الى / السيد معاون رئيس القسم

م/ الاجابة النموذجية لمادة (الجيولوجيا الهندسية 2)

تحية طيبة ....

نرفق لكم طيا نسخة من الأسئلة الخاصة بمادة الجيولوجيا الهندسية 2 و للإمتحان النهائي للفصل الدراسي الثاني – الدور الأول و للعام الدراسي 2014 – 2015 و الذي تم اجراءه بتاريخ 2015/5/31 مع الاجابة النموذجية الخاصة بها.

مع التقدير

أ.م.د. قيس جواد فريح

مسؤول المرحلة الأولى

٥١ /6/ 2015

نسخة منه الى/
- ملف اللجنة الامتحانية

University of Technology

Engineering Department of Building and Construction

Final Exam First Attempt 2014-2015

Subject: Engineering Geology

Examiner: Engineering Geology Committee

Date: 31 / 05 / 2014

Year: 1st Year

Time: 3 Hours

Answer FOUR Questions Only

Q1. State whether each of the following statements is TRUE or FALSE and correct the FALSE one. (25 Mark)

1. The triaxial compressive strength for determining clay shear strength is $\tau = \sigma_n \tan \Phi$.
2. In shallow depths from earth surface, the horizontal stresses are smaller than the vertical stresses.
3. For the bulk density of rocks, the average must be used because the minerals may be present in different amounts.
4. The driving force and the total friction force in the river become equal when the flow is at a constant velocity.
5. In river meanders, the abandoned bend is called an oxbow lake.
6. The main variations causing variations in river velocity are gradient and shape of the river only.
7. Seismic refraction and electrical resistivity methods geophysical methods to investigate the groundwater.
8. The ground water exists in the zone of aeration.
9. A rock with a high percentage of open spaces has high porosity.
10. Water moves slowly through a clay stratum because the pores are not interconnected.

Q2. A. Fill the blanks with the suitable words. (15 Mark)

1. Depending upon the type of loading and the stresses, the strength may be classified as:-----------, ----------- and -----------.
2. Rivers and streams transport their load of sediments in three ways:--------,-------- and -------.
3. Total precipitation = ----------- + ----------+ -----------.
4. Two types of discharges are presented in rivers; these are --------- and -------------.
5. The quality of ground water can be classified according to the total dissolved salts into four types: -----------, -----------, ----------- and -----------.

B. Choose the correct answer: (10 Mark)

1. A river's velocity is ------------- on the outside meander curve compared to the inside.
   a) higher   b) equal   c) lower
2. A platform of sediment formed where a stream flows into standing water is: a) an alluvial fan   b) a delta   c) a meander   d) a flood plain
3. Porosity is: a) the percentage of a rock's volume that is voids   b) the capacity of a rock to transmit a fluid   c) the ability of a sediment to hold water   d) none of the preceding
4. The subsurface zone in which all rock openings are filled with water is called the:
   a) saturated zone   b) water table   c) unsaturated zone   d) aquiclude
5. For most rocks, Poisson's ratio values are ranging between: a) 0.0-0.5   b) 0.0-0.4   c) 0.1-0.5   d) 0.2-0.3

Q3.A. A sandstone rock has a volume in its natural state of **0.0093 m³** and weighs **177.6 N**. The oven-dried weight of this rock is **153.63 N**. If the specific gravity is **2.67**.
Calculate: 1. Moisture content (%)   2. Moist and dry unit weights
             3. Void ratio and porosity   4. Degree of saturation   **(16 Mark)**

B. Show by sketches only the following items: (9 Mark)
1. The relation between rock constituents (Rock phase relationship).
2. Vertical classification of groundwater.
3. A river meander showing its main parts.

