Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, JUNE 2022

SUBJECT: WATER RESOURCES ENGINEERING [CIE-2255]

REVISED CREDIT SYSTEM

(_ / 06 / 2022)

Time: 3 Hours Max. Marks: **50**

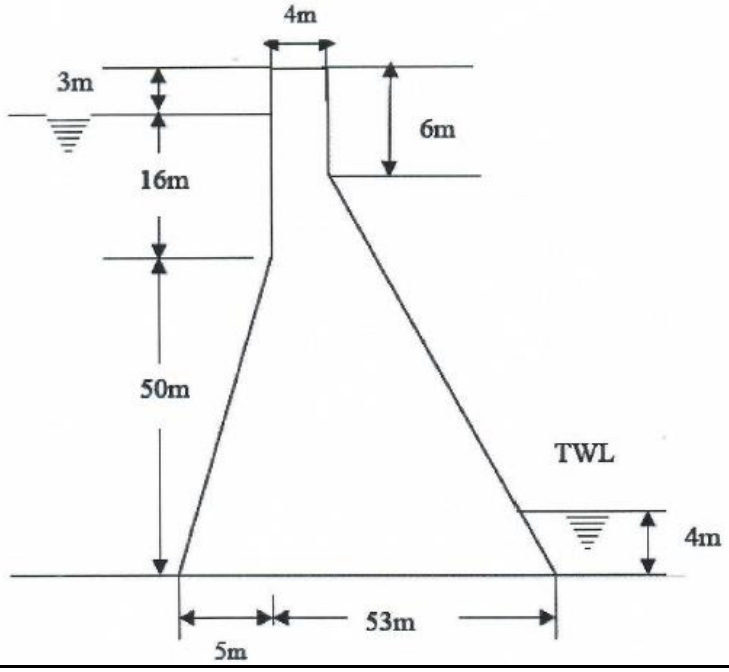
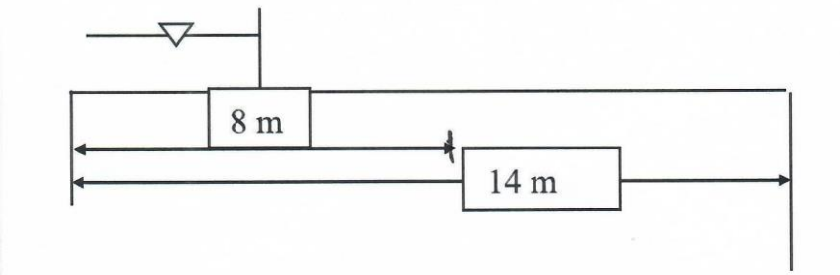
Instructions to Candidates:

- Answer ALL the questions
- Missing data may be suitably assumed
- Draw the explanatory sketches wherever required.

Q.No		Marks	CO
1.	Explain Symon's rain gauge and Natural Syphon type rain gauge with a neat diagram.	05	1
2.	Explain in detail how shape, size and topography of catchment effects runoff	03	2
3.	What is diversion head works? Explain the provision made for uninterrupted movement of fishes.	02	5
4.	The ordinates of a 4-hour unit hydrograph are given below. Obtain the ordinates of Direct Runoff Hydrograph and Stream Flow resulting from a storm of 4-hour effective duration and a total depth of 3 cm. The Ø-index for the catchment is estimated to be 0.3 cm/hr. Base flow may be assumed to be 10 m^3 /sec.	04	2
5.	Explain with a neat sketch the river training work adopted to prevent the river from changing its alignment or meandering.	03	3
6.	What is the suitability of 'Artificial Cutoffs'? What are the functions served by them? Explain. (no sketch). C03 standing	03	3
7.	Discuss the components of a streamflow hydrograph, with a neat sketch. The streamflow due to a storm of 6-hour effective duration on a basin and base flow ordinates are given below. The area of the basin is 30 km^2. Derive the ordinates of a 6- hour unit hydrograph for the basin.	05	3
8.	Explain the salient features of embankment dam.	03	4

Time (hours)	0	2	4	6	8	10	12	14	16	18	20
Ordinates of 4-hr unit hydrograph (m^3/sec)	00	30	80	70	65	45	30	20	10	6	0

Time (hrs)	0	3	6	9	12	15	18	21	24	27
Streamflow (cumec)	10	16	20	28	35	30	24	29	12	10
Base flow (cumecs)	10	10	16	18	20	18	18	16	10	10

9.	Write short note on arch dam.	02	4
10.	For the gravity dam section shown in the figure, find the magnitude of water pressure force and self-weight acting on the dam. Take unit weight of concrete is 24 kN/m^3.  	05	4
11.	Discuss in detail the factors to be considered during the alignment of the canals.	03	5
12.	List out any four circumstances during which an emergency spillway is to be provided	02	5
13.	With a neat sketch write short notes on the following: i) Ogee Spillway ii) Contour Canal	05	5
14.	Calculate the average hydraulic gradient and the uplift pressures at points 8m and 14m from the u/s end of the floor. Also find the thickness of the floor at these points for the barrage founded on sand as shown in the figure. The water level on the U/S is 4m and there is no water on the D/S. The height of the sheet pile is 6m on the left end and 8m on the right end.  	03	5
15.	List out the different modes of failures of the weirs.	02	5