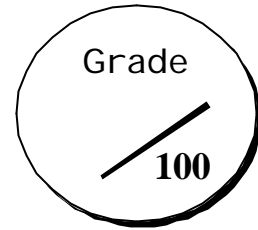


AMERICAN UNIVERSITY OF BEIRUT

Department of Geology

Geo. 102 FINAL Exam



Date: 23/01/2006

Time: 2 hrs.

Part I: Multiple-choice questions (75%).

Choose the best answer for the following 50 questions.

1. Which sphere provides the platform for most life forms on Earth?
 - a. *atmosphere*
 - b. *hydrosphere*
 - c. *lithosphere*
 - d. *biosphere*

2. The second abundant gas in the atmosphere is:
 - a. *oxygen*
 - b. *carbon dioxide*
 - c. *nitrogen*
 - d. *ozone*

3. The Sun emits _____, and the Earth emits _____ .
 - a. *longwave radiation ; longwave radiation*
 - b. *shortwave radiation ; shortwave radiation*
 - c. *longwave radiation ; shortwave radiation*
 - d. *shortwave radiation ; longwave radiation*

4. The planet closest to the Earth is:
 - a. *Neptune*
 - b. *Saturn*
 - c. *Mercury*
 - c. *Venus*

5. The cause of seasonality is:
 - a. *parallelism*
 - b. *axis tilt*
 - c. *revolution*
 - d. *all of the above*

6. The main driving force for winds is the :
 - a. *Coriolis force*
 - b. *frictional force*
 - c. *pressure-gradient force*
 - d. *centrifugal force*

7. A wind coming from the east to the west is called a/an:
- westerly wind*
 - easterly wind*
 - northeasterly wind*
 - northwesterly wind*
8. The grid of the Earth is made up of:
- east-west latitudes and north-south longitudes*
 - east-west meridians and north south parallels*
 - east-west longitudes and north-south latitudes*
 - east-north latitudes and west-south longitudes*
9. The attached figure shows two perspectives that divide the
- Water hemisphere (A) & Land hemisphere (B)*
 - Eastern hemisphere (A) & Western hemisphere (B)*
 - Northern hemisphere (A) & Southern hemisphere (B)*
 - Southern hemisphere (A) & Northern hemisphere (B)*
10. Which of the following remote sensing techniques is a passive system?
- thermal infrared*
 - color infrared*
 - aerial photos*
 - all of the above*
11. Starting from the surface, the temperature decreases in the _____, then increases in the _____, then decreases in the _____ till it finally increases in the _____.
- stratosphere ; thermosphere ; troposphere ; mesosphere*
 - troposphere ; stratosphere ; mesosphere ; thermosphere*
 - thermosphere ; stratosphere ; troposphere ; mesosphere*
 - troposphere ; thermosphere ; mesosphere ; stratosphere*
12. _____ where most _____ occur.
- 97% ; evapotranspiration & precipitation*
 - 97% ; evaporation & precipitation*
 - 2.8% ; transpiration & precipitation*
 - 2.8% ; transpiration & evaporation*
- 13.
- it either infiltrates to the subsurface or infiltrates to the soil*
 - it either joins the groundwater or evaporates by plants*
 - it either evaporates or transpires*
 - it either flows overland or infiltrates to the soil*



14. According to the idealized model of surface atmospheric circulation, _____ broad pressure areas (features) exist the Northern hemisphere and a _____ set exists in the Southern hemisphere of which one feature is in common.
- 2 ; similar*
 - 4 ; different*
 - 2 ; different*
 - 4 ; similar*
- 15.
- Coriolis force*
 - density differences*
 - frictional drag of winds*
 - all of the above*
16. The amount of solar insolation falling on the surface of the Earth depends mainly on the:
- angle of incidence*
 - solar radiation output of the sun*
 - amount of glacial coverage in a particular area*
 - amount of ocean surface in a particular region*
17. The circulation systems of surface ocean currents are known as _____, and they move _____ in the Southern hemisphere.
- highs ; clockwise*
 - highs ; counterclockwise*
 - gyres ; clockwise*
 - gyres ; counterclockwise*
18. The greatest amount of insolation reaching the Earth is at the:
- the poles*
 - the equatorial region*
 - the midlatitudes*
 - the subtropics*
19. The air pressure surface zone located between about 10°N & 10°S is called the _____, and it is caused by _____ factors.
- subtropical high ; dynamic*
 - subtropical high ; thermal*
 - equatorial low ; thermal*
 - equatorial low ; dynamic*
20. The Coriolis effect is:
- curve to the right in the Northern Hemisphere*
 - on from the west to the east and causes objects to curve to the right in the Northern Hemisphere*
 - to curve to the left in the Northern Hemisphere*
 - none*

The three following questions (21, 22 & 23) are based on the attached figure.

