



AMERICAN UNIVERSITY OF BEIRUT  
Geology Department  
Geology 224  
Final Exam



June 25, 1999

Student Name: \_\_\_\_\_

**Part I. Choose the best answer (64 pts.)**

1. During Mesozoic the Arabian region was in . . . latitudes and was low lying with little terrigenous clastics.

- |                   |           |
|-------------------|-----------|
| a. high to middle | b. middle |
| c. low to middle  | d. high   |

2. The Rub al Khali basin is a Tertiary . . . that apparently originated in the early Palaeozoic as a sag basin.

- |                      |                   |
|----------------------|-------------------|
| a. epicratonic basin | b. orogenic basin |
| c. epicratonic axis  | d. orogenic axis  |

3. As Mesozoic was the time of the break up of Pangaea, the similarity of depositional conditions between Arabia and . . . prevailed in Palaeozoic ceased.

- |                 |              |
|-----------------|--------------|
| a. SW Iran      | b. SE Turkey |
| c. Central Iran | d. Sinai     |

4. Although it is difficult to separate it from Upper Permian, Triassic was marked by partial quite extensive . . . episodes.

- |                    |                 |
|--------------------|-----------------|
| a. transgressional | b. taphrogenic  |
| c. orogenic        | d. regressional |

5. The main trend of the Najd fault system is:

- |            |            |
|------------|------------|
| a. NE-SW   | b. NW-SE   |
| c. NNE-SSW | d. ENE-WSW |

6. The Central Arabian arch trends . . . and it is located to the . . . of the Central Arabian trough system.

- |                    |                    |
|--------------------|--------------------|
| a. E-W . . . north | b. E-W . . . south |
| c. N-S . . . east  | d. N-S . . . west  |



7. The main trend of the Palmyride fold belt is:

- |            |            |
|------------|------------|
| a. NE-SW   | b. NW-SE   |
| c. NNW-SSE | d. WNW-ESE |
- 

8. . . . basin is located east of the Hail-Jauf-Ga'ara Arch.

- |          |           |
|----------|-----------|
| a. Jafr  | b. Risha  |
| c. Tabuk | d. Widyan |
- 

9. The Jawf-Marib Graben is trending :

- |          |          |
|----------|----------|
| a. N-S   | b. E-W   |
| c. NW-SE | d. NE-SW |
- 

10. The main trend of the Huqf-Ja'alan Axis is:

- |            |            |
|------------|------------|
| a. NE-SW   | b. NW-SE   |
| c. NNW-SSE | d. WNW-ESE |
- 

11. The Ghawar Axis trends . . . and it is located to the . . . of the Qatar-Fars Arch.

- |                    |                    |
|--------------------|--------------------|
| a. E-W . . . north | b. E-W . . . south |
| c. N-S . . . east  | d. N-S . . . west  |
- 

12. . . . evaporites are exposed to the surface in the cores of some of the south-eastern Palmyrides asymmetric anticlines.

- |               |             |
|---------------|-------------|
| a. Cretaceous | b. Jurassic |
| c. Triassic   | d. Miocene  |
- 

13. The discontinuous crescentic-shaped belt of ophiolites along the northern and eastern edge of Arabia was emplaced in . . . .

- |                     |                    |
|---------------------|--------------------|
| a. early Cretaceous | b. late Cretaceous |
| c. early Jurassic   | d. late Jurassic   |
- 

14. Triassic deposits are . . . exposed in the . . . region.

- |                          |                             |
|--------------------------|-----------------------------|
| a. sparsely . . . Levant | b. extensively . . . Levant |
| c. sparsely . . . Gulf   | d. extensively . . . Gulf   |
-

15. . . . rocks of the central Arabian outcrop area (Saudi Arabia) are extensively exposed in an arcuate fashion to the east of the . . . rim of the Arabian shield.

- a. Cenozoic . . . Mesozoic
  - b. Mesozoic . . . Palaeozoic
  - c. Mesozoic . . . Cenozoic
  - d. Palaeozoic . . . Mesozoic
- 

16. In Lebanon, Bikfaya limestones are . . . by Bhanes complex, and Hammana marls underlie . . . formation.

- a. overlain . . . Mdairej
  - b. underlain . . . Mdairej
  - c. overlain . . . Sannine
  - d. underlain . . . Sannine
- 

17. Arab formation directly underlies:

- a. Hith evaporites
  - b. Hanifa evaporites
  - c. Hith carbonates
  - d. Hanifa carbonates
- 

18. Wasia formation overlies . . . carbonates and was deposited during . . .

- a. Jubaila . . . Jurassic
  - b. Shuaiba . . . Jurassic
  - c. Jubaila . . . Cretaceous
  - d. Shuaiba . . . Cretaceous
- 

19. Kohlan . . . formation ( . . . ) was deposited in Jurassic.

- a. clastic . . . Oman
  - b. carbonate . . . Oman
  - c. clastic . . . Yemen
  - d. carbonate . . . Yemen
- 

20. Haynes and McQuilan (1974) pointed that the Zagros suture zone is divisible into the following (from NE to SW) zones: stable block of the Iranian "continent", . . . and Arabian platform part .

