Reg.No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

IV SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, MAY/JUNE 2016

SUBJECT: **WATER RESOURCES ENGINEERING[CIE – 2201]**

— — 2016

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A.	Differentiate between conventional and orographic precipitation.	(2)
1B.	Define water budget equation. Give the mathematical equation and explain the terms.	(3)
1C.	The monthly rainfall (P) and monthly runoff (R) for the month of October of a catchment is given below. Find the correlation coefficient; establish a linear rainfall-runoff regression equation and comment on its applicability. Estimate the value of runoff for a rainfall of 32cm and 18 cm.	(5)
2A.	List the factors affecting evaporation and describe any two briefly.	(3)
2B.	Explain velocity rods and velocity floats with neat sketch.	(2)
2C	Determine the design flood discharge allowing an increase of 33% over the estimated flood peak for a bridge site having the following data. Catchment area= 2x10^5 ha , observed maximum storm precipitation = 3cm for 6hr duration, time of concentration = 2hr, Gauged discharge during the past flood was 3400cumecs for an average maximum daily rainfall of 18cm.	(5)

Year	1991	1992	1993	1994	1995	1996
P (cm)	22	26	14	4	30	12
R (cm)	6	12	4	0	18	6

3A.	Define (i) water conveyance efficiency (ii) water distribution efficiency (iii) water storage efficiency. (iv) water application efficiency.	(4)
3B.	Derive a relation between duty, delta and base period.	(2)
3C.	Determine the NIR, FIR, GIR if consumptive use of a certain crop is 20cm given tat rainfall during the season is 50cm. Assume that 7cm of water is required for leaching and other uses of agricultural operations. Take water application efficiency = 70%, water conveyance efficiency = 60%. If the extent of land to be irrigated is 1.6ha, find the volume of water required at the field , source and at the canal head.	(4)
4A.	Define limiting height. Differentiate between high and low gravity dam with sketch.	(2)
4B.	List the major and minor forces acting on a gravity dam. Represent the major forces for a typical gravity dam.	(2)
4C.	Design and draw the cross section of the elementary and practical profile of a gravity dam of stone masonry. Given the following data. RL of the base of the dam = 1500.0 m. RL of the HFL = 1550m. Specific gravity of masonry = 2.25. Safe compressive stress = 2500 kN/m2. Uplift intensity factor = 1. Maximum ware height = 1.5m	(6)
5A.	Draw the layout of typical diversion head work showing and naming all its component parts.	(3)
5B.	List the modes of failure of a diversion head work and explain any two.	(3)
5C.	Define and classify the cross drainage works . Explain aqueduct with neat sketch	(4)

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