

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

APPLIED PHYSICS DEPARTMENT

GLOBAL TECTONICS MAPH5134 EXAMINATION

MSC GEOPHYSICS: JANUARY 2014

DURATION: 4 HOURS

ANSWER ALL QUESTIONS IN THIS PAPER. THE MAXIMUM POSSIBLE MARKS IS 120.

1. Describe the chronological development of the theory of global tectonics. [8]
2. (a) Explain why the study of earthquakes is important in global tectonic theory. [3]
(b) (i) What are focal mechanisms? [3]
(ii) Why are focal mechanisms ambiguous? [3]
3. (a) With the aid of the seismic section of Figure 2, discuss the layering of the oceanic lithosphere.

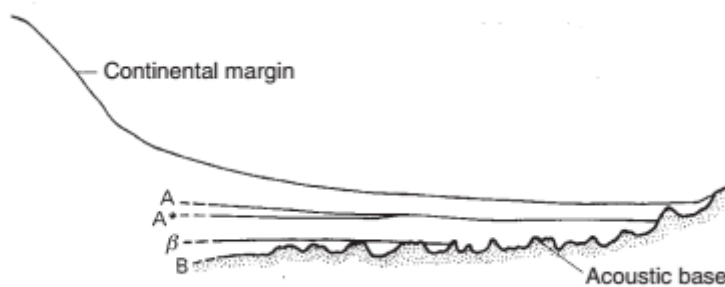


Figure 1. [7]

- (b) Compare and contrast the oceanic and continental lithosphere. [8]
4. (a) With the aid of well labeled diagrams and equations, compare and contrast Airy and Pratt's hypothesis of isostasy. [8]
(b) In your opinion which of the two hypotheses, Airy's or Pratt's is more acceptable? Justify your answer. [2]
5. (a) Discuss the reconstruction of the continents around the Atlantic. [6]
(b) How do the following aspects provide evidence for continental drift;
(i) Paleoclimatology? [7]

- (ii) Paleontology? [6]
- (iii) Paleomagnetism? [6]
- 6. (a) Why is the study of marine magnetic anomalies important in the study of seafloor spreading? [5]
- (b) Give a detailed account of how the Vine –Matthews hypothesis accounts for the formation of magnetic lineations and how this is related to sea floor spreading. [10]
- 7. (a) Explain the three possible forms of plate tectonic boundaries. [6]
- (b) Discuss the importance of the Euler pole in determining the relative plate motions. [10]
- 8. (a) Suggest and support the possible sources of the low velocity regions which underlie oceanic ridges. [5]
- (b) Using the theory of Heiskanen and Vening Meinesz (1958) as your starting point, describe how a continental rift is formed. [8]
- 9. Discuss, with the aid of a diagram, the general morphology of oceanic subduction zones. [9]

END OF PAPER