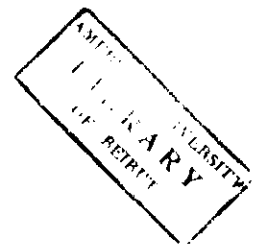




AMERICAN UNIVERSITY OF BEIRUT
Geology Department
Geol 224
Final Exam



January 28, 1997

Student Name: _____

Part I. Choose the best answer (50 pts.)

1. Late Eocene was characterised by vertical uplift covering almost the entire Arabian platform except for a narrow seaway in
 - a. North Syria and Jordan
 - b. North Syria and Iraq
 - c. North Jordan and Central Syria
 - d. North Jordan and Iraq

2. In Paleogene, the . . . side of Arabia underwent . . . tectonics with broad uplift (large dome).
 - a. western . . . compressional
 - b. western . . . tensional
 - c. eastern . . . compressional
 - d. eastern . . . tensional

3. The boundary zone of western edge of the Arabian shield has a crustal thickness . . . km to become 8 km under Farsan island.
 - a. 10
 - b. 32
 - c. 16
 - d. 48

4. In the northern Levant there is ample evidence of . . . differential . . . movements, which led to the foundering of the eastern Mediterranean floor and further uplift of the Levantine coastal range..
 - a. Oligocene . . . vertical
 - b. Oligocene . . . horizontal
 - c. Pliocene . . . vertical
 - d. Pliocene . . . horizontal

5. The drift of Arabia (7° counter-clockwise rotation), closed the seaway, folded its sediment into . . . ranges and it also reactivated deep seated Cambrian evaporites in the Gulf.
 - a. Taurus and Zagros
 - b. Sinjar and Taurus
 - c. Palmyrides and Lebanon
 - d. Palmyrides and Zagros



6. Progressive widening of the Gulf of Aden and rotation of Arabia was taken up by . . . horizontal movement along the . . . fracture.

- | | |
|---------------------------------|---------------------------|
| a. sinistral . . . Zagros | c. sinistral . . . Levant |
| b. dextral . . . East Anatolian | d. dextral . . . Dead Sea |
-

7. In Yemen the . . . salt was extruded to the surface in late Cenozoic.

- | | |
|-------------|---------------|
| a. Cambrian | c. Devonian |
| b. Jurassic | d. Cretaceous |
-

8. The Gulf of Oman is floored by . . . crust . . . M.A. defined according to heat flow evidence.

- | | |
|-------------------------|-----------------------------|
| a. oceanic . . . 30-50 | c. continental . . . 30-50 |
| b. oceanic . . . 70-100 | d. continental . . . 70-100 |
-

9. The . . . fracture zone runs along the SE edge of Arabia for 2000 km, . . . of which comprise the active segment.

- | | |
|--------------------|---------------------|
| a. Owen . . . 500 | c. Owen . . . 1000 |
| b. Sheba . . . 500 | d. Sheba . . . 1000 |
-

10. According to Cochrane (1983), an initial Red Sea 100 km wide was formed by continental rifting in:

- | | |
|-----------------------------------|------------------------------------|
| a. late Eocene or early Oligocene | c. late Oligocene or early Miocene |
| b. late Paleocene or early Eocene | d. late Miocene or early Pliocene |
-

11. Girdler (1985) concluded that oceanic lithosphere is present in the northern part of the Red Sea, . . . magnetic anomalies because it is constituted of . . . gabbroic intrusions.

- | | |
|------------------------------|-------------------------------------|
| a. with . . . fine-grained | c. but without . . . fine-grained |
| b. with . . . coarse grained | d. but without . . . coarse-grained |
-

12. In Afar region the presence of . . . Precambrian/Mesozoic blocks explain the difficulty in reconstructing the plate margins to pre-separation position.

- | | |
|---------------------------------|-----------------------|
| a. Aisha-Ali Sabieh and Sokotra | c. Farsan and Sokotra |
| b. Aisha-Ali Sabieh and Danakil | d. Farsan and Danakil |
-

13. The Levant or Dead Sea fracture is regarded as a . . . strike slip fault having a zig-zag trend (N-S and NNE-SSW).

- a. right-lateral (sinistral)
 - b. right-lateral (dextral)
 - c. left-lateral (sinistral)
 - d. left-lateral (dextral)
-

14. The greatest movement along the Levant fracture occurred in the . . . segment and it is about . . . km.

- a. northern . . . 65
 - b. southern . . . 65
 - c. northern . . . 107
 - d. southern . . . 107
-

15. The Phanerozoic section in the southwestern most part of . . . is about 13 km thick and the shortening across them there could exceed 30 km.

- a. Aleppo high
 - b. Palmyrides
 - c. Rutbah
 - d. Anti-Lebanon
-

16. In its central part (near Chtoura), the Yammouneh fault probably bifurcates northwards into two branches: 1) the Yammouneh-lake br. and 2) the . . . fault br.

