MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL (A constituent unit of MAHE, Manipal)

MANIPAL INSTITUTE OF TECHNOLOGY FOURTH SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATION, MAY 2024 WATER RESOURCES ENGINEERING (CIE 2225)

(24-06-2024)

TIME: 3 HRS.

MAX. MARKS: 50

Note: 1. Answer all questions.

2. Any missing data may be suitably assumed.

Q. NO	QUESTION	MARKS	CO	BL
1A	Give a detailed account of the hydrological failure with definition and causes for it.	3	1	2
1B	A 6h storm produced rainfall intensities 7, 18, 25, 12, 10 and 3 mm/h in successive one-hour intervals over a basin of 800 sq km. The resulting runoff is observed to be 2640 hectare-meters. Determine the \emptyset - index for the basin. Also compute the rainfall excess and corresponding duration.	3	1	4
1C	Highlight the working principle of an Ogee Spillway with a neat sketch. In what way it is more efficient than a straight drop or free fall spillway? Why?	4	4	3
2A	Explain in detail the construction and working principle of Simon's rain-gauge with a neat sketch. What are the disadvantages with these rain gauge stations? Discuss.	5	1	3
2B	Highlight the construction of flow duration curve. Enumerate any 2 uses of this curve.	3	2	2
2 C	Illustrate the flood routing methods.	2	3	2
3A	A weir is proposed across a stream draining an area of 85 ha. The maximum length of travel for water is 950 m, the average slope of the basin is 0.006 and average runoff coefficient is 0.68. Determine the peak flood discharge for observed maximum precipitation of 3 cm for 8 hr duration. What should be the design flood if a factor of safety of 3 is considered.	4	3	4
3 B	Explain with a sketch the procedure of plotting of stream flow hydrograph. Also illustrate the different base flow separation techniques.	4	3	3
3 C	Explain the different types of energy dissipaters along with the hydraulic structure generally they are associated with.	2	4	3

4A	Design and draw the practical profile of a gravity dam of stone masonry, given the following data: RL of base of the dam = 880.00m; RL of H.F.L = 910.00m; Specific gravity of masonry = 2.25 ; Safe compressive stress of masonry = 1400 kN/m ² ; Height of waves = $1.2m$; Co-efficient of friction = 0.7 . Uplift intensity factor =1	5	4	4
4B	Explain the purposes served by a dam.	2	4	2
4C	Enumerate any 3 factors to be considered while aligning the canals in detail.	3	5	3
5A	Explain briefly the components of a buttress dam.	2	4	2
5 B	How does the failure of the weirs by piping or undermining happen? Explain the remedial measure against these failures.	3	5	3
5C	The figure shows the section of a barrage founded on sand. Calculate the average hydraulic gradient. Also Calculate also uplift pressures below the foundation and the floor thicknesses at points 8m, 16m, 20m from the upstream end of the floor. Assume specific gravity=2.4 and factor of safety = 4/3.	5	5	4