

الجامعة التكنولوجية

قسم هندسة البناء والإنشاءات

المرحلة الأولى



العدد : ٢٥٦

التاريخ : 2017 / ٦ / ٥

الى / وحدة الانترنت في القسم

م/ الاجابة النموذجية لمادة (الجيولوجيا الهندسية 2)

تحية طيبة

لرفق لكم طيا نسخة من الأسئلة الخاصة بمادة الجيولوجيا الهندسية 2 و للإمتحان النهائي للفصل الدراسي الثاني - الدور الأول و للعلم الدراسي 2016 - 2017 و الذي تم اجراءه بتاريخ 2017/6/01 مع الاجابة النموذجية الخاصة بها.

مع التقدير

أ.م.د. قيس جواد فريج

مسؤول المرحلة الأولى

2017 / ٦ / ٥

نسخة منه الى/

• ملف اللجنة الامتحانية



Subject: Engineering Geology (2)
Examiner: Engineering Geology Committee
Date: /06/ 2017

Year: 1st Year
Time: 3 Hours

Answer FOUR Questions Only

Typical Answers for Final 3rd Attempt Engineering Geology 2, 2016-2017

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

1. Graphic scale consists of a line divided into number of segments. **TRUE**
2. Specific elevations are shown on topographic maps in different ways, e.g., bench mark. **TRUE**
3. $V_{\text{soild}} = V_{\text{void}} + V_{\text{total}}$ **FALSE: ($V_t = V_s + V_v$)**
4. Flood plains is the plains that are found near the estuaries and alongside the river valley **TRUE**
5. The main variations causing changes in river velocity are gradient and shape of the river only. **F, and roughness of the channel**
6. Contour lines do not cross or divide. **TRUE**
7. The driving force and the total friction force in the river become equal when the flow is at a constant velocity. **T**
8. The river meandering increases river gradient and also its velocity. **F (reduces)**
9. The ground water exists in the zone of aeration. **F, in zone of saturation**
10. In shallow depths from earth surface, the horizontal stresses are smaller than the vertical stresses. **F (greater)**

Q2. A. Fill the blanks with the suitable words. (10 Mark)

1. Depending upon the type of loading and the stresses, the strength may be classified as compressive, tensile and shear strengths.
2. Rivers and streams transport their load of sediments in three ways: dissolved, suspended and bed loads.
3. The main types of river deposits are delta, meander, flood plain and River levees

B. Choose the correct answer: (15 Mark)

1. The broad strip of land built up by sedimentation on either side of a stream channel is: a) flood plain b) delta c) an alluvial fan d) a meander
2. A river's velocity is ----- on the outside meander curve compared to the inside. a) higher b) equal c) lower
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. answer the followings (12 mark)

1. Prove that $n = e/(1+e)$
2. List the classification of rocks according to their ground water studies with examples.

1. **1. Porous and permeable rocks: They are called *aquifers*, such as sands.**
2. **Non Porous and pervious: They are called *aquifer pervious*, such as limestones.**

4. 3- Porous and Impermeable rocks: They are called *aquicludes*, such as clays.
 5. 4- Non porous and non- pervious: Such as quartzites and porcellaneous limestones.

Q3.b. 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? (13 Marks)

Solution:

$$Q = (1/n) \cdot A \cdot R^{2/3} \cdot S^{1/2}; \quad \text{where } [R]^{2/3} = [A]^{2/3} \cdot [P]^{-2/3}$$

$$9065 \text{ m}^3/\text{s} = (1/0.018) \cdot (840 \text{ [m] }^2) \cdot ((120 \text{ m} \times 7 \text{ m})/P)^{2/3} \cdot (0.002)^{1/2}$$

$$9065 \text{ [m] }^3/\text{s} = (1/0.018) \cdot (840 \text{ [m] }^2) \cdot ((120 \text{ m} \times 7 \text{ m})/P)^{2/3} \cdot (0.002)^{1/2}$$

$$9065 \text{ [m] }^3/\text{s} = (1/0.018) \times (840 \text{ [m] }^2) \times ((89.02 \text{ m})/P^{2/3}) \times 0.044$$

$$P^{2/3} = 3290.18 / 163.17 = 20.164$$

$$P = 90.545 \text{ m}$$

$$R = A/P = (w \times d)/P = (120 \times 7)/(90.545 \text{ m}) = 9.277 \text{ m}$$

$$Q = A \cdot V$$

$$9065 \text{ [m] }^3/\text{s} = (120 \times 7) \cdot V$$

$$V = 10.79 \text{ m/s}$$

Q4. A. A block of rock with edge length 85.5 cm, 79.0 cm, 43.8 cm has a mass of 953 kg. Find the specific gravity of the rock? (13 Mark)

Solution:

$$V = (0.855 \text{ m}) \times (0.79 \text{ m}) \times (0.438 \text{ m}) = 0.2958 \text{ m}^3$$

$$\rho = \frac{M}{V} = \frac{953 \text{ kg}}{0.2958 \text{ m}^3} = 3222 \text{ kg/m}^3$$

$$G_s = \frac{\rho}{\rho_w} = \frac{3222 \text{ kg/m}^3}{1000 \text{ kg/m}^3} = 3.22$$

Q4.B. Define the following items: (12Marks)

1. The scale types of topographic map

Scale of the map: It is the distance on the map to that on the ground which is: a-

Simple fraction scale: It is a fixed ratio between linear measurements on the map and corresponding distances on the ground. It is sometimes called the *representative fraction* or *R.F.*, such as 1 / 100 000.

b- Proportion scale: such as 1: 100 000.

