3 (Sem–6/CBCS) GLG HC 1

2022

GEOLOGY

(Honours)

Paper : GLG–HC–6016

(Engineering Geology)

Full Marks : 60

Time : Three hours

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

1. Attempt ***any seven*** from the following : 1×7=7

   (a) The most appropriate dam that can be built on alternating strong and weak rock is

   (i) buttress dam

   (ii) earth dam

   (iii) rockfill dam

   (iv) check dam

(b) Vertical and irregular underground openings are called

(i) shaft

(ii) raise

(iii) slope

(iv) adit

(c) The ideal condition for construction of tunnels is the presence of

(i) anticline, where width of the anticline is more than the width of the tunnel

(ii) anticline, where width of the anticline is less than the width of the tunnel

(iii) syncline, where width of the syncline is more than the width of the tunnel

(iv) syncline, where width of the syncline is less than the width of the tunnel

(d) When a site is said to be sound, which of the following characters is not desirable ?

(i) Strong

(ii) Permeable

(iii) Stable

(iv) Impermeable

(e) Abutment is

(i) upstream side of a dam

(ii) downstream side of a dam

(iii) openings for discharge

(iv) sides of the valley on which the dam structure rests

(f) Which of the following is not a quantitative mode of rock mass classification ?

(i) RQD

(ii) GSI

(iii) RMR

(iv) RSR

(g) Which of the following will have highest RSR value ?

(i) Massive rocks

(ii) Slightly folded rocks

(iii) Moderately faulted rocks

(iv) Intensely folded rocks

(h) Which of the following is not true for volcanic earthquakes ?

(i) Tremor effects felt far away from the hypocentre

(ii) Results after the withdrawal of magma from a system

(iii) Caused by slip on a fault near a volcano

(iv) Not as powerful as tectonic earthquakes

(i) Point load index (I_s) is an indirect measure of

(i) rock origin

(ii) rock age

(iii) rock strength

(iv) rock colour

(j) Tungsten carbide points are used to measure

(i) cone indenter number

(ii) shore scleroscope hardness

(iii) slake durability index

(iv) point load index

2. Attempt ***any four*** from the following : 2×4=8

(a) Give a short account on ravelling and running ground.

(b) Give a short account on parts of a traffic tunnel.

(c) Give a short account on rock bolting.

(d) Give a short account on reservoir-induced seismicity.

(e) What is the rock mass classification system ? Mention the names of *four* quantitative systems.

(f) State *any four* basic parameters which are used in the rock mass rating (RMR) system ?

(g) Mention *any two* anthropogenic causes of earthquakes.

(h) Mention *any two* steps that can be taken to reduce the risk from landslides.

3. Attempt ***any three*** from the following : 5×3=15

(a) Give a brief account of various geological investigations that are required to be carried out in a dam site.

(b) Explain different methods of excavation of a tunnel.

(c) Define grouting. Explain various methods of grouting.

(d) Define leakage and seepage of a dam.

(e) Define porosity. Mention various factors which govern the porosity changes in rock masses.

(f) Mention the applications of Schmidt hammer rebound number and slake durability index for intact rock studies.

(g) Define rock quality designation (RQD). Give the rock mass quality classification in a tabular form, according to RQD, as given by Deere et. al. 1967.

(h) Mention various components enlisted under the three parameters A, B and C in the RSR rating system of Wickham et. al. 1972.

4. Attempt ***any three*** from the following : 10×3=30

(a) What are different types of dam? Enumerate various causes of dam failure. 5+5=10

(b) What are various forces acting on a dam? Discuss the key geomorphological and geological factors to be considered in construction of dams. 3+7=10

(c) Mention various types of linear opening that are constructed during the excavation of a tunnel. Explain different geological factors to be considered in construction of tunnels. 3+7=10

(d) What is ground in a tunnel site? Elaborate different problems associated with soft and hard ground tunnelling. 2+8=10

(e) Define landslides. Describe various steps that can be taken to reduce the risk or damage from landslides. 1+9=10

(f) Write a brief account on the rock tunnelling quality index Q-system.

(g) Write notes on : 5+5=10

(a) Cerchar abrasivity index (CAI)

(b) Needle penetration index (NPI)

(h) Define earthquakes. Write an account on various tectonic and anthropogenic causes of earthquakes. 2+(4+4)=10