Q4. A. An aquifer has a cross-section with a horizontal width of **265 m**, and a vertical thickness below water table of **42 m**. The water table is **36 m** below ground surface. The discharge at this section is 3340 m³/d and the yield porosity **27.1%**.
It is required to find:
    a. the aquifer cross-sectional area
    b. Darcy's velocity
    c. actual velocity of aquifer water   **(15 Mark)**

B. Answer the following items: (10 Mark)
1. Draw the general change in river characteristic from the head to mouth.
2. List only the main index properties of rocks affecting design and construction in rocks.
3. By sketches show the formation of a cutoff and oxbow lake in meanders.

Q5. A. A river with a width **120 m**, depth **7 m**, discharge **9065 m³/s**, gradient **0.002** and roughness coefficient **0.018**. How long is the wetted perimeter, hydraulic radius and the river velocity? **(15 mark)**

B. Answer Two of the following items: (10 mark)
1. Prove that e= n /(1-n) ?
2. Define water table. What are the main characteristics of water table?
3. Differentiate between confined and unconfined aquifers.

.....Good Luck.....

Useful Relations

$\gamma_{dry} = G\,\gamma_w\,(1-n)$; $\gamma_{dry} = \gamma_{wet}\,/\,(1+W_c)$; $\gamma_{dry} = G\,\gamma_w\,/(1+e)$; $\gamma_{sat} = (G+e)\,\gamma_w\,/\,(1+e)$;

$\gamma_{sat} = \gamma_{dry} + n\,.\,\gamma_L$; $n = \dfrac{W_c\,.\,G}{1+W_c\,.G}$; $n = V_v/V$; $e=n/(1-n)$; $\rho_g = \rho\,/\,(1-n)$

$W_c = \dfrac{W_w}{W_s}$; $S = \dfrac{V_w}{V_v}$

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Typical Answers for Final Exam in Engineering Geology
1st Attempt 2014-2015

Q1. State whether each of the following statements is TRUE or FALSE and correct the FALSE one. (*25Mark*)

1. The triaxial compressive strength for determining clay shear strength is $\tau = \sigma_n \tan \Phi$.
   F ($\tau = \sigma_n \tan \Phi + C$)
2. In shallow depths from earth surface, the horizontal stresses are smaller than the vertical stresses. **F (the horizontal stresses are greater than the vertical stresses).**
3. For the bulk density of rocks, the average must be used because the minerals may be present in different amounts. **F (the weighted average must be used)**
4. The driving force and the total friction force in the river become equal when the flow is at a constant velocity. **T**
5. In river meanders, the abandoned bend is called an oxbow lake. **T**
6. The main variations causing variations in river velocity are gradient and shape of the river only. **F (and degree of roughness of the surface on which water flows)**
7. Seismic refraction and electrical resistivity methods geophysical methods to investigate the groundwater. **T**
8. The ground water exists in the zone of aeration. **F (in the zone of saturation)**
9. A rock with a high percentage of open spaces has high porosity. **T**
10. Water moves slowly through a clay stratum because the pores are not interconnected. **F (the pore spaces are very small in size).**

Q2. A. Fill the blanks with the suitable words. (*15 Mark*)

1. Depending upon the type of loading and the stresses, the strength may be classified as **compressive strength, tensile strength** and **shear strength.**
2. Rivers and streams transport their load of sediments in three ways **dissolved load, suspended load** and **bed load**.
3. Total precipitation = **Evaporation** + **infiltration**+ **Direct runoff**.
4. Two types of discharges are presented in rivers; these are **laminar flow** and **turbulent flow**.
5. Ground water can be classified according to the total dissolved salts into four types **Fresh water, Brackish water, Saline water** and **Brine water**.

B. Choose the correct answer: (*10 Mark*)

1. A river's velocity is ----------on the outside meander curve compared to the inside. **a) higher** b) equal c) lower
2. A platform of sediment formed where a stream flows into standing water is: a) an alluvial fan **b) a delta** c) a meander d) a flood plain
   a) Porosity is: a) the percentage of a rock's volume that is openings; b) the capacity of a rock to transmit a fluid **c) the ability of a sediment to hold water;** d) none of the preceding
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