KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B.E.
Year : IV

Course : CIEG 408
Semester: I

Exam Roll No.:

Time: 30 mins.

F.M. : 10

Registration No.:

Date : MAR 1 8 2018

SECTION "A"
[20Q× 0.5= 10marks]

Tick (√) clearly the most appropriate answer.

1. In drill and blast tunneling method, the purpose of the scaling is
   a) to clear loose rocks from walls and surfaces after blasting
   b) to make drill holes for blasting
   c) to fill the explosives in blast holes
   d) to level the walls of tunnel using shotcrete after blasting

2. Leakages into tunnels mainly
   a) Degree of jointing and character of rock joints
   b) Due to high ground water above the tunnel
   c) Due to high vegetation in mountain
   d) Due to high overburden above the tunnel

3. In your views which one is the most important safety matter during construction of tunnel in Himalayan region of Nepal
   a) Lighting b) Water leakage c) Sanitation d) Rock support

4. The most commonly used tunneling method in the Nepal Himalaya
   a) Cut and Cover b) Tunnel Boring Machine
   c) Drill and Blast d) Shield

5. Why is safety important in any construction projects?
   a) Accidents are costly to projects b) Satisfy the employer
   c) Safety is just a gimmick d) Not covered in quality management

6. The purpose of probe drilling
   a) Increase tunnel pull b) Decide drill pattern
   c) Identify ground water potential d) Decide mucking techniques

7. What is risk?
   a) Probability and accident b) Accident and cost
   c) Probability and consequence d) Consequence of non-wanted event

8. The main purpose of rock bolt is
   a) To reinforce loose rock to prevent caving in or spalling
   b) Used as permanent support
   c) To excavate in very poor rock mass
   d) To excavate in very good rock mass

9. The main point of a support system is
   a) To absorb deformations without collapsing
   b) To collapse the wall of tunnel
   c) To provide the maximum support pressure
   d) To allow the maximum deformation

10. To improve the mechanical qualities of the loose materials
    a) Pre-grouting b) Post-grouting c) Jet grouting d) Probe drilling

11. In dry-mix shotcrete
    a) the aggregate, cement and accelerators are mixed together and propelled by air
    b) the aggregate, cement and accelerators are mixed together and propelled by water
    c) the aggregate, cement, water and accelerators are mixed together
    d) the aggregate, accelerators and water are mixed together and propelled by cement

12. In very weak rock mass, which of the following items will be most costly
    a) Blasting b) Drilling c) Rock support d) Mucking

13. Which would be the best choice to reduce water leakage in tunnel passing through fault zone
    a) Surface/post-grouting b) Pregrouting
    b) Spiling d) Presplitting

14. For very poor rock mass the value Rock Quality Designation is lies between
    a) 50-75 b) 25-50 c) 0-25 d) 90-100

15. For poor rock the Q values in between
    a) 4-10 b) 0.1-1 c) 10-40 d) 40-100

16. For hydropower tunnels the values of Excavation support ratio (ESR) is generally lies between
    a) 2-5 b) 1.6-2.0 c) 0.9-1.1 d) 0.5-0.8

17. Shear Stress which results
    a) Stretches rocks b) slippage and translation of rocks
    c) Squeezes rocks d) Swelling rocks

18. In Q-system of rock mass classification Joint roughness number represents
    a) The conditions of joint roughness b) The strength of joints
    b) Number of joints in rock mass d) Length of joint in rock mass

19. In Q-system, RQD/J_n is expressed as
    a) block size b) strength of the block surfaces
    c) stress conditions d) stress free factor

20. In Electrical Resistivity Tomography
    a) Radar waves are used for investigation
    b) An electric current is injected to ground
    c) Seismic waves are used
    d) Boring holes are drilled for geological investigation

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SECTION "B"

Attempt *ALL* questions

1. Describe the different types of rock mass classification methods and its application to the Himalayan hydropower tunnel. [2+4]

2. A 2.5 km new road tunnel is planning between Sisne Khola, Naubise to Nagdhunga Pass to shorten the road to Kathmandu. As you are the Project manager of this project. Which type of geological investigation would you like to suggest for this purpose? [8]

3. In the same project as discussed in Question no. 2, which method of tunnelling is used for the excavation in such region. [6]

4. Explain the rock support interaction method to design support of tunnel. [6]

5. Explain the Health, safety and Environment plan for any underground construction in Himalayan region in Nepal. [6]

6. Write short notes on the following: [4×2= 8]
   a) Sprayed concrete
   b) Rock bolts
   c) Steel sets
   d) Grouting