Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, December 2023

Course: Well logging & Formation Evaluation **Semester:** I

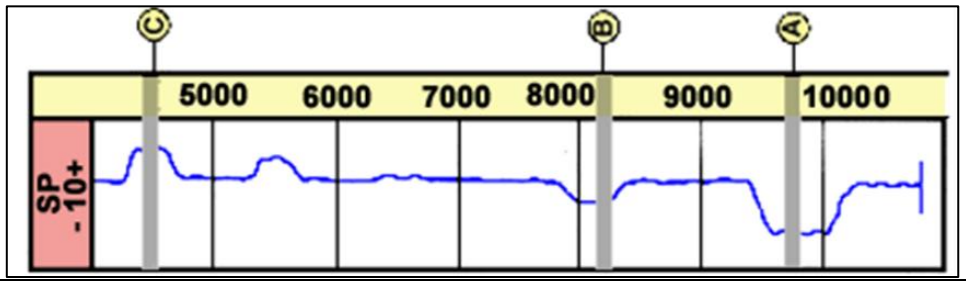
Program: M. Sc. Petroleum Geoscience **Time :** 03 hrs.

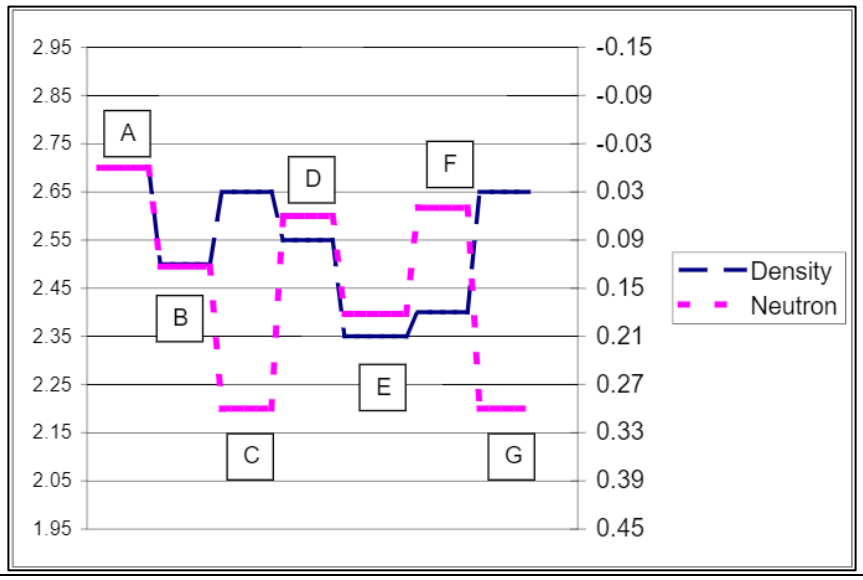
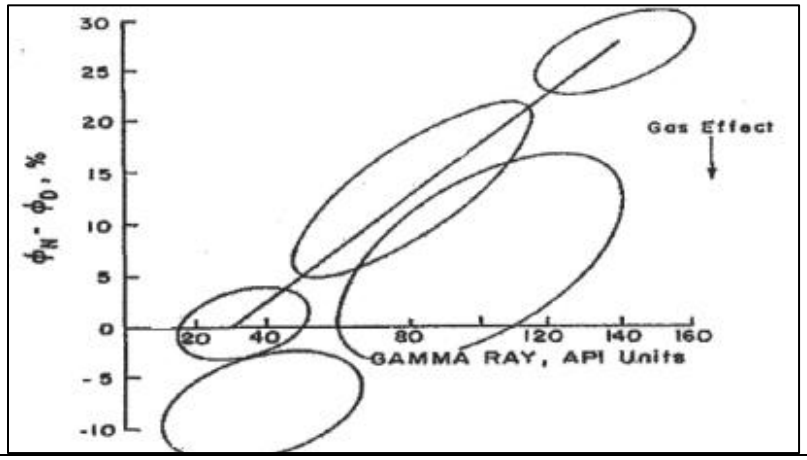
Course Code: PEGS8020 **Max. Marks:** 100

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	Define the ingredients of Borehole environment with labeled diagram.	**4**	**CO1**
2	Define Transit Time.	**4**	**CO1**
3	Illustrate the applications of drilling fluid in well logging.	**4**	**CO2**
4	Illustrate "Skin effect" and its importance in Induction logging.	**4**	**CO2**
5	Develop the empirical relationship between water resistivity, porosity and water saturation.	**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	Define Spontaneous Potential. What causes the SP voltage? Explain applications of SP Log and effect of bed thickness on SP.	**10**	**CO3**
8	Discuss the Dual Laterolog [DLL] logging tools in term of : i. Working Principles ii. Applications iii. Limitation	**10**	**CO4**

9	a. Explain the fallowing Density and Neutron log responses (A through G). b. Identify characteristic of each zones [A-G] based on Neutron and Density data given in figure. 	**10**	**CO4**
SECTION-C (2Qx20M=40 Marks)			
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 a fluid transit time of 189 μsec/ft. Calculate the porosity in the sandstone reservoir using Wyllie's time average equation. a. This figure shows a cross plot of (ΘN-ΘD) vs. gamma ray for a specific log interval, as it can be seen on the figure, five different zones were observed and each zone is shown by an ellipse. Assume that the detected zones are: 1- shelly gas bearing formation 2- clean gas bearing formation 3- shelly liquid bearing formation 4- shale 5- clean liquid bearing formation. Show each zone on the corresponding ellipse in below figure. 	**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 : $\Delta t = 84$ 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**