NATIONAL UNIVERSITY OF SCINCE AND TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONOURS) DEGREE
PART III FIRST SEMESTER EXAMINATION-APRIL 2009
ENGINEERING HYDROLOGY TCW 2202

INSTRUCTIONS

Answer all questions

Time : 3 hours
Total Marks: 100

QUESTION 1

(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 aid of a sketch, 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". **(2 marks)**

(g) Determine the point rainfall at station A in Fig Q1.1. the recorded data at adjacent station gauge stations within the same hydrological zone are given in Table Q1.1. **(4 marks)**

Table Q1.1.

Station	B	C	D	E	F
Rainfall, mm	41	46	38	51	43

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 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. **(10 marks)**

(e) Define the well function W(u) in unsteady well hydraulics. **(3 marks)**

QUESTION 3

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

(b) Define the following terms in relation to groundwater: (i) Pore pressure, (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 law groundwater flow **(2 marks)**

QUESTION 4

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

(b) What are the factors which affect infiltration? **(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)**