Government College of Engineering, Aurangabad

(An Autonomous Institute of Government of Maharashtra)

M.E. (Civil-Water Resources Engineering) Examination (Rev)

End Semester Examination November-December 2016

CE 542: ENGINEERING HYDROLOGY AND HYDROLOGIC SYSTEMS

Time: Three Hours 30 NOV 2016 *Max. Marks: 60*

"Verify the Course Code and check whether you have got the correct question paper"

N.B:-

1. *All questions are compulsory*
2. *All questions carry equal marks*
3. *Assume suitable data if necessary and state it clearly*
4. *Use of non-programmable calculator is allowed*

Q1. Attempt any TWO

a) Explain with sketch

(i) Deterministic lumped steady-flow model;

(ii) Deterministic lumped unsteady-flow model

(b) Ordinates of 4-h UH are given. Derive the ordinates of a 2-h UH for the same catchment.

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22
4-h UH ordinates (m^3/s)	0	8	60	140	250	100	70	50	20	8	5	0

(c) 6-h unit hydrograph ordinates are given. A storm had three successive 6-h intervals of rainfall magnitude of 4.0, 5.0 and 4.5 cm respectively. The Ø-index is 0.25 cm/hour and base flow is 18 m^3/sec. Determine the resulting hydrograph of flow.

Time (h)	0	3	6	9	12	18	24	30	36	42	48
6-h UH ordinate (m^3/sec)	0	20	120	210	290	130	70	30	15	5	0

Q2. Attempt any TWO

(a) Explain briefly the basic principles involved in the development of IUH by Nash's model.

(b) The time-area for a catchment is given. The catchment area is 275 km^2, Time of concentration is 8 hours and the storage constant is 6 hours. Determine the IUH for the catchment by Clark's method.

Time (h)	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Area (km^2)	25	50	60	70	40	20	10

(c) The following data is given for two catchments A and B. For a 6-h UH of catchment A, the peak discharge is 400 m^3/s and is at 36 hour from the start of rainfall excess. The catchments A and B are meteorologically similar. Determine the elements of a 6-hour synthetic unit hydrograph for catchment B. Use Snyder's method.

Catchment A	Catchment B
L = 300 km L_{ca} = 120 km A = 3000km^2	L = 120 km L_{ca} = 60 km A = 2200 km^2

Q3. Attempt any TWO

(a) Explain Poisson distribution and Gamma distribution

(b) For a river, the estimated flood peaks for two return periods by the use of Gumbel's method are as follows. What flood discharge in this river will have a return period of 1000 years?

Return period (Years)	Peak flood (m^3/s)
100	1000
50	550

(c) Explain the following

(i) Central Tendency as probability distribution characteristics;

(ii) Design flood

Q4. Attempt any TWO

(a) What are analog models? Explain any one model

(b) Explain land use and soil mapping using remote sensing

(c) Route the following flood hydrograph through a river reach for which the Muskingum coefficients are K = 20 hours, and X = 0.30. Obtain the outflow hydrograph. At the start of the inflow flood, the outflow is 12 m^3/sec.

Time (h)	0	12	24	36	48	60	72	84	96
Inflow (m^3/sec)	12	60	200	250	160	120	80	20	10

Q5. Attempt any TWO

(a) Discuss Soil and Water Assessment Tool (SWAT). What are the applications of SWAT in water resources engineering

(b) Explain Global Circulation Model (GCM) and Regional Circulation Model (RCM)

(c) What are the adaptation strategies to the impact of climate change

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