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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B.TECH [GSE& GIE]

Subject (Course): Formation Evaluation and Well Logging

Course Code : PEAU 4003

No. of page/s:

Semester – VII

Max. Marks : 100

Duration : 3 Hrs

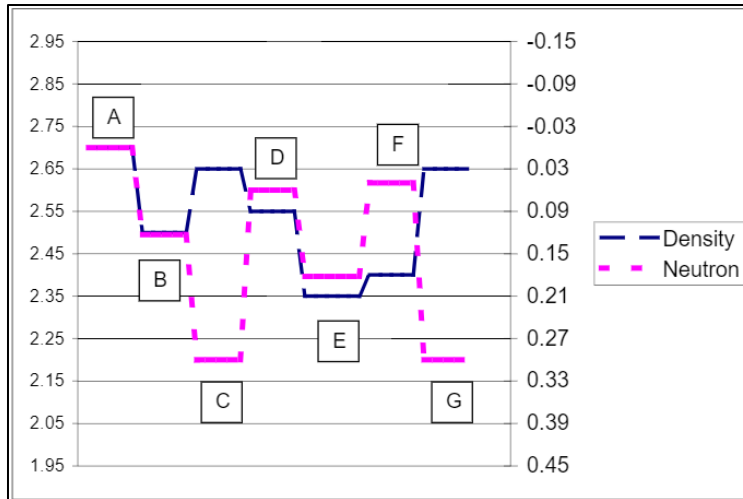
Section A [5X4=20 Marks] - Attempt All Four Questions

- 1- State the applications of drilling fluid in well logging. Define Transit Time. [5]
- 2- Define Cycle Skipping and its significance in sonic log analysis. [5]
- 3- Calculate minimum shaliness from $G_{rlog} = 40$, $G_{rmin} = 20$, $G_{rmax} = 100$, $\Phi_{in} = 30\%$, $\Phi_{Nsh} = 45\%$. $\Phi_{D} = 25\%$, $\Phi_{Dsh} = 20\%$, $PSP = -60\text{mv}$ and $SSP = -80\text{mv}$? [5]
- 4- Draw and explain resistivity profiles for three versions of fluid distributions near borehole. [5]

Section B [12X5=60 Marks] - Attempt All Five Questions

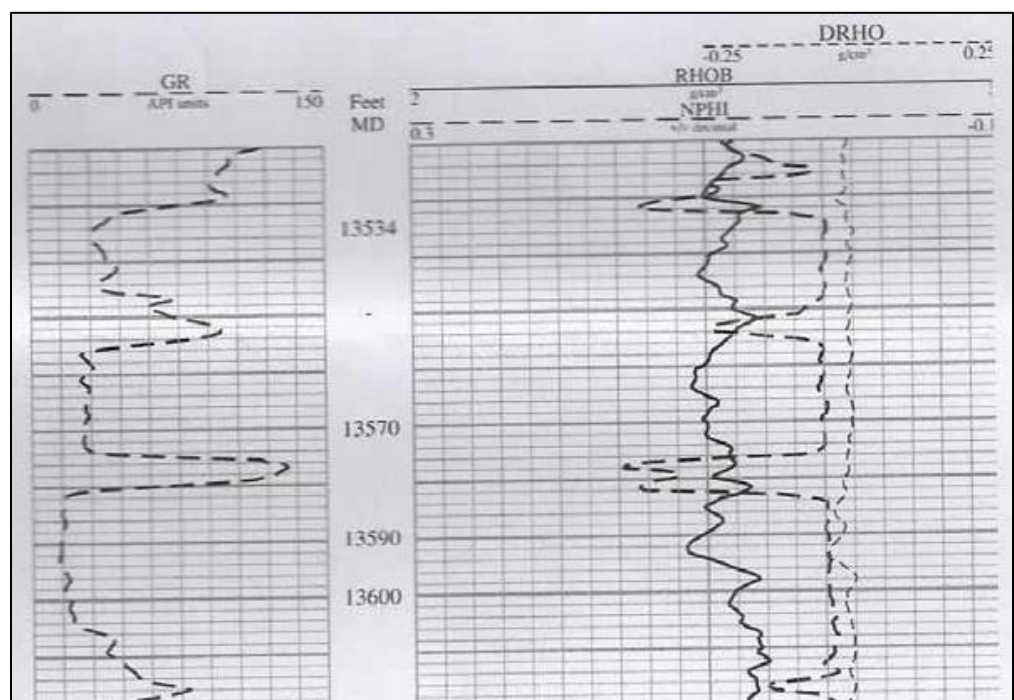
- 5- Calculate the SSP for a clean water bearing sand drilled with a fresh water base mud. The formation temperature observed 200°F . R_{mf} and R_w measured respectively at 68°F temperature, 0.31 and 0.054 ohm-m respectively. Illustrate borehole Environment. [12]
- 6- An oil well is analyzed with the depth of invasion (d_i) is 80 inch, $R_{xo} = 20$, and $R_t = 10$. From the above Induction Geometry Factor graphic, G for a d_i of 80 inches is 0.4. What will the induction tool read? [12]
- 7- State the working principle and application of Dual Laterolog [LL9]. [12]
- 8- Write short Notes on Any **THREE** [4X3=12]
 - I- Gamma Ray Log
 - II- Invasion Profile
 - III- Sonic Porosity
 - IV- Archie's Equations

- 9- (a) Why are the density and Neutron Log scale are plotted between 1.95 -2.95 gg/cc and 45 to -15% respectively. [6]
- (b) Explain the following Density and Neutron log responses (A through G). [6]



Section C [Attempt Any One Question=20 Marks]

- 10- A record of logs is given in figure 2. Track 1 is a record of gamma ray. While track 2 represents bulk density (RHOB), Neutron porosity (NPHI) and density correction (DRHO). Interpret the curves between 13534 feet and 13600 feet. What is shalyness in the figure? Establish the relationship between density and porosity with low gamma ray values. [20]



11-(a). In a clean hydrocarbon-bearing sandstone formation the neutron and density logs read 10 and 38 sandstone porosity units, respectively. The shallowest resistivity reading is 10 ohm-m across the hydrocarbon-bearing formation and the resistivity of mud filtrate at the temperature of the formation is 0.075 Ohm-m. The residual hydrocarbon saturation in the flushed zone is 0.65. What is the in situ hydrocarbon density? Estimate the effective porosity of the formation. Assume that $a=0.81$, m and $n = 2$ in Archie's equation. **[10]**

(b) Calculate the porosity and oil saturation if Bulk density, matrix density and fluid density is observed from a well : 2.5 gm/cc, 2.7 gm/cc and 0.95 gm/cc respectively. $m=2$, $n=2$, $a=1$, $R_w = 0.08$ ohmm and $R_t = 150$ ohmm. **[10]**
