

National Exams May 2011

98-Pet-A1, Principles of Stratigraphy & Sedimentation

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
- 2 This is a CLOSED-BOOK exam. No calculators permitted.
3. Answer 17 of the 20 questions in Part 1. Each question in Part 1 is worth 3 marks. Answer 5 of the 7 questions in Part 2. Each question in Part 2 is worth 1 mark. The total value is 56.

Part 1. Answer 17 out of the 20 following questions (each worth 3 marks):

1. Outline the main factors that give rise to transgressions and regressions and indicate (with the aid of diagrams) how transgressions and regressions can be differentiated in the rock record.
2. Explain the main differences between clastic and carbonate rocks.
3. Explain in what part of a fluvial depositional system you would explore for:
 - a. uranium
 - b. coal
 - c. placer gold
4. Explain the principal of radiometric age dating of rocks.
5. Explain Walther's Law. When does Walther's Law not work?
6. What are the distinguishing features and the origin of debris flows and turbidite?
7. Summarize the diagenesis of mud (include organic and inorganic processes in your answer).
8. Explain the two main theories for the origin of 'topography' as explained by isostasy.
9. What are suitable and unsuitable sedimentary rocks for foundation design and why?
10. How are evaporites formed and what are their economic importance?
11. How are dolostones thought to form?
12. What are the major facies and their distinguishing characteristics of the carbonate reef model?

13. What depositional environments produce the best petroleum reservoir rocks? Explain why in your answer.

14. What are the main characteristics of storm dominated shelf deposits?

15. Explain why carbon and oxygen stable isotopes may be utilized in diagenetic and sedimentological studies.

16. Compare and contrast microtidal and macrotidal coastal deposits. What are their distinguishing features in the rock record?

17. What are pelagic sediments and what factors control the distribution and type being deposited?

18. What are methods by which the relative ages of strata can be determined? Give an example of each.

19. What is a facies model and why are they useful?

20. Explain Froude numbers and how they can be used to determine the type of sedimentary structures which will form.

Part 2. Answer 5 out of the 7 following question (each worth 1 mark):

- a. What is Stokes Law and when does it apply?
- b. What is significance of hummocky cross-stratification
- c. What is significance of lenticular bedding
- d. What is a paraconformity
- e. What is a pressure solution
- f. Define mineral maturity
- g. Define textural maturity