

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Programme/Course: B.Tech. (GSE & GIE)

Subject: Well Logging & Formation Evaluation

Course Code: PTEG 429

Nos. of page(s) 3

Semester: 7th

Time 03 hrs.

Max. Marks: 100

SECTION A (All questions are compulsory)

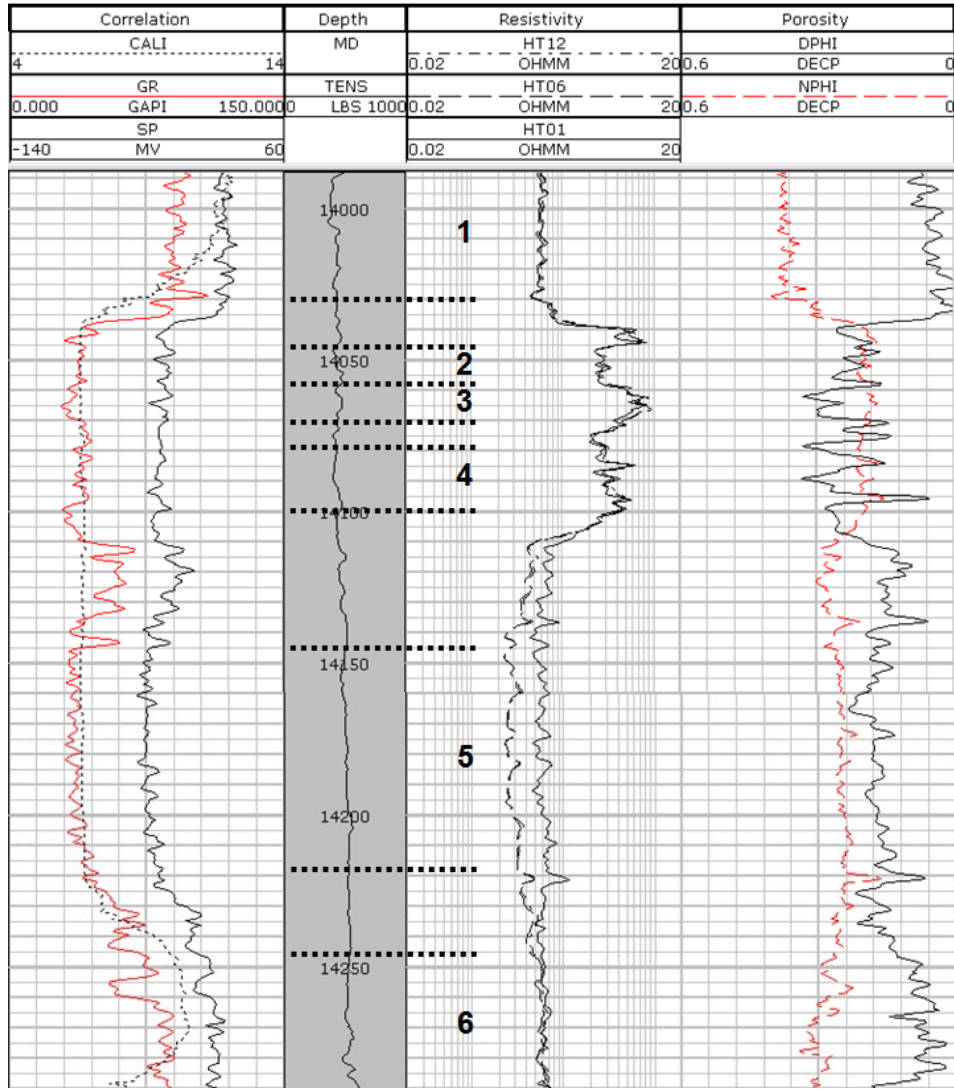
S. No.		Marks	CO
Q 1	Select the best environment for running Induction Log (and write in answer sheet giving reason) a. Oil based mud and High Resistivity formation b. Freshwater based mud and Medium Resistivity formation c. Synthetic mud and Low Resistivity formation d. Air filled hole and Low Resistivity formation e. Saline Water based mud and Medium Resistivity formation	4	CO1
Q 2	LithoDensity Tool gives RHOB, PE, Caliper and DRHO curves. Select all the correct statements below (and write to answer sheet) a. RHOB is calculated primarily from Gamma Rays that have done Compton Scattering b. DRHO is the positive for barite weighted muds c. PE is calculated primarily from Gamma Rays that have done Pair Production d. Caliper curve does not provide any information about formation Lithology e. If a Sandstone and Limestone have the same RHOB, then PE can be used to determine lithology	4	CO3
Q 3	Select all the factors below that affect Neutron Porosity and give brief explanation to each and write on Answer sheet f. Lithology g. Fluid h. Temperature i. Pressure j. Salinity	4	CO5
Q 4	The main purpose of <u>Sonic Porosity</u> is to (select the correct answer and provide brief explanation) k. Calibrate Surface Seismic l. To determine if Secondary Porosity exists m. Determine Cement Evaluation after Casing Cementation n. Determine Mechanical Properties of Rocks o. Determine High Pore Pressure zones	4	CO4
Q 5	Why does Sonic Porosity gets affected by Secondary Porosity like fractures in	4	CO4