- a. Mid-Lebanon
 - b. Baalbeck
 - c. Mid-Beqa'a
 - d. Hermel
-

17. Surface waves travel at . . . velocities than body waves and they are

- a. lower . . . not dispersive
 - b. higher . . . not dispersive
 - c. lower . . . dispersive
 - d. higher . . . dispersive
-

18. P or . . . waves travel at velocities higher than S or . . . waves.

- a. compressional . . . longitudinal
 - b. compressional . . . shear
 - c. transversal . . . longitudinal
 - d. transversal . . . shear
-

19. The Conrad discontinuity is . . . than the Moho discontinuity and it is located in the . . . crust.

- a. lower . . . oceanic
 - b. higher . . . oceanic
 - c. lower . . . continental
 - d. higher . . . continental
-

20. At Moho discontinuity the velocity of P waves increases from . . . km/sec.

- a. 4.3 to 5.6
- b. 5.6 to 7.9
- c. 5.6 to 6.3
- d. 4.3 to 7.9

21. The oceanic . . . consists of extrusive igneous material.

- a. layer 1
- b. all of the above
- c. layer 2
- d. layer 3
- e. none of the above

22. The Transition zone of the mantle is confined between discontinuities at depths of . . . km.

- a. 100 and 300
- b. 400 and 650
- c. 300 and 400
- d. 650 and 1000

23. The highest geothermal energy flux at the Earth surface is at the:

- a. trenches
- b. mountain ranges
- c. oceanic ridges
- d. transform faults

24. The fit in the reconstruction of continents is not made on the coastlines. The true junction between continental and oceanic crusts is at about . . . m contour.

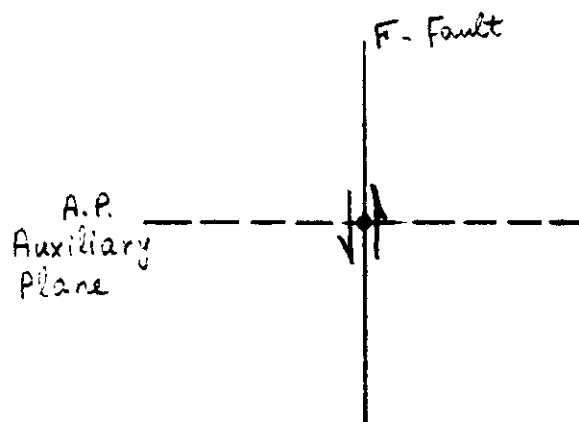
- a. 100
- b. 1000
- c. 200
- d. 2000

25. Primary remanent magnetism includes:

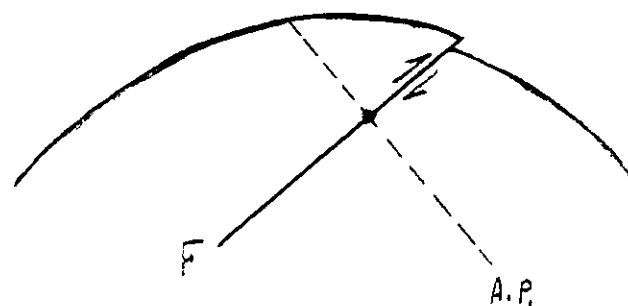
- a. thermo- and detrital
- b. isothermal and detrital
- c. thermo- and viscous
- d. isothermal and viscous

Part II. Answer the following questions (15 pts.)

