Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS APRIL/MAY 2019

SUBJECT: WATER RESOURCES ENGINEERING (CIE 2201)

Date of Exam:

Time of Exam:

Max. Marks: 50

Instructions to Candidates:

✤ Answer ALL the questions & missing data may be suitably assumed

Q.No	Questions	Marks	CO
1A	Explain three methods of determining the mean areal depth of precipitation over	03	CO1
	a basin covered by several raingauge stations.		
1B	The ordinates of mass curve of a rainfall over a catchment area 50ha are given below. If storm produces direct runoff of 2. 5ha.m, find φ -index and w- index if the initial loss is 5mm. Plot the hyetograph also (on plain sheet) $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	04	CO1
1C	What is a "mass curve of rainfall"? Discuss its salient features.	03	CO1
2A	Define stream gauging. Explain the following methods of stream gauging. i) Area – velocity method ii) Velocity rods and velocity floats.	03	CO2
2B	The ordinates of a 12hr unit hydrograph are given below. Compute a 6-hr unit hydrograph ordinated. Plot the same on graph sheet.Time (hr)0612182430364248546012-hr unit014816191512860hydrographOrdinates (cumec)	03	CO2
2C	The observed mean monthly flows in m^3 /sec of a stream for one year period from June to May is given below. Use graph sheet.	04	CO2
	June July Aug Sept Oct Nov Dec Jan Feb March April May		
	18 20 46 42 37 30 33 23 26 21 19 8		
	a. Determine the flow which can be expected 90% of time.		
	b. What is the dependability of the flow of magnitude 35 m^3 /sec ?		
3A	It is proposed to irrigate crops sown under the command of an irrigation canal. Determine depth and frequency of irrigation with the given data. Field capacity is 35%, permanent wilting point is 15%, density of soil is 1500kg/m ³ , conveyance efficiency of field canal is 80%, water application efficiency is 70%, root zone depth is 75cm, consumptive use is 10mm/day. Irrigation water is to be supplied when the average soil moisture falls to 15%. Also determine the depth of irrigation water required at the head of field canal system.	03	CO3
3B	List the benefits of Irrigation and discuss each of them briefly. (4 points)	02	CO3

3C	Sketch the typical layout of a diversion head work and briefly explain the component parts.	05	CO5
4 A	Stability analysis of a concrete gravity dam gives the following data. Total restoring moment = 3450.10×10^3 kN-m Total overturning moment = 1850.60×10^3 kN-m Total vertical forces = 58.50×10^3 kN Total horizontal forces = 30.43×10^3 kN Permissible shear stress of joint = 1500 kN/m ² Co-efficient of friction = 0.7 Base width of the dam = 60 m U/S face inclination = 1 V:0.07H, D/S face inclination= 1 V:0.7H Depth of reservoir water = 80 m, Depth of tail water = $8m$ i. Check the stability of the dam against (a) overturning (b) sliding (c) tension. ii. Where does the maximum vertical stress occur? iii. Is the section safe against compression if, the allowable compressive stress for dam material is 2500 kN/m ²	06	CO4
4B	Design and sketch the elementary and practical profile of a concrete gravity dam (non-overflow section) for the following data; R.L of the base of the dam = $3225m$ R.L of high flood level = $3290m$ Safe allowable compressive stress of dam material = 3000 kN/m^2 Expected height of waves = 2 m Specific gravity of dam material = 2.5 Coefficient of friction for dam material = 0.75	04	CO4
5A	How are canals classified? Briefly explain with sketches the types of canals based on the alignment	05	CO5
5B	Figure shows the section of a hydraulic structure founded on sand which has a Blighs creep coefficient of 12. Determine the minimum length of d/s floor to be provided so that the floor is safe against piping. Also determine the thickness of the floor at A, B and C if the Sp. Gr of floor material is 2.24. (All dimensions are in meters) A B C A C A B C A C A B C A C C A C C A C C A C C C C C C C C C C C C C C C C C C C	05	CO5