

University of Asia Pacific
Department of Civil Engineering
Final Examination Fall 2012
Program: B. Sc. Engineering (Civil)

Course Title : Engineering Geology & Geomorphology
 Time: 3 hours

Course # : CE 203
 Full Marks: 120 (6 X 20 = 120)

Section A

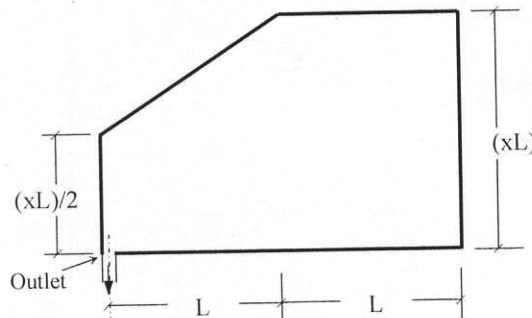
There are **four (4)** questions in this section, answer **any three (3)**

- | | | |
|----|--|------------|
| 1. | (a) Draw a schematic diagram of the rock cycle and discuss (with at least two examples of each) about igneous, sedimentary and metamorphic rocks according to the cycle. | 14 |
| | (b) Describe, in brief, the principal zones of the earth from geologic point of view. | 6 |
| 2. | (a) Classify (no description is required) major minerals. Discuss, in brief, major non-silicate minerals. | 8 |
| | (b) Classify fold (mention names only) based on geometry. | 3 |
| | (c) Classify and discuss briefly (with neat sketches) various types of faults according to the direction of movement and net slip. | 9 |
| 3. | (a) Define earthquake. Mention the causes of earthquake. Define the major earthquake parameters (geometric) with neat sketches. | 8 |
| | (b) Discuss liquefaction phenomenon (with basic mechanism) due to earthquake. | 7 |
| | (c) Tabulate Modified Mercalli intensity scales of earthquake (VIII to XII). | 5 |
| 4. | Briefly discuss, mention or draw sketches, as asked for, on any four of the following topics:- | 5 X 4 = 20 |
| | (i) Different geomorphic processes (no description required) based on origin | |
| | (ii) Neat sketches of anticline, basin and dome | |
| | (iii) Surface waves of earthquake (no sketch required) | |
| | (iv) Typical geometry of a fold (with neat sketch) | |
| | (v) Distinction between Ferromagnesian and non-Ferromagnesian silicates | |

Section B

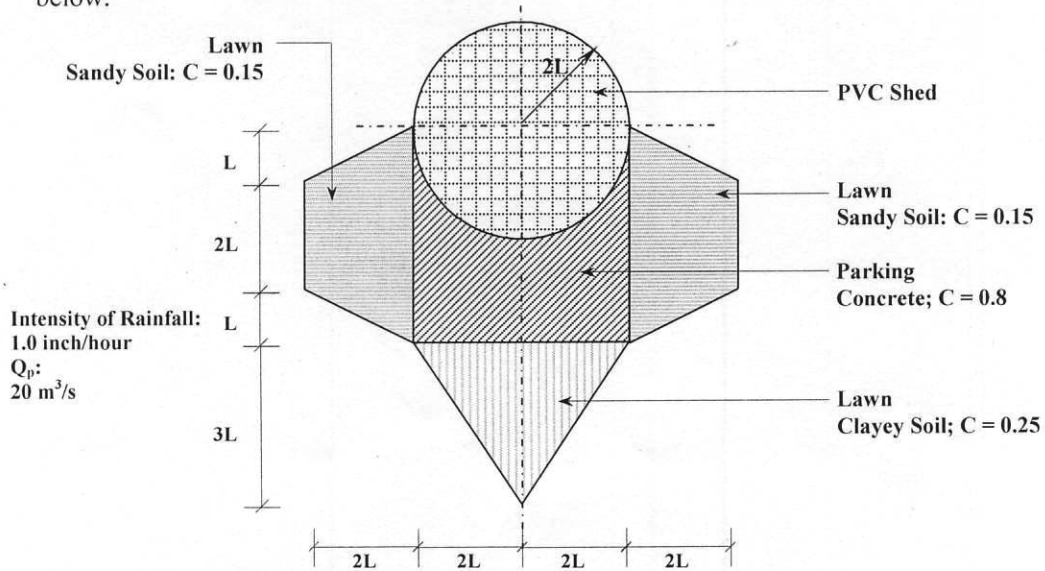
There are **four (4)** questions in this section, answer **any three (3)**

