

CHEN 490 – Fundamentals of Petroleum Engineering
Review for the Final Exam Sat. @ 1:00 pm on 13/12/2014
(2.00 hrs)

You should know the following:

1. Well Drilling
 - Objectives of oil company Drilling Dept.
 - Drilling rig methods and know their requirements
 - Cable-tool basic equipments and how this method operates
2. Rotary drilling rig
 - Basic rig equipments – their functions, types, and ratings
 - How rotary drilling method operates
 - How it makes connections
 - Offshore rig components – (platforms) – know their types
3. Drilling mud
 - Drilling rig mud circulation
 - Purpose of the mud
 - Mud basic functions
 - Turbulent slip velocity of cuttings
 - Mud properties
 - Mud composition
4. Drilling hazards-Dependent on mud control
5. Drilling mud calculations
6. Drilling mud pumps – functions, types
 - Pump calculations
 - Pump discharge pressure
7. Pressure control:
 - Mud weight or density
 - Hydrostatic pressure
8. Required flow rate
9. Flow behavior of plastic and Newtonian fluids, and how to determine the viscosity of each fluid
10. Type of flow, and Reynolds Number relationship
11. How to determine the pressure drop due to friction and other flow factors for:
 - Newtonian fluid –laminar flow-in pipe
 - Newtonian fluid –turbulent flow- in pipe
 - Newtonian fluid- laminar flow –in annulus
 - Know the equivalent diameter, d_e , and hydraulic radius, r_h , and equivalent Reynolds Number, N_{re}
 - Newtonian fluid – turbulent flow- in annulus
 - Plastic fluid- laminar flow in pipe
12. Know equivalent viscosity, μ_e , which is the viscosity of a plastic fluid would have if it were a Newtonian fluid.
 - Set $N_r = 2000$ and solve for the critical velocity, and an actual velocity below which is laminar flow and an actual velocity above which is turbulent flow, or
 - $V_{act} < v_c$, laminar
 - $V_{act} > v_c$, turbulent
 - Plastic fluid-turbulent flow-In pipe

Plastic fluid – laminar flow – in annulus

Plastic fluid - turbulent flow –in annulus

Know pressure drop, Δp_f , across bit nozzles Know horizontal well drilling: purpose, applications



13. Know coring and logging : purpose, type, and methods

14. Know horizontal well drilling techniques: purpose, and applications

15. Know how well is completed and methods used (explain why)

16. Introduction to reservoir engineering

Reservoir recovery processes

Tasks of reservoir engineers

Fundamentals of drive mechanisms

Reservoir types with reference to phase diagram

17. Problems – 4 or 5 problems. Similar to HW problems