

**University of Asia Pacific**  
**Department of Civil Engineering**  
**Final Examination Spring 2013**  
**Program: B. Sc. Engineering (Civil)**

Course # : CE-203

Course Title: Engineering Geology & Geomorphology

Full Marks: 120 (6 X 20 = 120)

Time: 3 hours

**Section A**

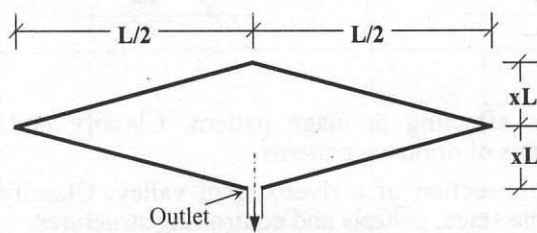
There are **four (4)** questions in this section, answer **any three (3)**

1. (a) What is geomorphic process? Classify (mention names only) geomorphic processes based on origin. Write down the names of major geomorphic agents. 5  
 (b) What are physical and chemical weathering processes? Discuss, in brief, the physical weathering processes. 7  
 (c) Give two examples of each type of major rocks. Discuss, in brief, sedimentary rocks. 8
2. (a) Classify (mention names only) major minerals. Mention the major properties of minerals. 4  
 (b) What is diastrophism? Draw neat sketch of a typical fold geometry showing its major features. 4  
 (c) Write short notes on folds, faults and joints and rock cleavage. 6  
 (d) Classify and discuss briefly (with neat sketches) any three types of folds. 6
3. (a) Classify (mention names only) faults and draw sketch of any two types of fault. 6  
 (b) Mention the aftermaths of liquefaction phenomenon. 4  
 (c) Classify and discuss briefly (no sketch required) different types of waves generated due to earthquake. 8  
 (d) Tabulate Modified Mercalli Intensity scales of earthquake (IX to XII). 2
4. Briefly discuss, mention or draw sketches, as asked for, on any four of the following topics:- 5 X 4 = 20
  - (i) Schematic diagram of rock cycle
  - (ii) Principal zones of earth (names only) with a schematic diagram showing the thicknesses of different parts of lithosphere/geosphere.
  - (iii) Neat sketches of Oblique fault and Graben
  - (iv) Basic mechanism of liquefaction
  - (v) Major earthquake parameters (geometric) with neat sketches

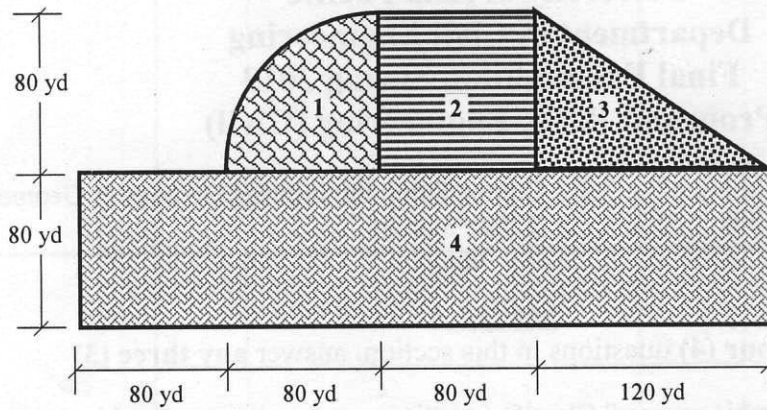
**Section B**

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

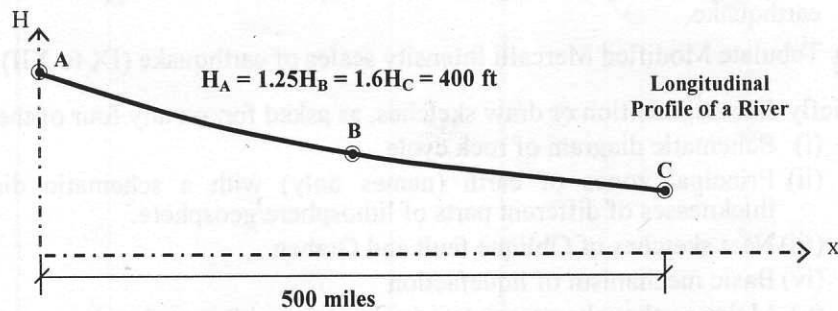
5. (a) Discuss, in brief, runoff. 3  
 (b) Mention the factors affecting runoff (no description is required). 3  
 (c) For the basin shown below, x is a constant factor. For what value of x, the flow rate (Q) will be the maximum for the basin? Find the FF and CC of the basin for maximum runoff. 8



- (d) For the drainage area as shown in the next page, calculate peak runoff in  $m^3/s$ . Use  $C_1 = 0.8$ ,  $C_2 = 1.0$ ,  $C_3 = 0.5$  and  $C_4 = 0.7$  and  $I = 0.2$  cm/min. 6



6. (a) What are the major causes of river erosion? Mention three hydraulic actions responsible for river erosion 3
- (b) Prove that  $d \propto v^2$ ; where symbols carry their usual meanings. 8
- (c) Two rivers, river 1 ( $R_1$ ) and river 2 ( $R_2$ ) has velocity  $v_1$  of river 1 about 4 times the velocity of river 2,  $v_2$ . Compare their sediment transport in terms of their maximum size. 3
- (d) Two locations of a river has slopes of 1:10000 (V:H) and 1:30000 (V:H) at locations 1 and 2, respectively. Hydraulic radius at location 1 is 3 times the hydraulic radius at location 2. Compare erosional tendency of the same river at these two locations. 3
- (e) For a stream having triangular X-section and  $T \lll D$ , prove:  $\tau \propto T$  3  
Where symbols carry their usual meanings.
7. (a) Define river transportation, load, capacity and competence. Write short notes on various types of loads of a river. 5
- (b) From the following figure, calculate the horizontal distance between locations B and C. 4



- (c) What is stream order/rank? Mention the laws of stream order/rank with diagram. 4
- (d) Calculate Drainage Density (DD) of a catchment area (having  $SF = 1.067 \times 10^{-3} / \text{Km}^2$ ) from the information provided in the table below. 7

Stream Rank	No. of Streams ( $N_{s_i}$ )	BR	ABR	Mean Length ( $L_{m_i}$ , Km)	LR	ALR
1	---	2.5	2.722	---	3.0	2.222
2	8			30		
3	---	---	---	---	---	---
4	---	---	---	---	---	---

8. (a) Mention the factors affecting drainage pattern. Classify and discuss, in brief with sketches, any two types of drainage patterns. 8
- (b) Sketch a typical cross-section of a river/stream valley. Classify (mention names only) valley according to the stage, genesis and controlling structures. 3
- (c) Discuss, in brief, the ways valleys are deepened and widened. 9