



**Question 4:** Figure 2 shows the stratum conditions at the two points of A and B. Describe the order of forming stratum at points A and B including granite and the fault. **(8 points)**

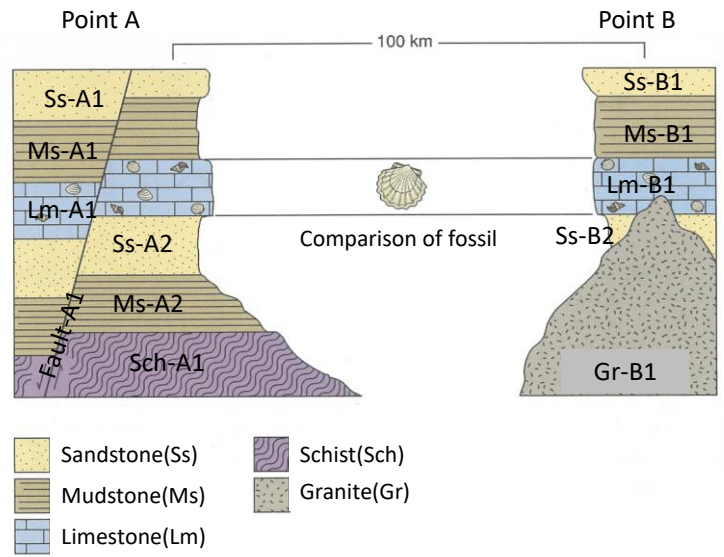
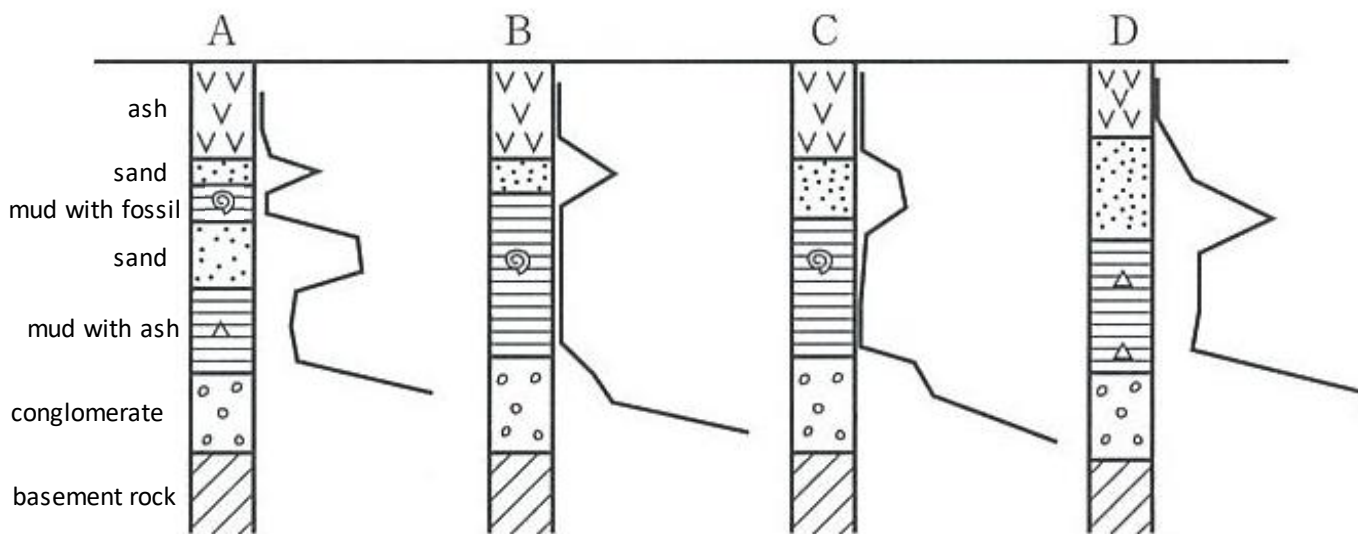


Fig. 2. Stratum conditions at the two points of A and B

**Question 5:** Figures below show four geological columnar section obtained by the boring exploration in the alluvial plain. The line on the side of each geological columnar section shows N value (value by which the hardness of the ground is shown). Make geological section map from these four geological columnar section. **(5 points)**



**Tunnel Engineering questions**

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**Question 6:** Describe advantages and disadvantages of the shield tunneling method? **(12 points)**

**Question 7:** Describe advantages and disadvantages of the cut and cover tunneling method? **(12 points)**

**Question 8:** Describe what happened in the ground and the mechanism about the face collapse on the video by your assumption. **(10 points)**



**Earthquake Engineering questions**

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**Question 9:** Fill out blank spaces in the following statements with given words. **(12 points)**

High stiffness houses have (1)..... (shorter, longer) period, and soft ground has a (2) ..... (shorter, longer) period. If the thickness of soft layer is deep, displacement response tends to (3) ..... (increase, decrease), but acceleration response tends to (4) ..... (increase, decrease). Soil liquefaction is the phenomena that (5) ..... (loose, dense) sand loses their strength due to (6) ..... (increase, decrease) of pore water pressure during an earthquake.

