3 (Sem–6/CBCS) GLG HC 1

2023

GEOLOGY

(Honours Core)

Paper : GLG–HC–6016

(Engineering Geology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following : 1×7=7

(a) Grouting is described as

(i) injection of suitable material into the Earth's crust to seal any open feature

(ii) process of determining the coefficient or water saturation of a material

(iii) process of lining of tunnels to support the pressure exerted by the material in which the tunnel is excavated

(iv) None of the above

(b) The upstream face of a gravity dam is always vertical

(i) True

(ii) False

(c) The breakage of rocks with tremors in hard ground tunneling is known as

(i) blowouts

(ii) spalling

(iii) bumping

(iv) popping

(d) Which of the following is used to designate joint set number in the Q-system ?

(i) J_a

(ii) J_w

(iii) J_r

(iv) J_n

(e) Density of a rockmass is governed by which of the following factors ?

(i) Porosity

(ii) Mineral composition

(iii) Depth of occurrence

(iv) All of the above

(f) Which of the following is a post-disaster earthquake preventive measure ?

(i) Evacuation of the affected people

(ii) Construction of temporary shelters

(iii) Providing medical care to injured people

(iv) All of the above

(g) Which of the following is true in case of addition of water to clay-bearing materials present in areas affected by landslide activity ?

(i) Decrease of cohesive strength

(ii) Decrease of angle of internal friction

(iii) Decrease in shear strength

(iv) All of the above

2. Answer the following : 2×4=8

(a) State the geological conditions required to construct a buttress dam.

(b) State the use of spillways and cut-off walls in the context of dams.

(c) Define porosity. How does porosity change with increasing depth or pressure ?

(d) Mention *any two* internal causes of landslides.

3. Answer the following : ***(any three)*** 5×3=15

(a) Describe the various problems associated with the reservoirs at a dam site.

(b) Describe the various impacts caused upon the environment due to the construction of large dams.

(c) Describe the basic parameters enlisted under the RMR system given by Bieniawski, 1989.

(d) Mention the application of the Rock Tunneling Quality Index Q System. State the formula for calculating Q.

(e) Outline on the applications of Slake Durability Index for intact rock studies.

4. Answer the following : ***(any three)*** 10×3=30

(a) What do you understand by engineering geological investigations ? What are the important ground aspects that needs to be investigated in *any* mega project ? 3+7=10

(b) Define 'dam'. Give an account of different stages and types of investigations carried out during construction of dams. 2+8=10

(c) Elaborate with suitable sketches the different geological conditions affecting the construction of tunnels. Mention *four* important tunnels of India. 8+2=10

(d) What is a landslide ? Describe the various external and internal causes that leads to the occurrence of landslides. 2+8=10

(e) What is an intact rock ? Describe *any two* index properties of intact rocks. 2+8=10

(f) Define Rock Mass Classification. Describe the various parameters which are used in classifying rock mass through the RMR system. 2+8=10

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