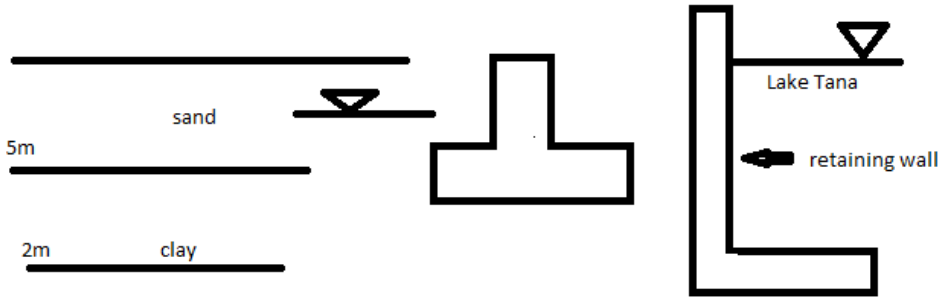
Surveying

1. List at least two modern methods of collecting data's in surveying?
   Ans: - topographic surveying
   aerial and agricultural maps
   Photogrammetric surveying
   Published and unpublished information concerning the physical, environmental and economic characteristics of the study area
   Remote sensing
   GPS& GIS
   Site investigations

FOUNDATION

2.



A. draw the diagram of vertical stress

B. draw the critical section of the footing (isolated) for wide beam ,for moment, for punching

C. list the parameters those should be known to calculate the bearing capacity of foundation soil.

Ans: - cohesion, internal friction

D. sketch qualitatively the vertical effective stress, vertical total stress and water pressure along.

E. estimate the coefficient of horizontal active pressure for water.

HIGHWAY

3. Ethiopian government has launched a project of highway from Addis Ababa to Adama that can allow 8 vehicles to pass at a time and it takes only 40-50 minutes but the existing road takes more than 2hr. state the reason for this improvement (difference) from density, volume, level of service and speed point of view?
   Ans: - the density of traffic is the vehicle occupying a given length of the roadway. Therefore when the length and number of lane increases the density will also increases which will decrease the crowd of cars within the given road.
   The volume of traffic is number of vehicles passing a point during a given time interval therefore as the lane number increases the vehicle using the road will increase at a given time.
   Level of service is describes the quality of the given pavement. Therefore the new road will have with no doubt a higher level of service than the existing alignment. It will give comfort and convenience provided to drivers is excellent.
   Design speed describes as kilometers travelled within the given time. will increase as the above points increases. Therefore the time to reach the final destination will be much faster than the previous as it have direct relation with the speed.

SURVEY

4. There is a tower its top level (RL of top) of tower to be determined. Near the tower there is a bench mark. What method can you use to find the RL of top of tower?

ANS:- using LEVELING method,

Staff reading, back sight and fore sight, rise and fall method and height of plane of collimation method. And if there is obstacle we will use reciprocal leveling.

RC

4. a residential building have 5 stories with each floor has the same service and the columns have the same arrangement throughout but the designer give more thickness for first floor slab. If you are a consultant Engineer asked for approval. Will you approve it? Justify your answer.
   Ans: - no, the slab only transfers the load that is applied on itself. It doesn’t transfer load from any other slab or beam or column. Therefore, the thickness must remain constant as the other slabs unless there is a special case like difference in live load.

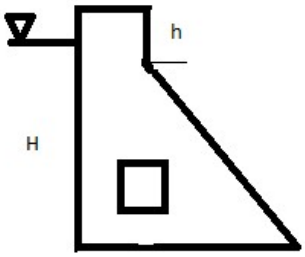
HYDRAULICS

6.a. TEL, hydraulic head, specific energy at section 1-1 &2-2

b. find the head loss

HS

7. compute the overturning moment and the resisting moment by considering only; self-weight of the dam, pore water pressure, uplift force, if Y_m is unit weight of concrete and Y_w is unit weight of water



RC

8. The slab is designed by making it able to transfer the load in one way. The designer provides the reinforcement as follows, give your comment on the design &will you approve it.

Ans: - if Ly/Lx>=2 one way slab and if Ly/Lx<2 it’s a two way slab

*transverse reinforecement provided in perpendicular direction of bending moment to resist volume insitblity(shrinkage, creep& temperature stress)

SOIL

9. There is a road to be constructed but the soil at deep level is loose (low bearing capacity) and you are required to construct the road. How can you tackle this problem to construct the road (what method can you apply to)

Ans: - there are certain methods that can be used

1) we can consider cut and fill method
2) adding granular material (blending) to improve its property
3) we can consider rigid pavement design since it's not dependent in subgrade soil strength
4) if the treatments are too much cost we can consider leaving the site and consider other alignment choices
5) We can use some admixtures that are stabilizing agents to improve the quality of the soil like cement stabilization, etc.
   HIGHWAY

10. What is the difference between the material in the sub base and sub grade with respect to their quality?

Ans: - sub base course is constructed using local& cheaper materials to be economical. It provide additional help to the base& upper layers in distributing load. It facilitates drainage of free water that might get accumulated below the pavement. If the base course is open graded, the sub base course with more fines can serve as a filter between the sub grade and the base course.

Subgrade is the foundation which vehicle load and weight of pavement layers finally rest. It's an insitu or a layer of selected materials compacted to proper shape, properly drain and compacted to receive the pavement layers.

RC

11. a) what are the loads to which any structure is exposed explain each with the help of sketch of their load pattern?

Ans: - live, dead, environmental loads (wind, rain, snow and ice, earthquake and wind load).

b) Structure has 3 stories and two bays in X and Y directions. Selection the structure along the height and apply lateral load and explain the load harmonization on the structure and the load path and action on the structure. The external actions act on the structure are (should be) restricted by the reaction of supports i.e. equilibrium.

c) List the method of analysis of frame structure that used for design of section of frame.

Ans: - slope deflection method, moment distribution or handy cross method, kani's method of moment distribution and matrix method

SOIL

12. A bldg. is built with a basement but the dampness problem has occurred on the basement after the retaining wall has constructed .what is your recommendations to prevent this problem without damaging the structure.

Ans: - piping the water out of the damp area, addictional water proofing materials can be used to cover the retaining water (eg. Laminate it by grease, bituminous; cement routing, cover with PVC)

FOUNDATION

13. What are the factors that enforce use to a trapezoidal footing?

Ans: - space requirements and when the load carried by the columns are unequal.

MATERIAL+ HIGHWAY

14. What are the tests performed on concrete material before mix design.

Ans: - aggregate test, sieve analysis, the presence of fines (clay and silt) and sulfate must be tested

Cement test, normal consistency and setting times of cement, fineness of cement, soundness test on cement, strength of cement.

Water test, the presence of impurities must be tested.

And for appropriate concrete mix “maximum compression” can be determined by concrete compression test.