**Question 10:** Based on Fig. 3 configuration, determine the critical height of a cut in the normally consolidated clay. The internal friction angle ( $\phi$ ) of the clay is 0. **(10 points)**

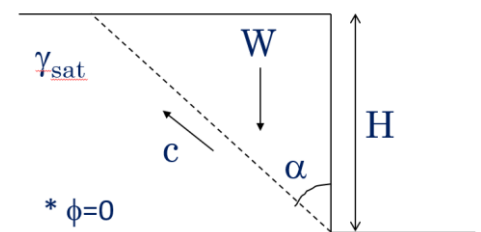


Fig. 3: Critical height of a cut in clayey soil.

**Question 11:** what is the angle of repose of sand? And how a steeper dry sand slope can be built without using water or glue? Please suggest reinforcing method for dry sand slope. **(10 points)**

**End of questions.**



**Question 4:** Figure 2 shows the stratum conditions at the two points of A and B. Describe the order of forming stratum at points A and B including granite and the fault. (8 points)

1) Ss-A2=Ss-B2, Lm-A1=Lm-B1, Ms-A1=Ms-B1, Ss-A1=Ss-B1

2) Sch-A1 -> Ms-A2 -> (Ss-A2=Ss-B2) -> (Lm-A1=Lm-B1) -> (Ms-A1=Ms-B1) -> (Ss-A1=Ss-B1) -> Fault-A1

We can understand that the Gr-B1 intruded after (Lm-A1=Lm-B1), but cannot decide the order of occurrence among Gr-B1 intrusion, (Ms-A1=Ms-B1) sedimentation, (Ss-A1=Ss-B1) sedimentation and fault activity.

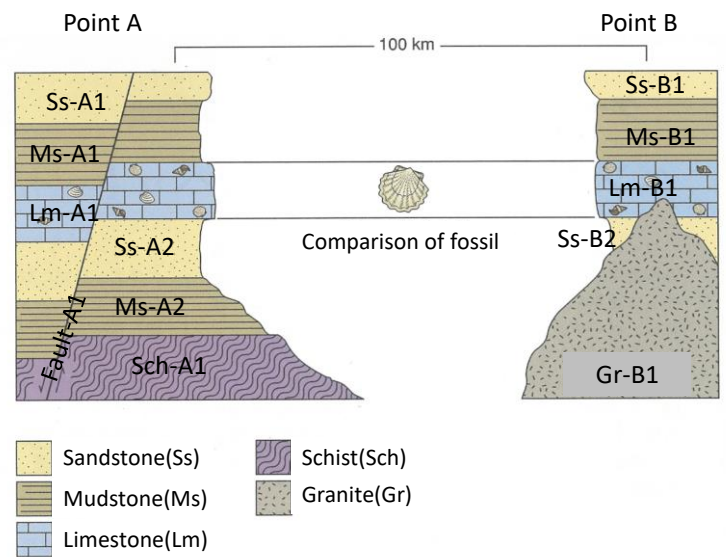
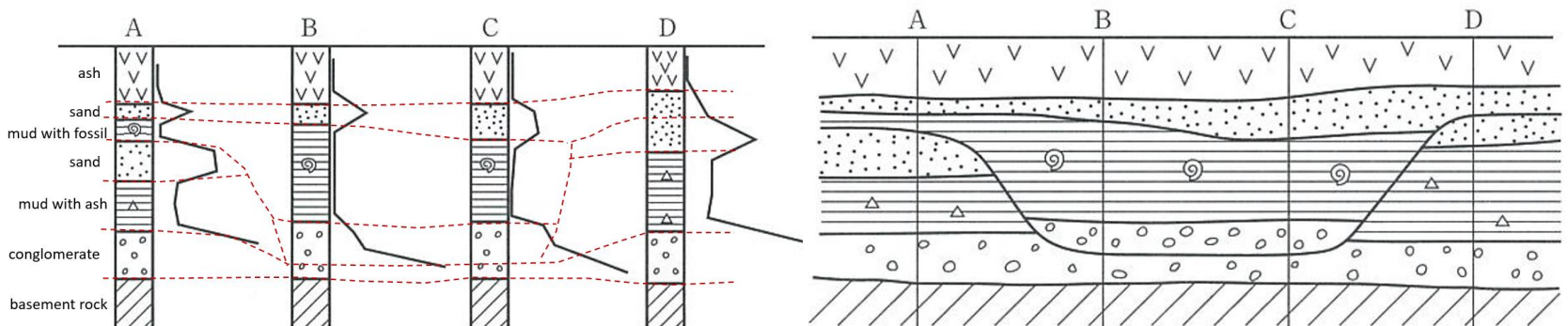


Fig. 2. Stratum conditions at the two points of A and B

**Question 5:** Figures below show four geological columnar section obtained by the boring exploration in the alluvial plain. The line on the side of each geological columnar section shows N value (value by which the hardness of the ground is shown). Make geological section map from these four geological columnar section. (5 points)



**Tunnel Engineering questions**

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**Question 6:** Describe advantages and disadvantages of the shield tunneling method? (12 points)

Advantages: It is safe. The settlement is very small. No traffic blockage. No counterbalance for water pressure is needed.

Disadvantages: Expensive, Shape and size of the tunnel cannot be changed.

**Question 7:** Describe advantages and disadvantages of the cut and cover tunneling method? (12 points)

Advantages: It is economical, fast, and visible so that one can understand the situation. One can change plan or tunnel shape during construction.

Disadvantages: vibration, noise, dust, longer construction time, larger construction area, may block traffic in ground surface.