1. Assign the regions of compression (shaded) and those of dilation (dotted) for the given diagrams.



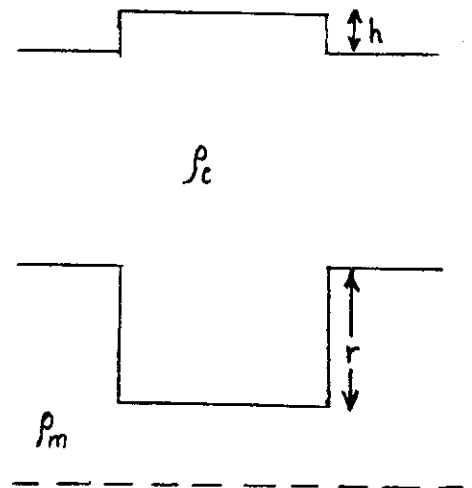
Dr. K. Khair



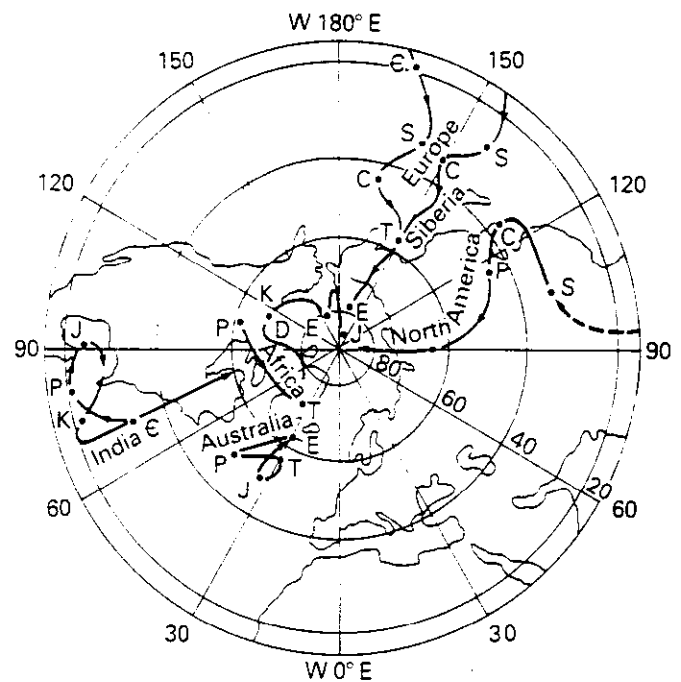
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2. Applying the Airy's hypothesis of isostasy, derive the formula and calculate the root r of the plateau with a height $h = 5$ km; the density of the continental crust $\rho_c = 2.7$ g/cm³ and that of the mantle $\rho_m = 3.15$ g/cm³.



3. Explain the given diagram and discuss its significance to continental drift.

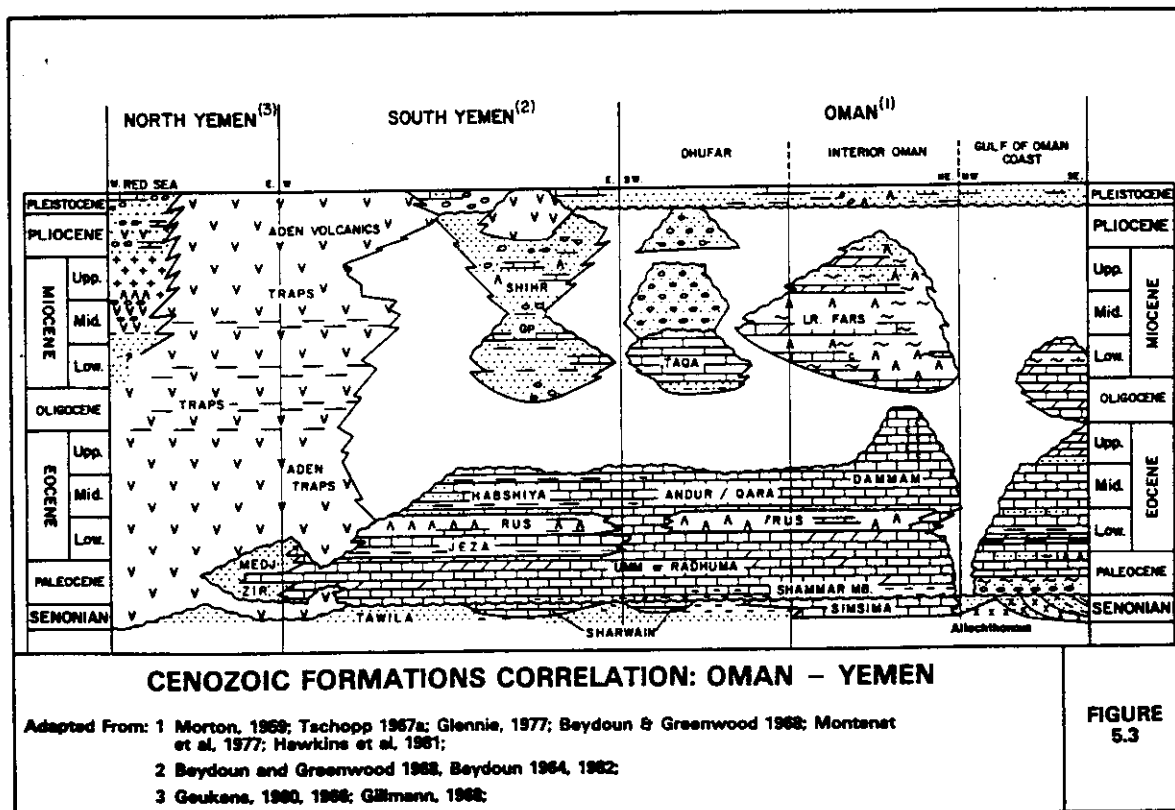


Part III. Answer two of the following three questions (20 pts.)

1. Discuss the Messinian salinity crisis in the Mediterranean Sea.
 2. Describe the Aden Trap series.
 3. Discuss the conclusion of the evolution and development of the Levant fracture.
-

Part IV. Describe the presented formation correlation in terms of deposition, lithology, palaeogeography and palaeoclimate. (15 pts.)

GOOD LUCK



Z. R. Beydoun

FIGURE 5.3