- a. Zagros crush, simply folded, trench, imbricate
  - b. Zagros crush, trench, imbricate, simply folded
  - c. imbricate, Zagros crush, simply folded, trench
  - d. trench, imbricate, Zagros crush, simply folded
- 

21. In his model, Gealy (1977) attributed the obduction of the . . . ophiolites to collision between the passive margin of Arabia and . . .

- a. Oman . . . SW Iran
  - b. Iraqi . . . SW Iran
  - c. Oman . . . island arc
  - d. Iraqi . . . island arc
-

22. In his model for the obduction of Oman ophiolites, Coleman (1981) suggested that Eurasia and Africa rotated in . . . direction(s) initiating the closure of the Tethys during late . . . .

- a. the same . . . Jurassic
  - b. opposite . . . Jurassic
  - c. the same . . . Cretaceous
  - d. opposite . . . Cretaceous
- 

23. Most of the models explaining the obduction of ophiolites agree that the . . . was short-lived and was aborted because the compression was being taken up by the closure of . . . .

- a. uplift . . . small oceans
  - b. orogeny . . . small oceans
  - c. uplift . . . sag basins
  - d. orogeny . . . sag basins
- 

24. Late Eocene was characterized by vertical uplift covering almost the entire Arabian platform except for a narrow seaway in:

- a. North Syria and Iraq
  - b. North Jordan and Palestine
  - c. West Syria and Lebanon
  - d. North Jordan and Iraq
- 

25. The Cenozoic opened with a paleocene transgression covering almost the entire Arabian platform except for:

- a. Yemen
  - b. Oman
  - c. Jordan
  - d. Syria
- 

26. By late lower Eocene shoaling over eastern Arabia gave rise to . . . deposition of . . . form.

- a. evaporitic . . . Damman
  - b. carbonate . . . Damman
  - c. evaporitic . . . Rus
  - d. carbonate . . . Rus
- 

27. At the beginning of its formation, the sea entered to the Red Sea from . . . depositing a great thickness of organically rich marls providing the . . . rock of oil in the Gulf of Suez.

- a. south . . . source
  - b. north . . . source
  - c. south . . . reservoir
  - d. north . . . reservoir
- 

28. In Oman, . . . salts moved with piercement to the surface in late Tertiary.

- a. Ordovician
  - b. Permo-Carboniferous
  - c. Devonian
  - d. Infracambrian-Cambrian
- 

29. In Yemen, the Jurassic salt was extruded to the surface in:

- a. late Cenozoic
  - b. early Cenozoic
  - c. late Cretaceous
  - d. early Cretaceous
-

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

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

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31. 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 . . . coarse-grained
- b. but without . . . coarse-grained
- c. with . . . fine-grained
- d. but without . . . fine-grained

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32. 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. Hermel
- d. Mid-Beqa'a

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**Part II. Circle T = True or F = False and explain why if it is false (16 pts.)**

T F 1. The clastic deposition of the Palaeozoic era gave way to a predominance of carbonate deposition in the Mesozoic.

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T F 2. Being the northern extension of the Hail-Jauf-Rutbah trend, the Khleissia high is separated from it (trend) by the palmyrides.

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T F 3. In southern Arabia (Yemen to Oman) Mesozoic rocks are discontinuously, but well and widely, exposed in different portions of plateau outcrop erosion windows in the slopes of valleys and basins.

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T F 4. The boundary zone of the western edge of the Arabian Shield has a crusta thickness of 24 km to become 8 km under Farsan island. However, the coastal plain (to Red Sea) is underlain by continental crust.

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T F 5. In the northern Levant there is ample evidence of Pliocene differential vertical movements which led to the foundering of the eastern Mediterranean floor and further uplift of the Levantine coastal range.

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T F 6. Late Miocene witnessed the Messinia salinity crisis. This was a time of regression, where evaporites interfinger with continental deposits. These Messinia evaporites are found, on a limited scale, in Lattakiya and Syria-Lebanon littoral border.

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T F 7. During Late Tertiary and Pleistocene basaltic volcanism was widespread in the Levant-fracture zone, but it was restricted to its eastern side.

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T F 8. Dubertret (1932) developed the hypothesis of sinistral movement along the Levant fracture, notifying that the Sinai-Levant block moved 106 km southward relative to Arabia, in response to the counterclockwise rotation of Africa for 6°.

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T F 9. Quennell (1983, 84) modified his model to account for the lack of a significant horizontal movement along Yammouneh. He subdivided the Levant fracture into northern and southern transform systems separated by Lebanon and Palmyrides.

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T F 10. The crust of Lebanon thins from about 35 km beneath the Anti-Lebanon range to about 27 km beneath the Lebanese coast. Moreover, relatively thin crustal roots exist beneath the Lebanese ranges.

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

1. Review the introduction of terminal Cretaceous events and outline the main conclusions of Takin (1972).
2. Discuss the introduction of the opening of the Gulf of Aden and Red Sea including that given in the overview of Cenozoic.
3. Discuss (maximum one page) the Extension of the Dead Sea transform fault in Lebanon and its role in the geomorphology of the country.

**GOOD LUCK**