

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, APRIL/MAY 2017 SUBJECT: WATER RESOURCE ENGINEERING [CIE 2201] REVISED CREDIT SYSTEM (19/04/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

✤ Missing data may be suitable assumed.

Q.No	Question									Marks		
1A.	Define the following terms: (a).Hydrological Budget; (b) Hydrological Design; (c) Hydraulic Design; (d) Catchment Area										02	
1B.	Write short notes on: (i) Isohyetal Map & Its Use; (ii) Convectional Precipitation. (iii) Automatic Rain gauges; (iv) Rainfall Moving Averages Curve										04	
1C.	The following details refer to an isolated storm in a 500 ha watershed. If the direct runoff by the storm measured at the outlet is 0.340 Mm ₃ , estimate the Φ -index of the storm, distribution of the excess rainfall and its duration. Time from the start (h) 0 2 4 6 8 10 12 14 16 18 Cumulative rainfall (cm) 0 0 8 2 6 2 8 4 1 7 3 10 8 11 8 12 4 12 6								04			
2A.	Distinguish between: (i) Guide Banks and Levees ii)Attracting Groynes, Repelling Groynes and Deflecting Groynes								02			
2B.	What is meant by Flood routing? Explain, briefly, the different methods of Flood routing.									04		
2C.	The following table shows the observed annual rainfall and the corresponding annual runoff for a small catchment. Develop the rainfall-runoff correlation equation for this catchment, find the correlation coefficient and comment on the result. What annual runoff can be expected from this catchment for an annual rainfall of 30 cm and 100cm?								04			
	Year Rainfall (cm) Runoff (cm)	2008 90.5 30.1	2009 111 50.2	20 38 5.)10 3.7 3	2011 129.5 61.5	20 14 74	12 2 5.5 9	2013 99.8 39.9	2014 147.6 64.7	2015 50.9 6.5	
3A.	Define the terms: Field Capacity (FC), Permanent Wilting Point (PWP), and Moisture Equivalent (ME) State the relationship of ME with FC and PWP								02			
3B.	Represent different _zones of storage in a reservoir with neat sketch showing relevant water level terms and explain each of them.							04				



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3C.	The details of crops under the command of a reservoir are given below. Estimate the Gross									
	design discharge capacity of the main canal taking-off from it making all necessary									
	allowances, assuming suitable values.									
	CROPS	DELTA	SOWING	HARVESTING	AREA IRRIGATED					
		cm	TIME	TIME	ha					
	Rice	125	June	September	3000	04				
	Wheat	28	November	January	5400					
	Sugarcane	356	February	December	6000					
	Vegetables	60	February	April	2500					
	(Summer Crop)	(Summer Crop)								
4A.	State merits, demerits (any TWO each) of Arch Dams and situations in which they									
	are preferred.									
4B.	i) Explain: Spillways Energy Dissinaters & State their different types (ii) Draw a neat									
	sketch of a Spillway with energy Dissipater showing & naming all its component parts									
	sketen of a opinious with energy Dissipated showing a number of its component parts.									
	Following data is obtained from the analysis of a Cravity Dam of transzoidal C/S									
	24m high having U/S	food you	the analysis	width $-4m$ and	$\frac{1101}{1000} \frac{1000}{1000} $					
4C.	24m mgn, naving U/S face vertical, top width = 4m, and base width = 18m.									
	Assuming that there is no water on D/S side and a free board of 3m, find the									
	maximum and minimum normal stresses in dam, its foundation. State their nature.									
	DATA OBTAINED: $\Sigma V = 2750 \text{ kN}$; $\Sigma H = 2063.11 \text{ kN}$; $\Sigma M_R = 42.125.53 \text{ kNm}$; ΣM_O									
	= 28502.20 kNm.									
F A	Explain the terms: (i) Diversion Head Works; (ii) Canal Masonry Works;									
5A.	(iii) Cross Drainage Works: (iv) River Training Works									
5B.	Explain the classification of canals based on their alignment and state the merits and									
	demerits of each of them									
	A vertical drop weir has following particulars: I anoth of weir = 15m; Ita Height =									
5C.	A vertical drop well has following particulars: Length of well = 1511; Its Height = 2 m_{s} is Tag Width = 1.8 m is Dass width = 2.8 m Height = 6.75 N f									
	Sin; its 1 op width = 1.8m; its Base width = 3.8m; Height of Shutter = $0.75m$. Nature									
	of bed: Coarse Sand with Bligh's Coefficient = 15. (a) Design the length and									
	thickness of solid apron for the weir; (b) Draw the C/S of the weir giving details of									
	the solid apron design and showing & naming all the relevant component parts.									
	Assume the length of <i>U/S</i> and <i>D/S</i> cut-offs as 6m and 12m respectively; and take the									
	length of U/S and D/S Bed protections as 10mm and 20mm respectively: their									
	thickness being 1m.									