Name:

Enrolment No:

UPES

End Semester Examination, December 2023

Course: Formation Evaluation & Well logging

Semester: I

Program: M. Tech Petroleum Engineering **Time :** 03 hrs.

Course Code: PEAU 7005 **Max. Marks:** 100

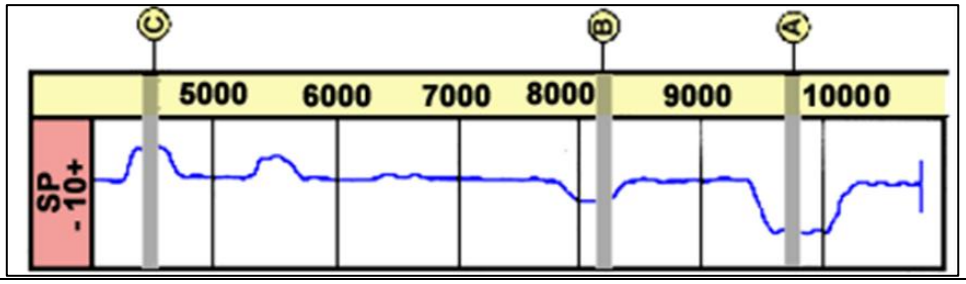
Instructions:

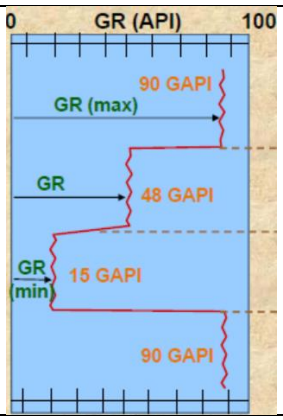
I. All questions are compulsory.
II. Read question carefully and write appropriate answer.
III. Write correct unit in numerical after calculation.
IV. Draw neat diagram with proper labeling to explain the answer

SECTION A (5Qx4M=20Marks)

Q. No.		Marks	CO
1	Illustrate the objectives of well logging & formation evaluation.	**4**	**CO1**
2	Define the invasion process with labeled diagram.	**4**	**CO1**
3	Give the common applications well logging.	**4**	**CO2**
4	Give the classification of wireline logging tools.	**4**	**CO2**
5	Differentiate between Laterolog-7 & Laterolog -9. OR Calculate Rw & Sw by using the given well log data: **Porosity% | Ro ohm-m | Rt ohm -m** 19.0 | 4.2 | 13 15.0 | 6.7 | 9.8 12.0 | 10.4 | 15.6	**4**	**CO3**

SECTION B (4Qx10M= 40 Marks)

6	Develop the relation between Rw & Rmf among all three sandstone reservoirs A, B & C as in given log chart. 	**10**	**CO4**

7	a. Calculate the volume of shale in shelly reservoir if a well is logged with PSP=20 mv, SSP=45 b. Calculate the volume of shale in shelly reservoir with reference to given log chart.  	**10**	**CO3**
8	Discuss the Neutron porosity logging tools in term of : i. Working Principles ii. Applications iii. Limitation	**10**	**CO4**
9	Differentiate Laterolog & Induction Log based on their working principles. Which log will be preferred and why in specific borehole environment, in case of: i. Rt<Rxo ii . Rt>Rxo. **OR** An oil well is logged with these data: di is 80 in., Rxo = 20, and Rt = 10. What will the induction tool read? For this case Induction Geometry Factor Graphic, "G" for a di of 80 inches is 0.4.	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
10	A Well is producing from limestone formations of 30-ft thickness and well drainage is 50 acre. Acoustic log shows porosity 20 %. Resistivity logs show Rt equals to 3 Ω m and Rxo equal to 2.72 Ω m. Formation water resistivity is 0.02 Ω m and mud filtrate resistivity is 0.05 Ω m at formation temperature. a. Calculate the initial oil in place, bbl b. Calculate the movable oil, bbl c. Estimate the type of the used drilling fluid in this well? If in a lower limestone section of the same porosity (Rw and Rmf are the same), resistivity logs showed Rt equal to 0.8 Ω m and Rxo equals to 0.21 Ω m. Determine water saturation of this section and do you think this is oil zone?	**20**	**CO5**
11	a. Describe the principle of commonly used tools in electrical resistivity logging. Why do we need different types of resistivity tools to record resistivity? b. Explain the process of Shaly Sand analysis and its different steps, each step should be accomplished in specific order. **OR** a. A well has logged with these data set : Δt = 84 μsec/ft in the zone of interest In a sandstone matrix, with an acoustic velocity of 5400 ft/sec in the fluid and 18,000 ft/ sec in the matrix, calculate Primary porosity. b. Density tool acquired data from a respective zone of a borehole with bulk density 2.31 g/cm, matrix density 2.67 g/cm and fluid density 1.00 g/cm. calculate the Density porosity of zone of interest.	**20**	**CO5**