Potential Essay Questions, Exam II

Draw and describe the two general models/concepts that describe regolith production rates (soils production and bedrock weathering) to depth. Under what conditions do each occur?

What are the 5 soil production factors? Describe how they influence soil production.

Know the common soil horizon nomenclature scheme and how to interpret what is present in a soil based on the letter/number sequence provided. (e.g. O, A, E, B, C) You should also know what some of the common horizon modifiers mean (e.g. Xt, Xk, Xb, Xp, Xw, etc) and the rules for numbering (e.g. what it means if a number is in front or behind the soil horizon letter). I will give you an example soil sequence based on the lettered horizons and ask you to interpret/describe that soil and answer questions about it.

Describe how soils are useful in geomorphology. Describe the concept of a Catena and Chronosequence.

Know the key characteristic of Alfisols (Spodosol), Mollisols and Aridisols, where they formed and their typical horizonations.

Define and describe the difference between Transport and Weathering limited hillslopes in terms of sediment production and erosion. Where are they dominant? Relationship to vegetation cover and soil thickness? Slope profile/shape? Dominant weathering and slope transport processes for each?

The Coulomb Equation describes the strength of a material in relationship to the shear strength of a material and the normal stress applied. Draw a diagram to describe this relationship. Describe how the Angle of internal friction, cohesion and water content influences the Shear Strength of a material.

Describe the three situations/mechanisms that produce overland flow. Under what conditions do each type of runoff/return flow occur?

Draw two example flood hydrographs on the same plot, one for a large river in a humid setting and the other for a small catchment in an arid region. Include a plot of the timing and distribution of precipitation – assume the same rainfall event for each. Label the beginning and end of the precipitation event and timing of peak precipitation. Also label the rising and falling limb of the hydrograph, peak discharge and expected center of mass and baseflow for each hydrograph. Describe why they look different – what are the reasons for the differences in hydrograph shape. Describe the expected dominant processes and water flow paths reaching each river? Why are these flow paths different?

In lecture and in your text book we discussed three general types of diffusive processes that move sediment and shape hillslopes. Describe these processes and what factors influence their effectiveness.

Know the three general types of mass movements and how they can be differentiated based on the style of movement and nature of deposit (e.g. intact or not, distance moved, internal faulting, sorting)
Draw, label and describe the components of a rotational slide. Within what types of deposits do these more commonly occur? How are these different from Translational slides? Under what conditions are translational slides likely to occur?

Describe how the Froude Number relates to the characteristic of flow within a channel. Provide the equation and describe how the Froude Number relates to bedforms produced. Why would bedform type relate to Froude Number of the flow?

What does the Reynolds Number tell us about flow properties? Provide the equation and discuss the dominant factors influencing flow conditions (ie what values are near-equivalent between different streams)? (Note you can include any of the simplified equations provided in the slides or textbook, define variables if you use abbreviations)

Why is the Manning Number and hydraulic radius important for calculating stream discharge?