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]**

05 – 05 – 2016

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Describe briefly the hydrological cycle with a neat sketch.	(3)
1B.	Describe the Symon's raingauge with a neat sketch.	(3)
1C.	The ordinates of the mass curve of a rainfall over a catchment area of 44 ha are given in the table below. If the storm produces direct runoff of 2 ha-m, find the Ø-index and W-index if the initial loss is 5 mm. Plot it on the hyetograph (on plain sheet)	(4)
2A.	State Dalton's law and give its expression. Define the terms 'saturation vapour pressure' and 'vapour pressure deficit'.	(3)
2B.	Define a flow-duration curve with a neat sketch. Mention its salient features and uses. (**TWO points each**)	(3)
2C.	The ordinates of storm hydrograph measured at an interval of 2 hours and base flow ordinates are given in the table. Effective duration of storm was 4 hours. The	(4)

Time (min)	0	15	30	45	60	75	90	105
Mass curve ordinates (cm)	0	0.2	1.6	2.8	3.5	4.5	5.2	5.2

	catchment area is estimated to be 80 sq.km. Derive the ordinates of 4 hour unit hydrograph. Plot the DRH and UH on a graph sheet. Time (hrs) | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 Stream flow (m^3/sec) | 40 | 85 | 140 | 130 | 100 | 93 | 40 | 40 Base flow ordinates (m^3/sec) | 40 | 42 | 45 | 46 | 46 | 46 | 40 | 40	
3A.	Explain how the stage-discharge-rating curve for a stream-gauging station is prepared.	(2)
3B.	List and explain the 3 categories of investigations required in reservoir planning.	(3)
3C.	The data collected to design a reservoir for irrigating a 24,000 ha cultivable command area is given below. Crop season | Base period (days) | Duty (ha/cumec) | Ratio of crop area sown | Proposed irrigation intensity (%) Perennial | 360 | 800 | 4 | 60 Rabi | 120 | 600 | 3 | 80 Kharif | 210 | 1400 | 2 | 60 Estimate (i) the gross storage capacity required for the reservoir and (ii) the gross design discharge value for the canal. Make all the necessary allowances required. List all the allowances and their values adopted to solve the problem.	(5)
4A.	Define (a) Net irrigation requirement (b) Water storage efficiency (c) Intensity of irrigation (d) Base period	(2)
4B.	List the merits and demerits of an ARCH DAM with relevant reasons (**TWO points each)**	(2)

4C.	Check the stability of the gravity dam section shown in fig.1for overturning, sliding and development of tension. Given : Specific weight of concrete 23.5kN/m^3, Co-efficient of friction = 0.7, Permissible shear strength of the joint between base of the dam and its foundation = 1373.4 kN/m^2,uplift area factor = 1 and uplift intensity factor is 0.65.	(6)
5A.	Distinguish between a weir and a barrage with neat sketches. **(FOUR POINTS)**	(3)
5B.	Draw neat sketch of SUPER PASSAGE and SYPHON SUPER PASSAGE. Illustrate their features and explain the situations in which they are used.	(4)
5C.	List the objectives of "RIVER TRAINING WORKS" **(FOUR POINTS)**. Explain the significance of guide banks.	(3)

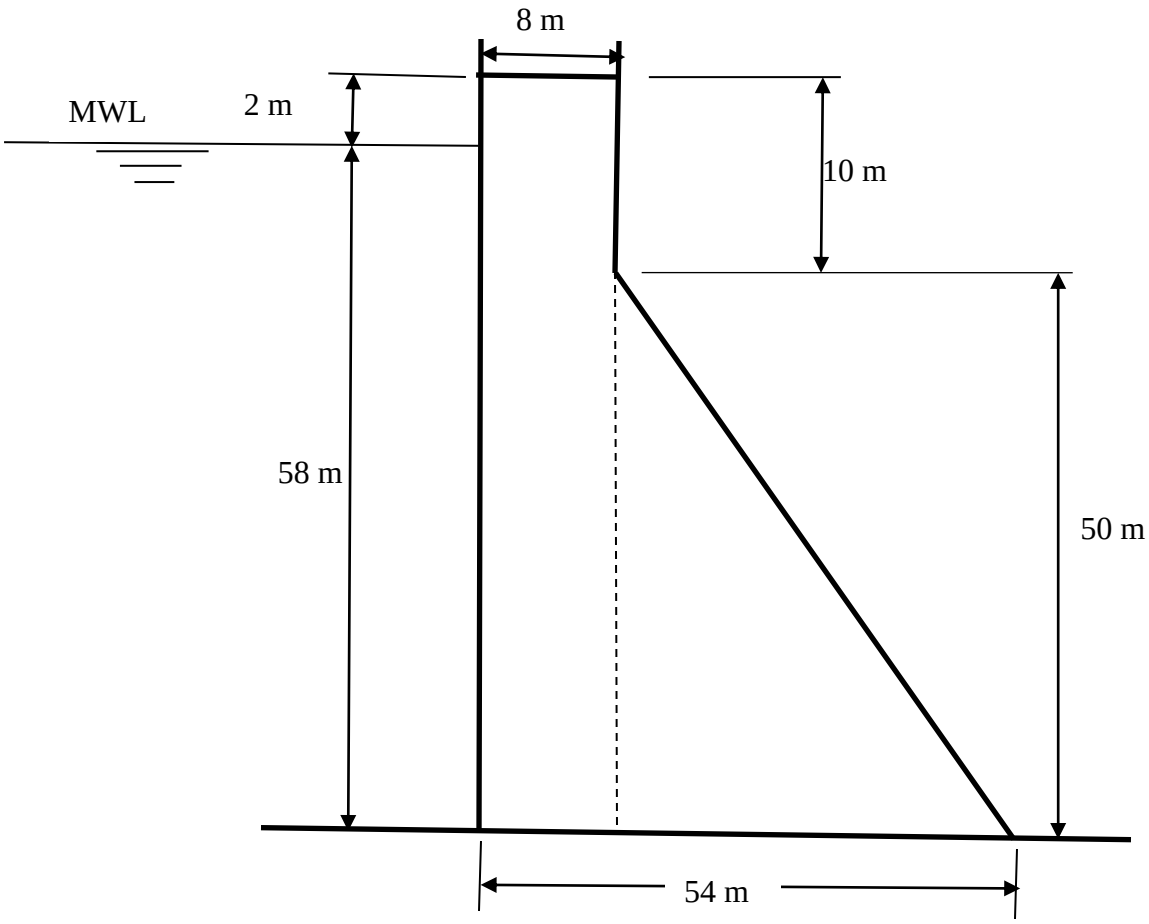

Fig.1

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