BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.TECH. **SEMESTER: VII/ADD.**
BRANCH: CIVIL **SESSION: MO/2024**

CE302 WATER RESOURCES ENGINEERING

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Describe the elements involved in a typical hydrologic cycle with the help of simple sketch only.	[5]	1	2
Q.1(b)	Define 'Catchment area'. Write and explain each term involved in water-budget equation with suitable notations.	[5]	1	1,2
Q.2(a)	Identify and briefly discuss various abstractions from precipitations.	[5]	2	3
Q.2(b)	Following are the ordinates of a storm hydrograph of a river draining a catchment area of 400 km^2 due to a 6-h isolated storm. Derive the ordinates of a 6-h unit hydrograph for the catchment. Take base flow as 10.0 m^3/s.	[5]	2	3

Time from start of storm (h)	**-6**	**0**	**6**	**12**	**18**	**24**	**30**	**36**	**42**	**48**
Discharge (m^3/s)	10.0	10.0	30.0	90.0	116.0	102.0	85.0	71.0	59.0	48.0
Time from start of storm (h)	**54**	**60**	**66**	**72**	**78**	**84**	**90**	**96**	**102**	
Discharge (m^3/s)	39.0	32.0	26.0	22.0	18.0	15.0	13.0	10.0	10.0	

Q.3(a)	A 20-cm well penetrates 30 m below static water level (GWT). After a long period of pumping at a rate of 1800 lpm, the drawdowns in the observation wells at 12 m and 36 m from the pumped well are 1.2 m and 0.5 m, respectively. Determine the transmissibility of the aquifer.	[5]	3	3
Q.3(b)	Derive a relationship between Duty 'D' and Delta 'Δ' for a given base period.	[5]	3	3
Q.4(a)	Differentiate between 'Alluvial' and 'non-alluvial canals.	[5]	4	2
Q.4(b)	Design an irrigation channel to carry 50 cumecs of discharge. The channel is to be laid at a slope of 1 in 4000. The critical velocity ratio for the soil is 1.1. Use Kutter's rugosity coefficient as 0.023. Perform the design using two iterations only.	[5]	4	3

PTO

Q.5(a) The non-overflow portion of a concrete gravity dam is shown in Fig.1. Calculate the maximum vertical stress at the heel and toe of the dam. Assume weight of concrete as 24.0 kN/m^3—neglect earthquake & wind effects and pressures due to silt & ice for this dam. [5] 5 4

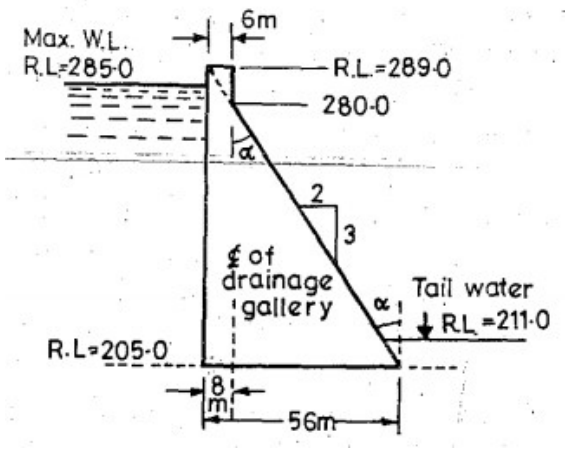

Fig.1

Q.5(b) Discuss the merits and demerits of different types of spillway gates. [5] 5 4

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