fold and chevron fold?

- Q.38)** What is the difference between hinge line and crest line?
- Q.39)** What is fold facing?
- Q.40)** What's Cylindricity of fold? What are types of folds based on the Cylindricity of fold?
- Q.41)** How can you determine regional tectonic transport direction of the fold system?
- Q.42)** What is "Pumpelly's Rule"? what is advantage of "Pumpelly's" in the fold study?
- Q.43)** Explain this statement "Fleuty (1964) and Rickard (1971) are geometric classifications, and not associated with mechanism/kinematic of the folding".
- Q.44)** Compare between the Fleuty (1964) and Rickard (1971) geometric classifications?
- Q.45)** What is Ramsay's classification 1967? What are the classes of the Ramsay's classification 1967?
- Q.46)** What is deformation? What are the stages of the deformation?
- Q.47)** What are categories of Structural analysis?
- Q.48)** define:1- Parallel fold; 2- Overtured folds; 3- Homocline.
- Q.49)** What is a minor fold? What are types of the minor fold?
- Q.50)** Compare between the Thin skinned deformation and Thick skinned deformation.