كلية الهندسة – جامعة مصراتة

فصل الربيع 2014/2013		القسم/ الهندسة النفطية
المقرر / هندسة الانتاج II	الامتحان النهائي	الزمن / 3 ساعات
التاريخ / 17 / 6 / 2014		أستاذ المادة / أ.يحيى شرفي

أجب عن جميع الأسئلة

Question One: (15 Marks)

a) What are the basic criteria for artificial lift selection?
b) Compare between the different types of artificial lift in terms of:
   - Effect due to gas presence
   - Onshore / Offshore application
   - Well geometry

Question Two: (15 Marks)

a) What are the surface equipments for sucker rod pump? Sucker Rod Pump is classified as positive displacement pump displacing constant volumes of fluid per distance known as "Up and Down Strokes". Explain with sketches?
b) Explain with sketch how "dynamometer card" can be used for pump's performance diagnosis?
c) What is the meaning of the following pump code:
   25 – 225 – THBC – 20 – 5 – 3? Estimate the surface flow rate for a sucker rod pump using below data:
   - Pump speed = 10 SPM
   - Plunger diameter = 2 inches
   - Plunger stroke length = 30 inches
   - Pump efficiency = 85%
   - Oil FVF = 1.13 bbl/stb

Question Three: (15 Marks)

a) Show with drawing the surface and subsurface components of the Electrical Submersible Pump (ESP)?
b) ESP performance is monitored and diagnosed by the "ammeter chart"; explain how? And draw a sketch of an ammeter chart in normal operation conditions?
c) A well is supposed to produce using an ESP. The expected production rate is 1800 bpd. The pump is set at the same depth as perforations. Well data was as follows:
   - Tubing depth is 8000 ft
   - Average reservoir pressure of 1800 psi

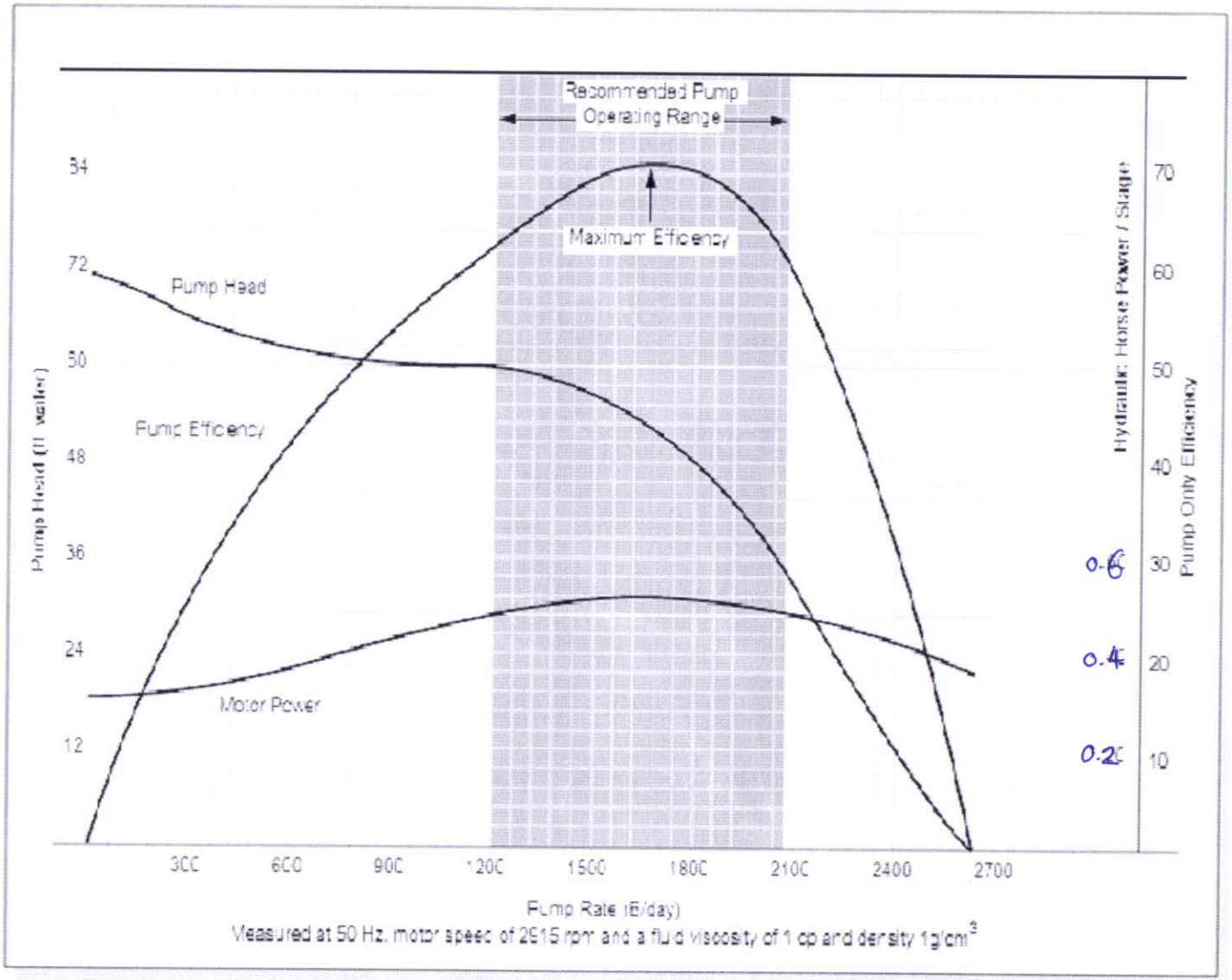
- Surface pressure of 50 psi
- Produced fluid is water with S.G of 1
- Productivity Index was 2 STB/d/psi
- Tubing internal diameter of 0.188 feet
- Fluid density is 0.433 psi/ft
- Moody friction factor is 0.03

How many stages are required to produce this well and how much horse power does the motor need? What is the pump efficiency?

Question Four: (15 Marks)

a) What is the basic concept of gas lift technology? Discuss the types of gas lift systems? What are the four significant gas injection rates that may occur during gas lift cycle?
b) Explain how to determine the deepest injection point / maximum injection depth inside the well?
c) Discuss the factors affecting gas lift performance?
d) Design a gas lift well using the following data:
   - Surface injection pressure = 1000 psi
   - Gas injection pressure gradient = 0.03 psi/ft
   - Tubing head pressure = 200 psi
   - Flowing pressure gradient = 0.2 psi/ft
   - Kill fluid pressure gradient = 0.465 psi/ft
   - Total well depth = 5000 feet
   - Packer is set at 4000 feet

انتهت الأسئلة


Recommended Pump
Operating Range
Maximum Efficiency
Pump Head
Pump Efficiency
Motor Power
84
72
60
48
36
24
12
Pump Head (ft water)
70
60
50
40
30
20
10
Hydraulic Horse Power / Stage
Pump Only Efficiency
0.6
0.4
0.2
300
600
900
1200
1500
1800
2100
2400
2700
Pump Rate (B/day)
Measured at 50 Hz. motor speed of 2915 rpm and a fluid viscosity of 1 cp and density 1g/cm3