21. A is the:

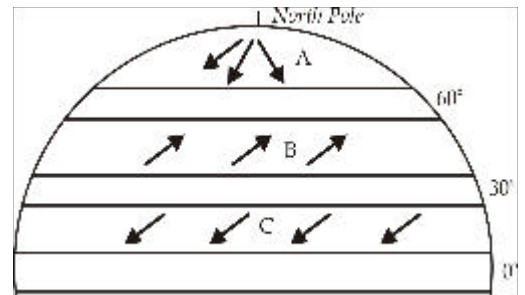
- a. *northeast trade winds*
- b. *southeast trade winds*
- c. *polar easterlies*
- d. *westerlies*

22. B is the:

- a. *northeast trade winds*
- b. *southeast trade winds*
- c. *polar easterlies*
- d. *westerlies*

23. C is the:

- a. *northeast trade winds*
- b. *southeast trade winds*
- c. *polar easterlies*
- d. *westerlies*



24. There are three kinds of jet streams, two are _____ and strong, and the third is _____ but weak.

- a. *easterly ; westerly*
- b. *easterly ; easterly*
- c. *westerly ; westerly*
- d. *westerly ; easterly*

25. A cyclone is a _____ pressure zone rotating _____ in the Northern hemisphere, whereas an anticyclone is a _____ pressure zone rotating in the opposite direction.

- a. *high ; counterclockwise ; low*
- b. *high ; clockwise ; low*
- c. *low ; clockwise ; high*
- d. *low ; counterclockwise ; high*

26. Ice caps and glaciers

- a. *2.8%*
- b. *35%*
- c. *76%*
- d. *97%*

27. In the phase change of 1 gram of ice at 0°C to 1 gram of water at 0°C, _____ is/are required:

- a. *1 calorie*
- b. *80 calories*
- c. *597 calories*
- d. *677 calories*

28. The _____ you are to the equator, the _____ the precipitation you expect.

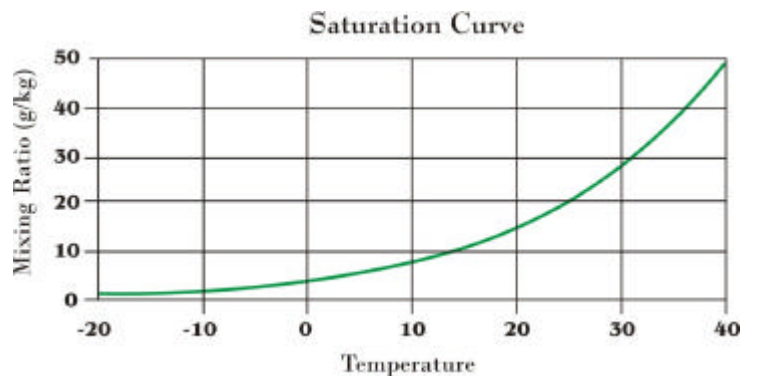
- a. *closer ; higher*
- b. *closer ; lower*
- c. *farther ; higher*
- d. *none of the above*

29. Evaporation of water from plants is called:
- radiation*
 - transpiration*
 - evapotranspiration*
 - evaporation*
30. A parcel of air whose relative humidity is 10 % cools following the:
- dry adiabatic lapse rate (DALR)*
 - saturated adiabatic lapse rate (SALR)*
 - environmental lapse rate (ELR)*
 - none*
31. The temperature at which air achieves saturation is called the:
- sublimation temperature*
 - condensation temperature*
 - coalescence point*
 - dew point*
- 32.
- ocean currents in the northern hemisphere*
 - ocean currents in the southern ocean*
 - wind flow patterns along the equatorial zone*
 - ocean currents in the Atlantic Ocean*

The four following questions (33, 34, 35 & 36) are related.

