



Geology Final 201 Summer Session

Name _____ Number _____

Answer all Sections. Read instructions carefully. Time allotted 2 hours

Section 1 True or False. 30 marks 1 mark each

Where answer is false please give a corrected version of the statement.

T F

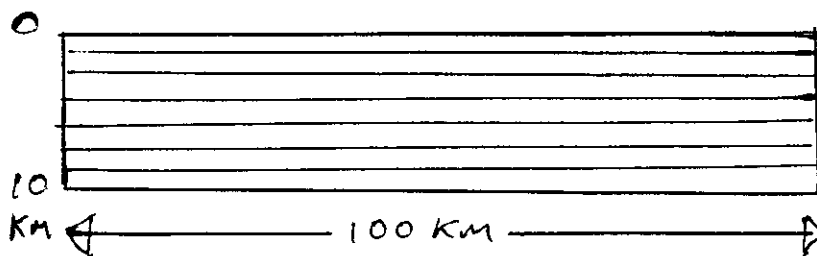
- 1) Peat and lignite are impure forms of carbonate sediment.
- 2) The M-Discontinuity is the level of physical change which marks the base of the lithosphere.
- 3) Although fluctuations in energy input may explain the cycles within glacial periods these are most likely due to the variations in the Earth's orbit as the sun's output is known to be fixed.
- 4) An earthquake will have a single unique Richter Magnitude value but many different Mercalli intensity values
- 5) A tsunami will form a high and slow wave in the mid ocean which becomes high and fast only when it hits the shore.
- 6) A cirque glacier will be larger than a piedmont glacier.
- 7) A thick sequence of sediments in basin will produce a positive gravity anomaly compared to the areas either side.
- 8) The main Benioff Zones along the western part of the Americas all dip westwards.
- 9) Although the Earth's magnetic poles have switched their polarity they have stayed aligned more or less parallel to the axis of rotation.
- 10) The zone of aeration is the upper, oxygenated part of the water table
- 11) Plates move because of convection motions in the thick, liquid, part of the mantle
- 12) Gondwanaland is the ancient supercontinent made up of all the modern continents.
- 13) The main desert areas of the southern hemisphere are dominated by winds that blow to the NE.
- 14) Gabbros are rich in pyroxenes and amphiboles and can be found in the cooled magma chambers below basaltic volcanoes.
- 15) The Coriolis Effect proves that the earth is rotating.
- 16) The oldest rocks in Lebanon occur at the base of the Cretaceous.



- T-F
- 17) Stream discharge and gradient decrease downstream.
 - 18) Karst weathering takes its name from the Karst region of western China
 - 19) In soils the C level is generally darker than the A level
 - 20) In an overturned sequence Permian strata would lie under Triassic strata but overlie Carboniferous strata.
 - 21) A wind blowing to the west will produce barchan dunes whose crescent arms face eastwards
 - 22) The mineral halite is a compound made up of the anion N^+ and the cation Cl^- .
 - 23) The mesosphere is the thickest part of the mantle.
 - 24) A berm is a feature of the inshore region
 - 25) Of the terrestrial planets only Venus and Earth have a thick atmosphere
 - 26) The salinity of the world ocean is between 36 and 38‰; the Mediterranean is at the high end of this range.
 - 27) Topaz is the fourth hardest mineral in the Mohs scale of hardness.
 - 28) Average geothermal gradient is around 30°C a Km.
 - 29) Dacite will have finer crystals than its plutonic equivalent diorite
 - 30) A rise in global temperatures would probably cause a rapid movement of many glaciers as they switched from being temperate to polar in type.

Section 2 25 Marks Answer all parts

2.1 12.5 marks Imagine an E-W block of crust 100 Km wide and 10 km thick made up of horizontal identical sedimentary units



- a) This block is extended in an E-W direction so that so that it becomes 150 Km wide. In your answer books draw a reasonable scale diagram of what the block might look like as a result.

- b) The original block is instead compressed in an E-W manner so that it is only 50km wide. Draw scale cross sections of possible results of the following situations and explain briefly what is happening.
- The sediments are pure well cemented quartz sandstones and the compression is geologically rapid.
 - The sediments are limestones buried to considerable depths and the compression is relatively slow.
 - The sediments are limestones but there is a layer of evaporite at 7km depth.
- c) Under what plate tectonic situations might a) and b) occur?

2.2 12.5 marks Iceland is a large island formed by the coincidence of a hot spot and a Mid Ocean ridge in the North Atlantic area. On the basis of this information

- Discuss the probable volcanicity of the island. What can you assume about its heat flow?
- What is the seismic risk likely to be?
- Why is the coincidence between the hot spot and the Mid Ocean Ridge likely to be temporary in geological terms?
- Using a simple sketch cross section diagram draw the pattern of the lithosphere when traced from Canada to Europe through Iceland as it is now.
- Using similar labelled diagrams show what might happen if the Atlantic were to start to close and eventually were to close entirely. There are several possible answers. You need to show clearly the fate of Iceland during this time.

SECTION 3: THE GEOLOGY OF LEBANON. 25 marks

USE INFORMATION LEARNED FROM YOUR FIELD TRIP. USE YOUR ANSWER BOOKS

3.1 Think about the limestones you saw,

- Under what conditions were the limestones formed?
- What do they tell us about the tectonic situation of the area at the time.
- What distinctive properties do limestone have when a) they weather, b) they form aquifers.
- How does the weathering of such rocks at the tops of the Lebanese Mountains differ from that on the same rocks near the coast.

3.2 Think about the volcanics you saw.

- How had they formed? Give examples of evidence that we saw which allowed such a conclusion.
- What did this indicate about the tectonic setting of the time?
- Why are there so many clays associated with these rocks?
- The volcanic soils are often used by farmers for crops. Why?
- How could we date these rocks?

3.3 Think about the sandstones that you saw.

- What is the main mineral that you observed?
- Where did it come from and how did it get into Lebanon?
- Why, when the bedding is horizontal do we get steeply dipping surfaces within the beds?
- What sort of environment did these rocks form in?
- How does this environment differ from that of the underlying and overlying strata?

f) What hazards and problems occur when these rocks are quarried?

3.4 You saw few clays, but thin units do occur in Lebanon. What significance do they have in

- a) mass wasting.
- b) aquifers.

3.5 In that area we were in a geologist might talk about 'the Chouf Sandstone Formation being of Early Cretaceous age.'

- a) Why do we use terms like 'Chouf Sandstone Formation'?
- b) Explain in simple terms what it actually means to call something Early Cretaceous.

SECTION 4: ESSAYS 20 marks

Answer briefly two

- 1) The moon has no water, no atmosphere, no life and low gravity. What processes, if any, cause the weathering and transportation of rocks. How could you predict mass wasting to be different from Earth
- 2) Why is the nature of crystal growth and motion the key to understanding?
 - a) Glacier formation.
 - b) Glacier motion.
 - c) The formation of gneiss
 - d) The bending of limestones and evaporites.
- 3) Explain **three** of the following.
 - a) Why glaciations are often associated with continents at the N or S poles.
 - b) Why andesites can form from the melting of basaltic crusts in subduction zones.
 - c) Why rocks of the same age contain totally different fossils.
 - d) Why since the last glaciation beaches are widely being submerged whilst in the northern part of Europe they have been emergent during the same time period.
- 4) What are the two energy sources for the earth?. For each list the main processes that are produced. Discuss how the earth would be different if the energy levels of each were reduced.

Best wishes,

C. D. Walley 23rd August 1997