

## National Exams May 2010

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. Questions have the values shown. The total value is 56.

- 3 1. Outline how the importance of eustatic change and variation in subsidence rate and sediment input result in transgressions and regressions?
- 2 2. How can evolutionary and migration events and biofacies be recognized and differentiated in the rock record?
- 3 3. What is the relationship between flow regime (Froude number), bed forms and sedimentary structures?
- 3 4. What is the difference between smectite and illite clays and why is smectite an engineering hazard? In your answer demonstrate with diagrams that you understand the mineral structures.
- 2 5. What are the main controls on the distribution of modern carbonates sediments and why?
- 4 6. Provide a typical paragenetic history of a sandstone. Indicate in your answer how secondary porosity may form.
- 2 7. What are the main differences between siliciclastic and carbonate sediments and why?
- 3 8. What is the principal of Rb-Sr radiometric age dating and what types and ages of rocks is this technique useful for and what are the limitations?
- 4 9. What are the distinguishing features of deltaic deposits? Why are deltas characteristically cyclic?
- 2 10. What are the periods of the Paleozoic and what is the approximate absolute ages of their boundaries.
- 4 11. With the aid of diagrams summarize the main sedimentary basins and their facies formed on convergent plate margins.

- 3 12. Compare and contrast fluvial meandering streams depositional models with alluvial fan model.
- 3 13. What are the distinguishing features of eolian (wind) deposits and why are these deposits rare in the rock record?
- 3 14. Compare and contrast mud flow, grain flow and turbidite deposits?
- 5 15. What is the underlying premise of sequence stratigraphy, what are the major system tracks and how are sequence boundaries and flooding surfaces recognized?
- 10 16. Short Answers:
- a. What is a Newtonian Fluid?
  - b. What is the origin of chert?
  - c. What is the origin of oolites?
  - d. What is the origin of carbonate mud (micrite)?
  - e. Why are lithoclasts rare but intraclasts common in carbonate rocks?
  - f. What is the sequence of clay minerals would you anticipate with progressive chemical weathering?
  - g. What is the significance of lenticular bedding?
  - h. What forces lead to grain entrainment in a flow with increasing flow velocity?
  - i. What is the difference between a stratigraphic and structural cross-section?
  - j. What is the Milankovitch view of the origin of cyclicity in the rock record?