***[](http://www.benha-univ.edu.eg/)*Benha University Time: one hour.**

**Faculty of Science Second Semester 2016-2017**

**Dept. Of Geology Date: 31/05/2017**

**Well logging (444G) for Fourth Level Students (Special Geology)**

**جامعة بنها – كلية العلوم – قسم الجيولوجيا**

**المستوى الرابع(جيولوجيا خاص)**

**يوم الامتحان: الاربعاء**

**تاريخ الامتحان: 31 / 5 / 2017**

**الماده: سجلات آبار (444 ج)**

**الممتحن: د/ وفاء الشحات عفيفى الشحات**

**أستاذ مساعد بقسم الجيولوجيا بكلية العلوم**

**الاسئله ونموذج الاجابه**

**نصف ورقه امتحانيه**

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**Faculty of Science Second Semester 2016-2017**

**Dept. Of Geology Date: 31/05/2017**

**Well logging (444G) for Fourth Level Students (Special Geology)**

**Answer the following questions:**

**Question1. (8 Marks)**

1. **Give reason:**

1. Most formations that contain reservoirs are sedimentary rocks? **(2 Marks)**

2. Laterolog tools requires water-based mud to operate, while Induction tools

can be operate in oil-based mud **(2 Marks)**

3.GR is commonly used in Geophysics more than α ray and β ray **(2 Marks)**

**B) Give an example of a rock with high porosity and low permeability. (2 Marks)**

**Question 2. (8Marks)**

**What do you know about Gamma ray spectroscopy tool and casing collar locator?**

**Question 3. (8Marks)**

**Write briefly on:**

1. Cuttings description (**4Marks)**
2. Core Acquisition (**4Marks)**

**BEST WISHES**

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**Answer of Question1. (8 Marks)**

1. **Give reason:**

1. **Most formations that contain reservoirs are sedimentary rocks? (2 Marks)**

Where the deposition of organically rich material has been followed by clean sandstones that form high porosity well connected pore systems, and are subsequently capped by

shales with very low permeabilities.

**2. Laterolog tools requires water-based mud to operate, while Induction tools**

**can be operate in oil-based mud (2 Marks)**

Laterolog tools use low-frequency currents (hence requiring water-based mud [WBM]) to measure the potential, while Induction-type tools operate at high frequencies so they can be used in oil-based mud (OBM) systems.

**3. GR is commonly used in Geophysics more than α ray and β ray (2 Marks)**

The rate of penetration of GR is about 300 m or more, so it is suitable to be used in geophysics survey

**B) Give an example of a rock with high porosity and low permeability. (2 Marks)**

Shale

**Answer of Question 2. (8Marks)**

**What do you know about Gamma ray spectroscopy tool and casing collar locator?**

Gamma ray spectroscopy tool (GST): This tool works on the same principal as the density tool, except that by measuring the contributions arising in various energy windows of the gamma rays arriving at the detectors, the relative proportions of various elements may be determined.

Casing collar locator (CCL): This tool is run in order to identify the positions of casing collars and perforated intervals in a well. It produces a trace that gives a “pip” where changes occur in the thickness of the steel.

**Answer of Question 3. (8Marks)**

**Write briefly on:**

**a)Cuttings description (4Marks)**

The mud-logging unit will generally take a sample of the cuttings received over the shale shakers at regular time intervals, calculated to correspond to regular changes in formation depth (e.g., every 5m). Some of these samples are placed into sealed polythene bags as “wet samples” and retained. Other samples are washed, dried, and retained as “dry samples.” Washed samples are examined under a microscope in the mud-logging unit and a description

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made that may be communicated to the office. In order for the information received from the rig to be useful, it is essential that rigid standards for reporting are followed .Items that should be included are:

• Grain properties: Texture (muddy/composite), Type (pelletoid/micropelletoid), Color

• Porosity and permeability

• Hydrocarbon detection

Hydrocarbons may be detected with one of the following methods:

Natural fluorescence, Solvent cut, Acetone test, Visible staining, Odor, Gas detection analysis

**b) Core Acquisition (4Marks)**

Coring presents an important means to calibrate the petrophysical model and gain additional information about the reservoir not obtainable by logs. Usually the decision of when and where to core will be made in conjunction with the geologist and operations department, taking into account the costs and data requirements. A so-called conventional core will usually consist of multiples of 18m and be 4 in. in diameter.

It is acquired while drilling using a metal sleeve into which the core passes during drilling. At the end of coring, the core barrel is retrieved at the surface and the core recovered from the barrel and laid out in 3-ft\ sections in core boxes for initial assessment on the wellsite and then transportation to the designated core laboratory. Special techniques may sometimes be proposed to improve the quality of the core and to preserve the in-situ fluids. These include:

• Using a large-diameter core (5 in.)

• Using a fiberglass or aluminum inner sleeve, which may be cut into sections at the surface, thereby preserving the core intact within the sleeve?

• Sponge coring, whereby a polyurethane material surrounds the core in the inner sleeve, thereby absorbing and retaining any formation fluids

• Resin coring, whereby a special resin is injected onto the surface of the core to seal the fluids inside

• Freezing the core as soon as it reaches the surface in order to preserve the fluids inside

Cutting plugs from the core at the well site, which may be sealed and used to measure the formation fluids?

• Using tracers in the mud to attempt to quantify the extent of invasion of drilling fluid If samples have been obtained and preserved so that it is expected that the in-situ fluids are representative of the formation, the following techniques may be applied:

• Centrifuging of samples to produce formation water, which can be analyzed for chemical composition and electrical properties?

• Applying Dean-Stark analysis to determine the relative amounts of water and hydrocarbons, thereby producing a measurement of *Sw*.