DEPARTMENT OF CIVIL ENGINEERING

CE-004 HYDROLOGY AND GROUND WATER
END SEMESTER EXAMINATION; December 6, 2006
SESSION 2006-2007

TIME: 3 Hours **M. MARKS: 100**

Note: Assume missing data suitably, if required.

Q1:

(a) Explain how rain falling on earth is disposed off.

(b) The following information is available from an isohyetal map of a catchment:

Rain gauge station	A	B	C	D	E	F	G	H
Annual rainfall (cm)	120	95	96	60	65	70	45	21

How many additional rainguage stations will be required if the desired limit of error in the mean value of rainfall is not to exceed 10 cm?

(c) The infiltration characteristics of an area was studied and the following data was obtained:

Time (h)	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.25
Infiltration (cm/h)	6.5	3.4	2.3	1.8	1.4	1.28	1.0	1.0	1.0

Determine equation of infiltration capacity curve.

(5, 7, 8)

Q2:

(a) A 6 h unit hydrograph for a catchment of area 1000 km^2 can be approximated as a triangle with a base of 66 h. If the peak of unit hydrograph occurs after 12 h from the start, calculate the flood hydrograph due to a storm of rainfall 3.2 cm occurring during first 6 h and 5.2 cm during successive second 6 h duration.

Assume infiltration index as 0.2 cm/h and a constant base flow of 30 cumec

(b) Characteristics of two catchments A and B measured from a map are given below:

Item	Catchment A	Catchment B
L_{ca}	76 km	52 km
L	148 km	106 km
A	2718 km^2	1400 km^2

P.T.O.

For a 6 h unit hydrograph in catchment A, the peak discharge is at 37 h from the start of the rainfall excess and its value is 200 m^3/s. Assuming catchments A and B are to be meteorologically similar, determine the elements of 6 h SUH for catchment B by using Snyder's method.

(10, 10)

Q3:

(a) What do you understand by flood routing and what is its importance?

(b) The inflow and outflow hydrographs of a particular reach of a channel are given below.

Time (h)	0	6	12	18	24	30	36	42	48	54	60	66	72
Inflow (m^3/s)	35	135	440	670	685	535	385	235	140	95	60	42	35
Outflow (m^3/s)	35	57	200	455	612	617	510	375	246	158	102	68	56

Determine Muskingum coefficients k and x for this reach.

(6, 14)

Q4:

(a) Differentiate between confined and unconfined aquifers

(b) Rainfall falls at the rate of 10 mm/hr on a strip of land 1 km wide lying between two parallel canals. It is underlain by a horizontal impervious stratum. The water depth above this stratum in the two canals are 12 m and 10 m. Assuming a permeability of 12 m/day with vertical boundaries and all the rainfall infiltrates into the soil, compute the discharge per meter length into each canal. Also, determine the equation of the water table profile and the location of the water table divide. Derive the formulae.

(5, 15)

Q5:

(a) What is a mass curve and how will you determine the storage capacity of a reservoir by using the same?

(b) Discuss the economics of a flood control project.

(c) Discuss rational method of determing the peak discharge.

(d) What is a reservoir? Discuss in brief the different types of reservoirs.

(4 x 5)