33. Air at 100 m altitude has a temperature of 20°C. It rises over a 2000 m mountain before it descends into a basin with an elevation of 100 m. What is the lifting condensation level? (given: dew point is 5°C)
- 100 m*
 - 500 m*
 - 1500 m*
 - 1600 m*

34. Using the saturation curve, what is the relative humidity at 1100 m.
- 0%*
 - 43%*
 - 71%*
 - 100%*



35. What is the relative humidity at 1650 m?
- 0%*
 - 43%*
 - 71%*
 - 100%*

36. What is the temperature in the basin on the leeward side of the mountain? (given: SALR = $0.6^{\circ}\text{C}/100\text{m}$)

- a. 20°C
- b. 21°C
- c. 21.6°C
- d. 22.4°C

37. Clouds are visible masses made up of:

- a. *water vapor*
- b. *water liquid droplets*
- c. *water ice crystals*
- d. *b or c*

38. The heat involved in the change of water from the solid state to the liquid state is called:

- a. *latent heat of fusion*
- b. *latent heat of vaporization*
- c. *latent heat of condensation*
- d. *latent heat of melting*

39. Mixing ratio:

- a. *is the total amount of water vapor present in the air*
- b. *is the amount of water vapor in the air to the total mass of air*
- c. *is the amount of water vapor in the air to the capacity*
- d. *it is the amount of water vapor present in the air to the mass of dry air*

40. Clouds are usually classified on the basis of _____ and _____.

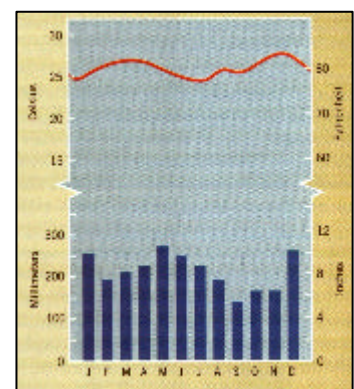
- a. *altitude ; process of formation*
- b. *color ; shape*
- c. *altitude ; shape*
- d. *altitude ; temperature*

41. When a cold air mass moves in a warmer surrounding, it results in a/an:

- a. *warm front*
- b. *cold front*
- c. *stationary front*
- d. *occluded front*

42. The attached figure showing the mean monthly values of air temperature and precipitation is called a:

- a. *hydrograph*
- b. *meteograph*
- c. *climograph*
- d. *isograph*



43. A mesothermal climate that is dry in winter and wet in summer is a/an:

- a. *BS climate*
- b. *Am climate*
- c. *Cw climate*
- d. *Dw climate*

44. BS climate is:
- dry and semiarid*
 - dry and arid*
 - tropical and always moist*
 - microthermal and dry in summer*
45. The stage in a thunderstorm characterized by rapid updrafts with the absence of downdraft is the:
- mature stage*
 - precipitation stage*
 - developing stage*
 - dissipating stage*
46. Black soil reflects:
- high amount of iron oxides*
 - low amount of iron oxides*
 - high amount of decomposed organic matter*
 - low amount of decomposed organic matter*
47. The process by which precipitation initially falls from the cloud as liquid is the:
- ice-crystal process*
 - cyclonic process*
 - convectonal process*
 - coalescence process*
48. A soil made up of columnar peds has a/an:
- platy structure*
 - prismatic structure*
 - spheroidal structure*
 - angular structure*
49. The precipitation producing mechanism where hot humid air rises due to thermal differences is called:
- cyclonic precipitation*
 - convectonal precipitation*
 - frontal precipitation*
 - orographic precipitation*
50. A stable atmosphere _____ the formation of clouds due to the fact that rising air _____ the dew point temperature.
- allows ; reaches*
 - allows ; sinks before reaching*
 -
 -

Part II: (25%).

Answer two of the three following questions.

1. Compare and contrast between a tornado and a hurricane (write in a table format 3 similarities and 3 differences).

2. Answer the following based on the provided table:
 - a. Calculate the actual evapotranspiration for each month (fill in the table), then calculate the annual value.
 - b. Calculate the annual precipitation.
 - c. Assuming that infiltration is 238 mm/year, then what is the expected annual surface runoff?

