

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING
2nd YEAR, 1st SEMESTER.
SUPPLEMENTARY EXAMINATION - 2023
ENGINEERING GEOLOGY

Time : Three hours

Full Marks : 100

(50 marks for each group)

Use a separate Answer-Script for each group

Part - I

Answer any five (05) questions from the following: (5×10)

1. Draw a neat labeled flow chart showing the major component of Rock cycle. What are the major steps of formation of sedimentary rock? How a clastic sedimentary rock does differ from non-clastic sedimentary rocks, discuss in brief. **(4+3+3=10)**
2. Present the ISSCS classification of soil according to the grain size in a tabular format. Prove that $S = \frac{W_C \times G_S}{e}$, where S = Degree of saturation, W_C = Water content, e = Void ratio, G_S = Specific gravity of the solid mass of the soil or rock. **(6+4 = 10)**
3. What is meant by 'Ground Water Table'? What is an aquifer? Distinguish between confined and unconfined aquifer. What is meant by 'specific yield'? **(3+2+3+2 = 10)**
4. What is meant by the 'Water content' of a natural soil sample? How does it differ from Degree of saturation?
A soil sample in its undisturbed state was found to have volume of 105 cm³ and weight of 201 gm. After oven drying the weight got reduces to 168 gm. Compute (a) the water content, (b) Dry density (c) Void ratio, (d) Porosity, Assume $G_S = 2.7$. **(5+5 = 10)**
5. **Write short notes on any two: (2×5 = 10)**
 - a. Porosity and permeability
 - b. Vadose zone & phreatic zone
 - c. Interflow & base flow

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6. Choose the correct answer from the following:

(1×10 =10)

(i) 'Lithosphere' consists of –

- (a) The lower part of earth crust and the upper part of the mantle (b) The lower part of the mantle and the upper part of the core (c) From upper to lower part of the crust (d) Entire earth crust and upper part of mantle

(ii) Annual average rainfall of India is about –

- (a) 900 mm/yr (b) 1200 cm/yr (c) 800 cm/yr (d) 1200 mm/yr

(iii) Hardness of mineral is an

- (a) Isotropic property (b) Anisotropic property (c) Internal mechanical property (d) None of these

(iv) The percentage of fresh water available as subsurface ground water is about

- (a) 1.61% (b) 61.0% (c) 0.61% (d) 0.81%

(v) 'P – wave' shadow zone azimuthally covers a distance on the Earth surface from

- (a) 90° to 130° (b) 100° to 140° (c) 100° to 180° (d) 90° to 140°

(vi) The most widely spread rock type on the surface of the Earth is the

- (a) Metamorphic rocks (b) Igneous rocks (c) Sedimentary rocks (d) Humus

(vii) Bulk density of the soil generally denotes

- (a) Density of soil when all its pores filled up with water. (b) Natural density of the soil in-situ condition (c) Density of solid part of the soil (d) Soil density measured after compaction

(viii) Soil sample with a weight of W , having the weight of its solids is W_s . The water content of the sample is w , then

- (a) $W = \frac{W_s}{1+w}$ (b) $W = \frac{W_s}{1+w}$ (c) $W = \frac{1-W_s}{1-w}$ (d) $W_s = \frac{W}{1+w}$

(ix) If γ_t and γ_d are the bulk and dry unit weight of a soil sample having the water content 'w', then the which of the following relation is correct

- (a) $\gamma_t = \gamma_d(1+w)$ (b) $\gamma_t = \gamma_d(1-w)$ (c) $\gamma_d = \gamma_t(1+w)$ (d) $\gamma_d = \gamma_t(w-1)$

(x) The unit dimension of 'coefficient of permeability' is same as the unit of

- (a) Length (b) Area (c) Velocity (d) None of these

7. Write down the following statements and mention 'TRUE' or 'FALSE' (1×10 = 10)
- i. According to ISSCS the size range of silt size particles is 7.5micron to 0.2 micron.
 - ii. According to Mohs' scale the hardness of the mineral quartz is 7.
 - iii. The average thickness of the Earth crust is about 35 km.
 - iv. Compaction is a mechanical process that reduce the volume of air-filled inter granular voids of the unsaturated soil.
 - v. Porosity is property of soil which permits the ease of flow of liquid through the rock.
 - vi. The major rock type that is being used as railway ballast in India is limestone.
 - vii. Compaction is the process that increase the dry density of unsaturated soil.
 - viii. At present there are four major earthquake zones in India.
 - ix. Quartzite is a type of metamorphic rock formed by metamorphism of sandstone.
 - x. Influent water bodies always receive water from subsurface ground water table

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B.E. Civil Engineering
2nd Year, 1st Semester Examination Supplementary 2023
Subject: Engineering Geology

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PART-II

Answer Question Number 6 and any FOUR from the rest

- Q1. Define mineral and rock. What are the physical properties used to identify minerals? Mention the important physical properties of any two minerals known to you. (2+4+4)
- Q2. How do you classify rocks on the basis of their texture? What are the mineralogical compositions of i) Granite, ii) Limestone and iii) Peridotite (7+3)
- Q3. Discuss briefly the principles behind the geological time scale of our Earth. Differentiate absolute age dating and relative age dating. (6+4)
- Q4. Define weathering. Describe different types of weathering and their processes. (1+9)
- Q5. Define sedimentary rocks. How are they formed in nature? Discuss briefly about different types of chemical sedimentary rocks. (1+5+4)
- Q6. Write short notes on (any TWO) (5 X 2)
- a) Moh's scale of hardness
 - b) Agents of metamorphism
 - c) Erosional landform