NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONOURS) DEGREE
PART 11 SUPPLEMENTARY EXAMINATIONS – OCTOBER 2009
ENGINEERING HYDROLOGY – TCW 2202

INSTRUCTIONS
Answer all questions

Time: 3 hours
Total marks   100

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QUESTION 1

(a) What is groundwater?   **(2 marks)**

(b) Define the following terms in relation to groundwater: (i) Pore pressure   **(2 marks)**
(ii) Aquiclude, (iii) Aquifer, (iv) Hydraulic conductivity, (v) Transmissivity, (vi)
Specific yield, (vii) Specific retention, (viii) Porosity, (ix) Isotropy and
(x) Anisotropy   **(12 marks)**

(c) With the aid of illustrative diagrams, briefly explain what is meant by:
 (i)   Confined aquifer.   **(3 marks)**
 (ii) Unconfined acquifer   **(3 marks)**
 (iii) Artesian well   **(3 marks)**

(d) What are the limitation of Darcy's to law groundwater flow   **(2 marks)**

QUESTION 2

(a) The common methods to determine the areal depth of precipitation are Arithimetic,
Thiessen Polygon and Isohyetal. For each method describe its applicability.   **(6 marks)**

(b)   The hydrological variable of rainfall and stream flow can be represented by mean
values but these are often not satisfactory for design of hydraulic structures. Explain
why?   **(3 marks)**

(c)   What do you understand by the term storage co-efficient in confined
aquifers?   **(3 marks)**

(d)   Discuss any two methods you know which are commonly used to determine acquifer
constants in unsteady well hydraulics.   **(4 marks)**

(e) Derive the well function W(u) formula in unsteady well hydraulics.   **(9 marks)**

QUESTION 3

(a) Define infiltration.   **(2 marks)**

(b) State factors which affect infiltration? And briefly explain them .   **(8 marks)**

(c) State any two methods used to determine infiltration**.**   **(2 marks)**

(d) Briefly explain what is meant by infiltration capacity?   **(2 marks)**

(e) State the Horton's equation used to determine infiltration.   **(3 marks)**

(f) Discuss the limitations of Horton's equation.   **(8 marks)**

QUESTION 4

(a) What are the applications of hydrology in Civil Engineering?   **(4 marks**)

(b) Distinguish between a hydrologic cycle and a water budget.   **(4 marks)**

(c) Define the term "Dew point".   **(2 marks)**

(d) With an aid of a sketch, or diagram describe the disposition of precipitation with reference to the phases of a hydrologic cycle and channel flow.
(5 marks)

(e) Describe the processes that are considered in the formation of precipitation.

(4 marks)

(f) Define the term "Return period" with respect to precipitation   **(2 marks)**

(g) Determine the point rainfall at station A in Fig Q4.1. the recorded data at adjacent station gauge stations within the same hydrological zone are given in
Table Q4.1.   **(4 marks)**

Table Q1.1.

Station	B	C	D	E	F
Rainfall, mm	30	32	36	46	29