

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING
2nd YEAR, 1st SEMESTER.
SUPPLEMENTARY EXAMINATION - 2017
ENGINEERING GEOLOGY

Time: Three hours

Full Marks: 100

(50 marks for each group)

Use a separate Answer-Script for each group

GROUP – A

Answer any five (05) questions from the following:

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 differs 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. Explain the Darcy's Law. What is meant by hydraulic gradient? How porosity of a soil stratum does differ from permeability? What is void ratio? **(3+2+3+2 = 10)**
5. What are the major forces those act on a gravity dam? What is uplift pressure? How does it affect the stability of a gravity dam? Why quartzite is a more suitable subsurface rock stratum for construction of a dam than khondalite and marble? **(3+2+3+2 = 10)**
6. **Write short notes on any two:** **(2×5 = 10)**
 - a. Porosity and permeability
 - b. Natural external factors of landslide
 - c. Major mechanical properties of rock

7. 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 cover 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

8. 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 7.5 micron 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. 'Lehmann – Bullen discontinuity' present between the mantle and outer core of the earth.
- 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. There are seven major earthquake zones in India,
- ix. Cavitations are very common features in embankment dams.
- x. Influent water bodies always receive water from subsurface ground water table

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(2nd Year, 1st Semester, Supplementary)

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GROUP B

Answer Question No. 1 and any Four (4) from the rest:

$\{10 + (4 \times 10)\} = 50$

1. **Write "True" or "False" :**

1 x 10 = 10

- i) Mantle is the innermost layer of the Earth.
 - ii) S-wave can only pass through the liquid medium.
 - iii) Kankar is a variety of Limestone.
 - iv) Granite is a sedimentary rock.
 - v) Dip is the angle of inclination of a layer of rock with a vertical plane.
 - vi) The crust-mantle boundary is demarcated by "Gutenberg discontinuity".
 - vii) Petrology deals with study of petroleum.
 - viii) A curved rippled fracture is called conchoidal fracture
 - ix) Poikilitic texture is characterized by presence of large sized crystals in a fine ground mass.
 - x) Talc is the softest mineral in Moh's scale of hardness.
2. a) Define sedimentary rocks. How are they formed in nature?
b) Discuss briefly the chemical structures in sedimentary rocks. (1+5+4)
 3. a) What is an earthquake? What are the causes of an earthquake
b) Write short notes (any three): Epicentre, Seismogram, L-Waves and Rayleigh Waves (4+6)

- 4. a) Define weathering
b) Describe different types of weathering and their processes. (1+9)
- 5. a) What is a volcano? How and why do volcanoes erupt?
b) Explain the three stages of volcanoes with suitable examples. (1+3+6)
- 6. a) What is a metamorphic rock? Name any stress mineral.
b) Describe various textures and structures developed in rocks due to metamorphic processes. (1+1+8)
- 7. a) Discuss briefly the principles behind the Geologic Time Scale of our Earth.
b) Differentiate Absolute Age Dating and Relative Age Dating. (6+4)

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