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|----|--|---|
| 5. | (a) Define infiltration and percolation. | 2 |
| | (b) Define with sketch: (1) Axial length (2) Time of Concentration. | 2 |
| | (c) For the following basin, x is a constant factor. For what value of x, the flow rate (Q) will be the maximum for the basin? Find the FF and CC of the basin for maximum runoff. | 7 |

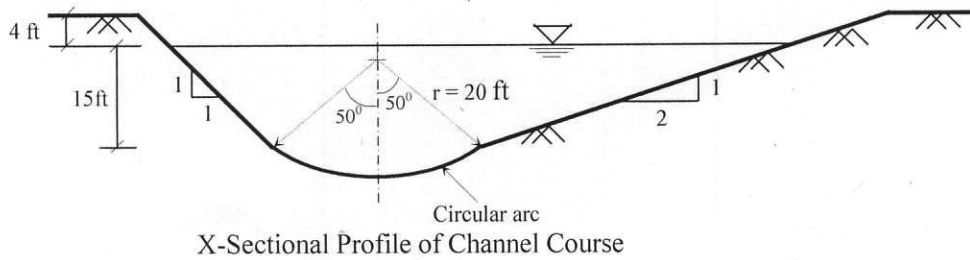


(d) Using the information provided below, calculate L for the catchment area as shown below.

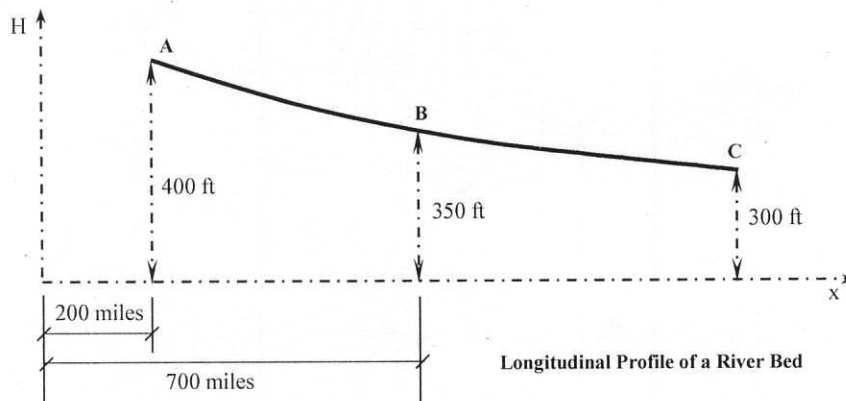
9



6. (a) Prove that $\tau = \gamma_w R_{HS}$; where symbols carry their usual meanings. 5
- (b) For a stream having triangular X-section and $D \lll T$, prove that $\tau \propto D$ where----- 4
- τ = tractive pressure along the stream T = Top width of stream
 D = depth of stream
- (c) Velocity of flow of one river (R-1) is four times the velocity of flow of another river (R-2). Derive a correlation between the two rivers in terms of their ability of transporting maximum size of sediments. 4
- (d) Cross-sectional profile of a channel is shown below. The gradient of the channel bed is 4.33×10^{-4} . Calculate the tractive pressure along the channel. 7

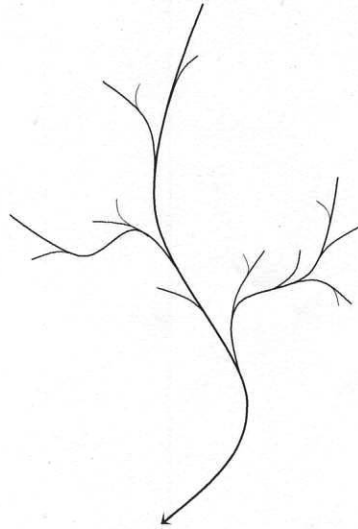


7. (a) Write short notes on various types of loads of a river. 3
- (b) Prove that $H = ae^{-bx}$; where symbols carry their usual meanings. 5
- (c) Using the figure shown below, calculate the horizontal distance between B and C. 5



- (d) Rank the streams of the following drainage basin having a total catchment area of 9,111 square kilometer. The results of the survey are summarized in the table below.

7



Stream Rank	Average Length (km)
1	7.0
2	18.9
3	44.8
4	99.9

Calculate the following parameters:

- (i) Average Bifurcation Ratio (ABR)
- (ii) Average Length Ratio (ALR)
- (iii) Stream Frequency

8. (a) Write down the major factors affecting drainage pattern. Discuss, in brief, and draw sketches of any five types of drainage patterns. 10
- (b) What is a river valley? Sketch a typical cross-section of a river/stream valley. Classify (mention names only) valley according to the stage, genesis and controlling structures. 5
- (c) Discuss, in brief, the ways valleys are deepened. 5