**Name:**

**Enrolment No:**

**UPES**

**End Semester Examination, May 2023**

**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 (5Qx4M=20Marks)**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Define Formation Resistivity Factor, Skin effect and Cycle skipping. | **4** | **CO5** |
| Q 2 | Illustrate the components of wireline logging. | **4** | **CO2** |
| Q 3 | Illustrate any four applications of Neutron –Density cross plot analysis. | **4** | **CO4** |
| Q 4 | Give the name of logs with their applications used for logging into cased hole. | **4** | **CO3** |
| Q 5 | State the applications of drilling fluid in well logging. Define Transit Time | **4** | **CO1** |

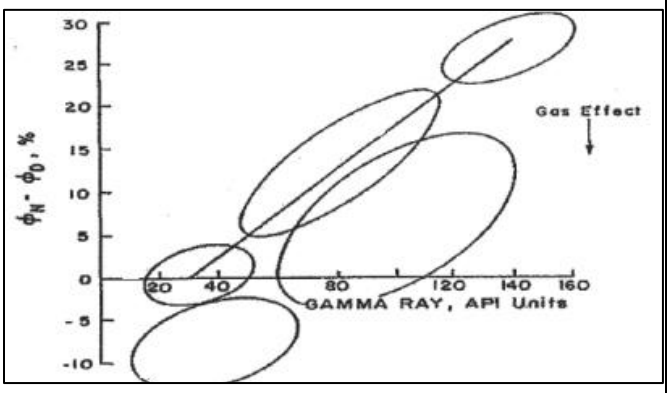
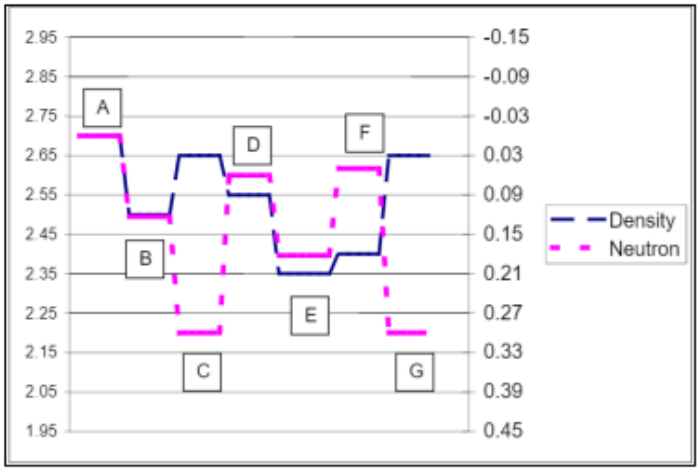
**SECTION B (4Qx10M= 40 Marks)**

| | | | |
|---|---|---|---|
| Q 6 | Discuss the working principles of following logging tools-<br>a. Laterolog-9<br>b. Induction tool<br>OR<br>Explain the application of the following tools-<br>a. Thermal Neutron<br>b. Mud logging | **10** | **CO1** |
| Q 7 | Fluid density for a volume with oil, gas and water phases can be estimated using ρf . Estimate fluid density when gas density is 0.00086 g/cc, Oil density is 0.71 g/cc and water density is 1.03 g/cc, and water saturation is 30% and oil saturation is 50%. Suppose bulk density ρb is 2.20 g/cc from a density log, and density of rock matrix ρma is 2.62g/cc. Use the fluid densities and estimate density porosity in each fluid types. | **10** | **CO3** |
| Q 8 | Calculate formation resistivity factor "F" from a resistivity log data as given below. | **10** | **CO3** |
| Q 9 | Discuss the working principles and applications of Dual Latero log [LL9] with neat sketch. | **10** | **CO2** |

| | Sandstone | carbonate |
|---|---|---|
| a | 0.81 | 1 |
| m | 2 | 2 |
| Porosity | 10% | 20% |
| F | | |

**SECTION-C (2Qx20M=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.<br>b. 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.<br>  | | |
| 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.<br>OR<br>a. Discuss the significance and interpretation of Neutron and Density log data for hydrocarbon bearing zone.<br>b. Explain interpret the combination of Density and Neutron log responses from zone A to G.<br>  | **20** | **CO5** |