



Answer **FOUR** Questions

Q1. Answer the following items as required (Note: For True or False, correct the false) (25%)

1. ----- science deals with the study of the physical properties of soil and the behavior of soil masses subjected to various types of forces. **(Fill)**
2. The hot molten mineral matter below the surface of the earth known as ----- **(Fill)**
3. Erosion is called when rock or its products are removed. **(T or F)**.
4. Rocks used for facing stones should have a high tensile strength in order to resist cracking. **(T or F)**.
5. Unconformities record a period of deposition. **(T or F)**.
6. Kaolinite group consists of layers with ratio of silicate: gibbsite as 2:1. **(T or F)**.
7. Sedimentary rocks represent about 5% of earth surface and about 75% of earth crust volume. **(T or F)**.
8. Horst and graben are central blocks bounded by normal faults. **(T or F)**.
9. Bench marks are land locations which indicate specific elevations and are shown on topographic maps. **(T or F)**.
10. In geologic map, the geologic boundaries intersect the contours for horizontal beds but are parallel for inclined beds. **(T or F)**.

Q2. Choose the correct answer for the following items: (25%)

1. The component refers to the vertical displacement of fault plane is:
a) Heave b) Throw c) Slip d) Fault plane
2. Sills and dykes are structures belong to:
a) Sedimentary rocks b) Minerals c) Igneous rocks d) Metamorphic rocks
3. Any horizontal line on the rock plane along which all points are at equal elevation: a) Contour line b) True dip c) Strike line d) Apparent dip
4. We refer to the separating surface between solid earth interior envelopes as:
a) Boundary b) Discontinuity c) Bedding d) Stratification.
5. Which of the following words is associated with the formation of limestone?
a) Deposition b) Lithification c) Compaction d) Cementation e) Crystallization
6. The single most characteristic feature of sedimentary rocks is:
a) Presence of fossils b) Porous c) Presence of bedding planes d) Containing cavities
7. Metamorphic rocks with a planar texture (the constituents of the rock are parallel to one another) are said to be: a) Concordant b) Foliated c) Discordant d) Non-foliated
8. Windborne deposits (soils) are called:
a) Alluvium b) colluviums c) Aeolian d) Glacial
9. -----are folds with horizontal axial planes.
a) Recumbent b) Symmetrical c) Inclined d) Asymmetrical

10. One of the following rock is not sedimentary rocks:

- a) Shale b) Marble c) Sandstone d) Limestone

Q3. A. A sample of saturated rock has a mass of 126 kg, when oven-dried its mass became 109.57 kg. The mass of water 16.43 kg. The following data were obtained from laboratory tests on the sample: volume of solid grain $V_s = 0.04058 \text{ m}^3$, wet density $\rho_{sat} = 2.1 \text{ g/cm}^3$, $G_s = 2.7$, water content $W_c = 15\%$. Determine (i) dry density, ρ_{dry} , (ii) porosity, (iii) void ratio, and (iv) degree of saturation. (16%)

B. Answer the following items with drawings if available: (9%)

1. Show the effect of both weathering (physical and chemical) on the following minerals from high resistant to low resistant: 1. Feldspar 2. Silicates 3. Ferromagnesian minerals
2. List 3 construction uses for each of the following: 1. Clays 2. Rock aggregates
3. What are the main components of a fold?

Q4. A. Answer the following items:

(10%)

1. Show what each of the following statements indicates?

i. The closely spaced contour lines. ii. The widely spaced contour lines.

2. Draw a topographic map which shows a hill between two valleys with steeply side in the west and gently side in the east. Knowing that the minimum and maximum elevations are 5m and 40m respectively. (Use contour interval 5m).

B. Answer the following items with drawings:

(15%)

1. Define the term unconformity. What conditions favor for its formation. List 2 types with sketches.

2. Compare with sketches between normal and reverse faults with respect to:

i. Displacement; ii. Layers repetition or omission and; iii. Type of force produces each.

3. Show by sketch the effect of grade of metamorphism on foliated metamorphic rocks.

Q5. A. A block of shale rock has edge lengths 45.0 cm, 37.2 cm and 12.8 cm. The rock consists of 34.1% chlorite and 65.9 % pyrite, and has a porosity of 38.8 % knowing that the density of the chlorite is 2.8 gm/cm^3 and for pyrite is 5.05 gm/cm^3 . Find: 1. Its volume of pores 2. The bulk density of the rock. (9%)

B. Give a list only for the following items: (16%)

1. Solid Earth envelopes with its discontinuities.

2. Characteristics of residual soil.

3. Igneous textures and sedimentary structures.

4. Crystallographic systems of crystal forms showing their relative lengths and the angles between them.

..... BEST WISHES.....

Useful Relations

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

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

$$W_c = \frac{W_w}{W_s}; \quad S = \frac{V_w}{V_p}$$



Subject: Engineering Geology
Division: All Engineering Branches
Examiner: Engineering Geology Committee

Year: 1st Year
Time: 3 Hours
Date: 27 / 05 / 2014

Answer FOUR Questions Only

**Typical Answers for Final Exam in Engineering Geology
1st Attempt 2013-2014**

Q1. Answer the following items as required (Note: For true or False, correct the false) (25%)

1. **Soil Mechanics** science deals with the study of the physical properties of soil and the behavior of soil masses subjected to various types of forces. **(Fill)**
2. The hot molten mineral matter below the surface of the earth known as **Magma**. **(Fill)**
3. Erosion is called when rock or its products are removed. **(T or F correct the false): True**
4. Rocks used for facing stones should have a high tensile strength in order to resist cracking. **(T or F, correct the false): True**
5. Unconformities record a period of deposition. **(T or F correct the false): F: Period of erosion**
6. Kaolinite group consists of layers with ratio of silicate: gibbsite as 2:1. **(T or F, correct the false): False , Kaolinite 1:1, or Montmorillonite 2:1**
7. Sedimentary rocks represent about 25% of earth surface and 95% of earth crust volume. **(T or F, correct the false): F, about 75% of earth surface and about 5% of earth crust volume.**
8. Horst and Graben are central blocks bounded by normal faults. **(T or F), True**
9. Bench marks are land locations which indicate specific elevations and are shown on topographic maps. **(T or F), True**
10. In geologic map, the geologic boundaries intersect the contours for the horizontal beds but are parallel for inclined beds. **(T or F). False, the reverse is true. Intersect contours for dipping; parallel for horizontal beds**

Q2. Choose the correct answer for the following items:

1. The component refers to the vertical displacement of fault plane is: **(Choose)**
1. Heave **b) Throw** c) Slip d) Fault plane
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