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET¹	25.78	29.37	41.20	57.60	77.51	94.59	109.73	109.79	90.46	67.44	42.90	29.41
Precipitation	190.09	133.40	110.80	46.30	15.00	1.50	0.30	0.40	2.30	54.80	105.90	163.80
Soil moisture	100.00	100.00	100.00	88.70	26.00	0.00	0.00	0.00	0.00	0.00	63.00	100.00
AET²												

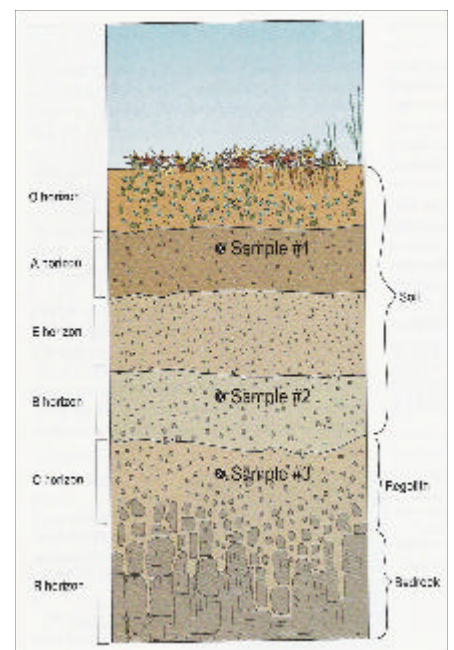
* Values are given in mm.

3. Consider a soil type exposed in Indiana and made up of silt loam. Samples from different horizons (as shown in the figure) are plotted on the soil texture triangle as points 1, 2 and 3.

- a. Fill in the textural analysis for each sample in the following table.

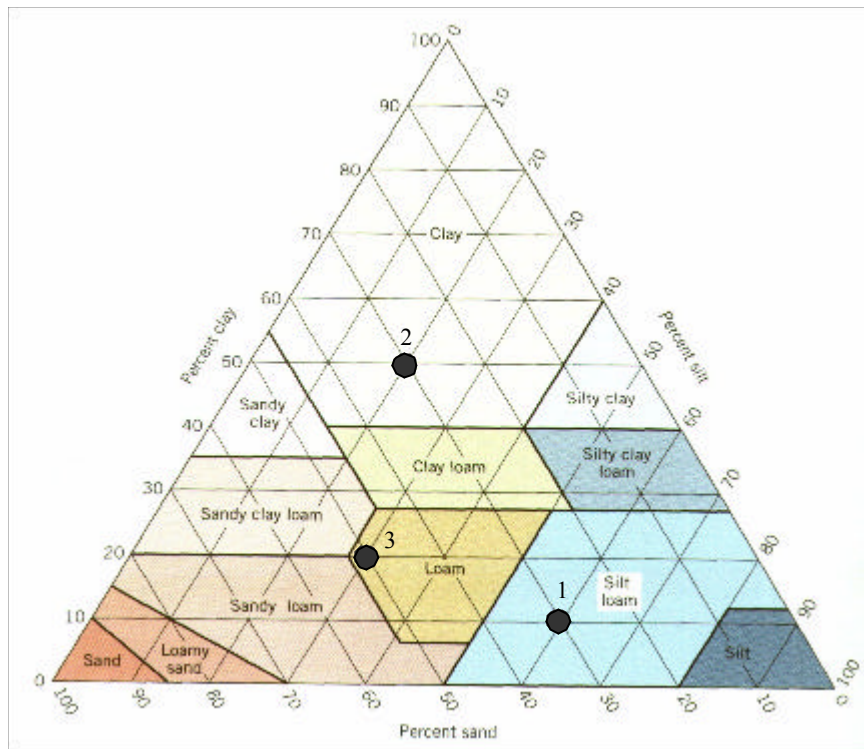
Sample #	% Sand	% Silt	% Clay
1			
2			
3			

- b. What can you say about the texture variation from the surface to the lower depths (Hint: Note the dominating size in each sample).



¹ Potential evapotranspiration.

² Actual evapotranspiration.



BEST WISHES
