ES473 Environmental Geology – Quiz 2 (20 Pts)   **Spring 2020**   Name __KEY__

A. Short Answer Essay / Definition. Briefly define or discuss the following terms and concepts. Include a drawing or sketch as required. 4 to 5 well written sentences are appropriate for each answer.

1. List and discuss four factors that control the occurrence and distribution of landslides at the Earth's surface (include sketches and equations, as needed) **(4 pts)**

SLOPE ANGLE

SHEAR FORCE

ROOT STRENGTH - VEGETATION

MATERIAL COMPOSITION

WATER CONTENT / PORE PRESSURE

$$SLOPE = \frac{\Delta\ ELEV}{\Delta\ H.D.}$$

FRICTION → shear

Normal wt force
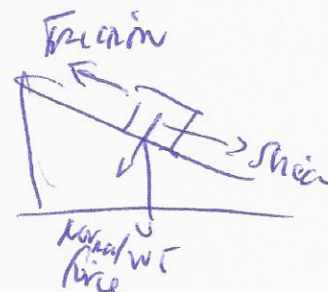
2. Define river discharge vs. river stage, include description, equations and units of measurement. Draw a sketch to show how these types of gage data are collected, and related by the rating curve for a given channel reach. **(4 pts)**

$$DISCHARGE = Q = \frac{VOLUME_{H_2O}}{TIME} = \frac{L^3}{t}\quad \frac{ft^3}{sec}\ or\ \frac{m^3}{sec}\quad \text{"cfs" or "cms"}$$

STAGE = RIVER SURFACE HEIGHT COMPARED TO SURVEY GAGE STAFF

GAGE STAFF   River level

Q ft³/sec

STAGE ft ── Rating Curve
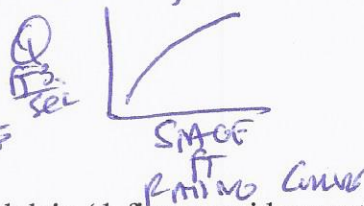
Hydrograph = measure of Q & STAGE vs. TIME

Q ── TIME
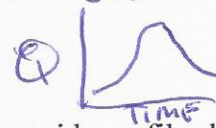
3. Recurrence interval, probability and 100-year floodplain (define, provide equations, provide profile sketch, describe how it is identified) **(4 pts)**

SKETCH IT

PEAK Q ANALYSIS

R.I. = time series of annual peak floods on river

m = magnitude = Q or STAGE

RANK n = TOTAL no. of observations

1 = highest VALUE

n = lowest VALUE

$$R.I. = \frac{n+1}{m}$$

P = probability of occurrence

$$P = \frac{1}{R.I.} = \frac{1}{\left(\frac{n+1}{m}\right)} = \frac{m}{n+1}$$

R.I. = 100 yr Flood Q

$$P = \frac{1}{100} = 1\% \text{ chance}$$

4. slump vs. translational landslide (sketch, define, described process, materials involved, and hazards associated with) **(4 pts)**

SLUMP

ROTATIONAL FAILURE

BEDROCK vs. REGOLITH

CLIMATE vs. ...

HAZARDS = loss of LIFE & Property in ...

5. Exam the topographic map below. (A) Calculate the hillslope gradient between points X and Y in degrees and percent. Show all of your math work and unit algebra.

SW/4 DALLAS 15' QUADRANGLE

$$\text{DIST } \overline{XY} = \sim 1,050\text{ft}$$

$$C.I. = 40\text{ft} \qquad \text{RELIEF } \overline{XY} = 200\text{ft}$$

$$\overline{XY} =$$

$$\text{GRAD} = \frac{\Delta \text{ELEV}}{H.D.} = \frac{200\text{ft}}{1,050\text{ft}} = 0.19$$

$$\boxed{\text{INV. TAN}(0.19) = 10.8^\circ}$$

$$\boxed{\text{GRAD} = 0.19 \times 100\% = 19\%}$$

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