For both simple and proportion this means that 1 unit of distance on the map represents 100 000 of the same unit on the ground.

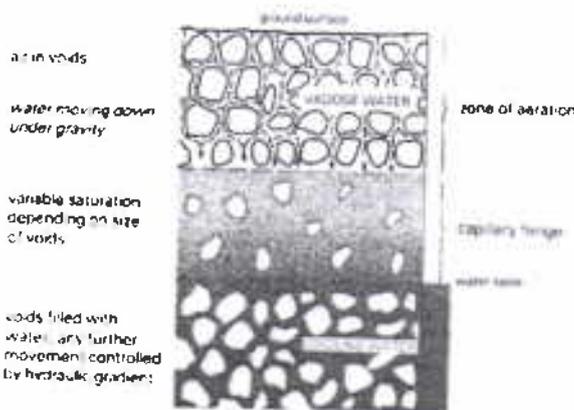
c- Absolute scale: such as 1cm = 1000 m.

d- Bar or graphic scale : It consists of a line divided into number of segments, for example



2. Zone of aeration.

a- Soil water zone (pellicular water): **b- Gravitational water:** The *pellicular* and *gravity* water in this *unsaturated zone* (or *zone of aeration*) is called *vadose water*. **c- Intermediate zone:** This zone may be present or absent. **d- Capillary zone:** This zone separates the aeration zone from the saturation zone.



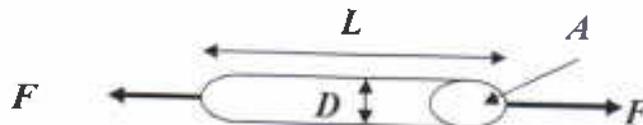
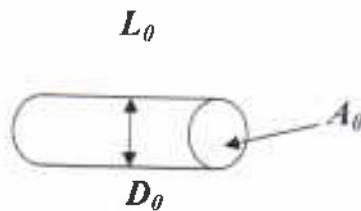
3- Geologic map

A geological map is, generally speaking, such a section, and the distribution of rocks in this case is the pattern of outcrops. It gives the details of the occurrences of geological formations, where the boundaries of the various formations and their attitude (strike and dip) are represented. Also it shows the geologic structures for strata as symbols.

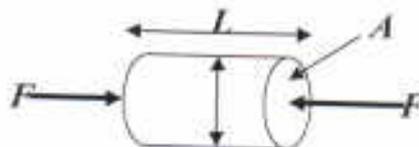
Q5. A. Give sketches ONLY for the following items: (12Marks)

1- Draw the types of compressive stress tests

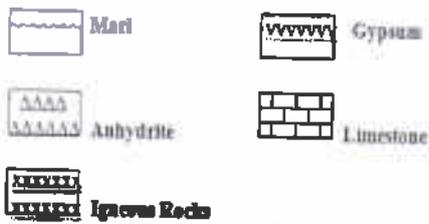
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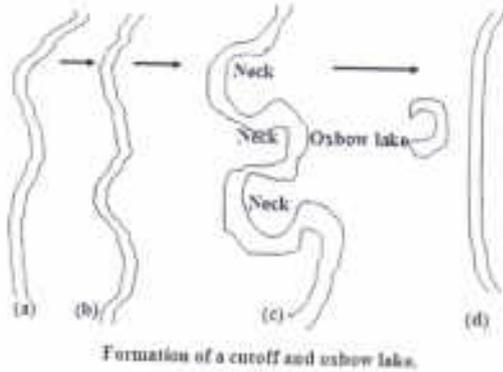
Compressive Load



2- Give 4 symbols only for rocks as represented in geologic maps.



3- Formation of river meander with cutoff and oxbow lake



Q5.B. Dry Weight of sample=20N, and the volume of solid part=23cm³, If the saturated weight with oil =24 N. Find the moisture content and porosity of the sample, if you know the oil density=0.8N/cm³. (13Mark)

Solution:

$$24 - 20 = 4 \text{ N weight of oil}$$

$$\text{Volume of oil} = M/V = 4 \text{ N} / 0.8 \text{ N/cm}^3 = 5 \text{ cm}^3 = V_v \text{ because saturated}$$

$$\text{Total Volume} = V_v + V_s = 5 + 23 = 28 \text{ cm}^3$$

$$n = V_v / V$$

$$n = 5/28 \% = 17.8 \%$$

$$W_c = W_w / W_s = 4 \text{ N} / 20 \text{ N} = 0.2 = 20\%$$



University of Technology
Engineering Department of Building and Construction
Final Exam –First Attempt 2016-2017



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4. Flood plains is the plains that are found near the estuaries and alongside the river valley
5. The main variations causing changes in river velocity are gradient and shape of the river only. ~~In river meanders, the abandoned bend is called a neck.~~
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3. The main types of river deposits are -----, -----, ----- and -----.

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Good luck for all students