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## MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

(A constituent institution of MAHE, Manipal)

## IV SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, APRIL/MAY 2018 SUBJECT: WATER RESOURCES ENGINEERING [CIE 2201] REVISED CREDIT SYSTEM

(17/ 04/ 2018)

Time: 3 Hours

MAX. MARKS: 50

## Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.

Q.No																	Marks	CO
1A.	Explain the hydrologic cycle with a neat diagram and state the water budget equation.											03	CO1					
1B.	The ordinates given below. of rainfall and Time (hr:min) Accumulated Rainfall (mm)	of th Find l aver 7:00 0	e rain the or age ra 7:15 10.5	fall de dinate infall 7:30 18	epths es of r inten ) 7:4 28	obtain rainfal sity. E 5 8:0 45	ed fre l hye xpres 00 8 .5 5	om tl togra ss int :15 1.3	he ch aph. C tensit 8:30 71.2	art of Dbtain ies in 8:45 85	a reo the mm/ 9:00 96	core val /h.	ding lues 9:15 120	rain of to 9:3 132	gau tal d 0 9	ge is lepth 9:45 32	04	CO1
1C.	Distinguish between Isohyetal method and Thiessen polygon methods of estimating average rainfall over a catchment area (4 points). List the common rainfall measuring devices under relevant categories.										ating uring	03	CO1					
2A.	What is the significance of infiltration indices? List the factors affecting infiltration.										•	02	CO1					
2B.	Hourly ordinates of the hyetograph of rainfall over a 50ha of watershed are $0,15,20,16,9,18,12,0$ mm/hr. The volume of runoff from this area was measured to be 4ha.m. Determine the Ø index and w- index. Assume initial storm losses as 0.6cm. Also find out the rainfall excess in each hour.									are to be 6cm.	04	CO1						
2C.	Explain the area-velocity method and slope area method of stream gauging.										04	CO2						
3A.	The streamflow due to a storm of effective duration 6 hour on a basin are given below. The area of the basin is 45.4 km <sup>2</sup> . Assuming a constant base flow of 10 cumec, derive the ordinates of a 6- hour unit hydro graph for the basin. Plot the 6 hour unit hydro graph on graph sheet. $\frac{\text{Time (hrs)} \ 0 \ 3 \ 6 \ 9 \ 12 \ 15 \ 18 \ 21 \ 24 \ 27 \ 30 \ 33 \ 36 \ 39}{\text{Streamflow 10} \ 14 \ 18 \ 32 \ 146 \ 54 \ 58 \ 49 \ 36 \ 25 \ 17 \ 12 \ 11 \ 10}$									elow. erive ydro <u>39</u> 10	04	CO2						

3B.	Define the following saturation Capacity, Content, Readily Ava	03	CO3						
3C.	Draw a typical section storage and define all material used.	03	CO4						
4A.	<b>4A.</b> The base period, intensity of irrigation and duty of water for various crops under a canal system are given in table below. Determine the reservoir capacity If the culturable command area is 40000ha. Canal losses are 20% and reservoir losses are 10%. <b>4A.</b> CropBase period (days)Duty (ha/cumecs)Intensity of irrigation (%) <b>4A.</b> Wheat120180020Sugarcane360170020cotton180140010rice12080015vegetable12070015						CO3		
4B.	List the major and minor forces acting on gravity dam. The computations for analyzing the stability of a concrete gravity dam have given the following values for reservoir full condition. Check for the safety of dam. $\Sigma V=58,966 \text{ kN}, \Sigma H=50,404 \text{ kN}, \Sigma M_R=37,05,433 \text{ kN-m}, \Sigma Mo=25,68,749 \text{ kN-m}$ Base of dam = 73m, Depth of reservoir water=89m, Depth of tail water=8m Unit weight of concrete = 24 kN/m <sup>3</sup> , The co-efficient of friction, $\mu=0.75$ , Shear strength of concrete, $q=150 \text{ kN/m}^2$								
4C.	Mention the merits an	04	CO4						
5A.	Cross section of a car pressures at A and B. a factor of safety of 1.	03	CO5						
5B.	Distinguish between: (i) Weir and barrage	(ii) Low and his	gh gravity dam (	iii) Aqueduct and	super passage	03	CO5		
5C.	Discuss the modes of their remedies (2 point	-surface flow and	04	CO5					