	<p>carbonates while there is hardly any effect on Neutron and Density porosity</p> <p>p. Any fracture in the path of Gamma Rays (Density Tool) causes GR attenuation</p> <p>q. Any fracture in the path of Neutrons (Neutron Tool) causes higher Neutrons</p> <p>r. Any fracture in the path of Sound (Sonic Tool) causes change in Travel time</p> <p>s. Fracture cause little change in permeability but large change in porosity</p>		
SECTION B (Attempt any four questions Max 200 words)			
Q 6	At higher porosities (like in Shale), Neutron Porosity tends to become more statistical and less reliable. Explain the reasons why?	10	CO6
Q 7	What is the RHOB of a Sandstone Formation, $V_{sh} = 35\%$, Density of Shale = 2.5 gm/cc, $S_w = 25\%$, Density of HC = 0.2 gm/cc	10	CO2
Q 8	Describe the process in which Gamma Rays are detected by filling in the blanks and writing the complete answers in your answer sheet- Gamma Rays interact with _____ and produce _____. Energy of Gamma Ray is directly proportional to amount of _____ produced. _____ enter the Photo-Multiplier tube and strike the _____ generating _____. These _____ are multiplied by successive dynodes and ultimately produce a _____ pulse of _____ polarity at the final Anode	10	CO3
Q 9	What is the relationship between Neutron Porosity and Borehole Temperature and Pressure? If the actual porosity of a Water Filled Limestone is 20%, then explain for each (Temperature and Pressure) what will be the effect on the Neutron Tool's porosity reading	10	CO6
Q 10	In a 100% water bearing sand, Porosity is 20%, $R_t = 20$ ohm. What is the value of R_w ? Use the correct Archie equation applicable	10	CO2
SECTION-C (Q11 is compulsory, attempt any one from Q12 or Q13 - Max 500 words)			
Q 11	<p>A. The Density (RHOB) read by Density Tool is 2.5 gm/cc. The formation is known to be Limestone filled with fresh water. What will be the reading of the Neutron Porosity for the same formation? (Show all calculations and explain the logic of your answer).</p> <p>B. In the diagram below choose any of the two parts a or b</p> <p>a) Explain Density Neutron response in Shale</p> <p>b) Explain the Density Neutron response in Gas</p>	15+5	CO5
Q 12	Explain the process of Shaly Sand analysis and its different steps, each step should be accomplished in specific order. Determine the effective water saturation (S_w) with the help	10+10	CO1

of various methods.

Q 13 Evaluate the below mentioned log Triple Combo Log (Induction - Density – Neutron – Gamma Ray) and answer the questions

Data:, Density matrix: 2.65 g/cc, Neutron matrix: SAND, Type fluid in the hole: Water based mud, Mud weight: 16.5 lbs/gal, Bit Size: 6.5”, T.D.: 15300’, BHT: 266°F, Mean Surface Temperature: 70°F, $R_w = 0.04\Omega\text{-m @ } 82^\circ\text{F}$, HT12=Deep Resistivity, HT06=Medium resistivity, HT01=Shallow resistivity, DPHI=Density porosity, NPHI=Neutron porosity.



- What is the lithology of Zone 1? (2)
- What is the temperature of Zone 4? (4)
- What is the average cross-plot porosity for Zone 5? (4)
- Why does the deep resistivity curve in Zone 5 read so much lower than in Zone 3?(2)
- What is the average caliper size in Zone 5? (2)
- What is the water saturation of zone 2 using Humble Equation? (6)