UPES
End Semester Examination, May 2024

Course Name: B.Tech. APE-UP **Semester:** VI
Program: Formation Evaluation & Well Logging **Time: 3** hrs**.**
Course Code: PEAU 3020 **Max. Marks:** 100
Instructions: All questions are compulsory

SECTION A (5Q×4M=20Marks)

S. No.		Marks	CO
Q 1	Illustrate borehole environment with labeled diagram.	4	CO5
Q 2	State the concept of Compton Scattering and its significance in logging	4	CO2
Q 3	Illustrate the significance of Natural Gamma ray and SP logging tools.	4	CO4
Q 4	Discuss tools used for well logging into Open & Cased hole.	4	CO3
Q 5	State the applications of drilling fluid in well logging. Define Cycle Skipping	4	CO1

SECTION B (4Q×10M= 40 Marks)

Q 6	Discuss the working principles of following logging tools- a. Gamma –Gamma Ray tool b. Induction Tool **OR** Explain the application of the following tools- a. Thermal Neutron b. MSFL Tool	10	CO1
Q 7	A Density logging tool has measured bulk density ρ_b = 2.71, & 2.83 at 3 km deep reservoir , Calculate Φ_d of reservoir Using ρ_{ma} = 2.65, gm/cc ρ = 1.00, gm/cc.	10	CO3
Q 8	Calculate formation resistivity factor "F" from a resistivity log data as given below. |	Sandstone	carbonate
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a	0.82	1
m	2	2
Porosity	20%	25%
F				10	CO3
Q 9	Discuss the working principles and applications of Neutron porosity measurement tool.	10	CO2

SECTION-C (2Q×20M=40 Marks)

Q 10	a. An interval transit time of 90 μsec/ft was measured in a sandstone reservoir. The acoustic velocity of the matrix was 18000 ft/sec. Assume	20	CO5

	a fluid transit time of 189 µsec/ft. Calculate the porosity in the sandstone reservoir using Wyllie's time average equation. b. In thick sandstone formation has porosity 20%. If Rw is equal to 0.05 Ωm, Rmf is equal to 0.05 Ωm, and the residual hydrocarbon saturation in the flushed zone is 40%; what will be the value of Rxo and Rt in the water and hydrocarbon zones if water saturation in the hydrocarbon zone is equal to 30%.		
Q 11	Explain the process of Shaly Sand analysis and its different steps, each step should be accomplished in specific order. Determine the effective water saturation (Sw) with the help of various methods. OR A well is drilled through a hydrocarbon-bearing formation which is at its irreducible water saturation and it has a porosity of 28%. Rock core data indicates that (a= 0.81, m=2, and n=2). The mud used for drilling is water-base, with a salt concentration (NaCl) of 50,000 ppm. The connate water has a salt concentration (NaCl) of 20,000 ppm. The shallow and deep resistivity logs readings are 12 ohm-m and 50 ohm-m respectively. You should assume that the deep resistivity tool will be sensing the virgin zone, which does not experience any mud-filtrate invasion, and that the shallow resistivity tool will be sensing the flushed zone. The formation temperature is 145 deg F. What is the hydrocarbon saturation of the formation and what is the water saturation in the flushed zone?	**20**	**CO5**