**ES486 Lecture Review Exercise Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**University of Delft Lecture Review Questions: Reservoir Properties**

Review the following U Delft lecture slides on reservoir properties:

<https://people.wou.edu/~taylors/es486_petro/PGeo_L5_Petroleum_Geology_-_Lecture_5_08.pdf>

Answer the review questions below. Use internet search resources as needed to augment your answers. Provide sketches or image-capture diagrams where required.

1. Examine slide two, provide a definition and explanation for the principal reservoir properties of
   1. Porosity
   2. Permeability
2. What is Darcy’s Law? Write the equation, explain the variables and explain relative permeability levels. Define the “Darcy” unit, and how does it relate to a millidarcy (mD)?
3. What is a “pore throat” and how does it related to permeability?
4. As an example of rock porosity, examine slide 5, what percent porosity is provided by the Navajo Sandstone Formation in four corners area of the southwestern U.S.?
5. Examine slide 8, it refers to variable “k” = percent porosity, in other literature, porosity is commonly referred to as variable “n”. Regardless of syntax, what are the three major factors in sedimentary detrital (clastic / fragmental) rocks that influence porosity? List and discuss.
6. Examine the graph on slide 9, what is the general relationship between porosity (x axis) and permeability (y axis)? How do they relate to one another in general? Direct relationship or inverse (opposite) relationship?
7. True or False: in a sandstone, well-rounded spherical sediment grains will tend to support higher permeability compared to angular sediment grains.
8. True or False: clay is a constipating agent and will lead to decreased permeability in your stomach, and in the reservoir environment.
9. Examine slide 14, True or False, with increasing depth of burial in a stack of sedimentary rocks, overburden weight and compaction increases, porosity in sediment decreases due to squeezing and compaction at depth.
10. Examine slide 18 showing an outcrop of interbedded sandstone and shales. True or False: all sedimentary rocks have the same porosities and permeabilities? True or False: according to the law of original horizontality, sedimentary rocks are deposited under the influence of gravity as tilted upright layers as exemplified in this outcrop.
11. Examine Slide 19 and use your internet search tool, explain the concept of a “well log” as related to “downhole geophysics” in relation to petroleum exploration. Provide image captures / sketches to support your answers.
12. Examine slide 22 showing cross section of sedimentary rock packages in 2-D. True or False: all sedimentary rock layers are deposited in flat sheets like a layer cake. True or False: river “channel fill” deposits are lense shaped in two dimensions, like an eye socket.
13. Skip a bunch, and now on to slide 30, “Carbonates” = limestone made up of calcium carbonate (calcite) minerals. Provide a brief summary of why carbonate (limestone) sedimentary rocks are different compared to “clastic” (detrital, e.g.) sandstone reservoir rocks.
14. Examine slide 31 and 32, examples of carbonate reef deposits. Draw a sketch or provide image capture of a carbonate reef cross section. If you wanted to go snorkeling in warm tropical reef waters right now (doesn’t that sound good?) what Islands south of Florida would you fly to for examination of a modern carbonate reef-forming environment?
15. Examine slide 37, True or False: fossiliferous carbonate limestone rocks from Iran are very psychedelic in appearance under a microscope thin section.
16. Examine slide 38, “Asmari Sedimentation and Facies”, explain what you see and provide an interpretation of why you think this is an important concept in relation to petroleum reservoirs.
17. Examine Slide 39, what is “dissolution” porosity in carbonates, and how does it form? True or False: dissolution porosity in limestones is a good thing with respect to storage capacity of subsurface fluids, including pay-dirt petroleum juice.
18. Examine slide 40 and 41, True or False: fracture porosity in carbonate rocks results in decreased petroleum storage potential as a reservoir rock in the subsurface.
19. True or False: I would rather poke my eyes out with a pair of scissors than ever look at another powerpoint slide or watch a video from the Netherlands ever again.