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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATION 2022/2023 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREEOF BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL ENGINEERING

COURSE CODE: CSE 354

COURSE TITLE: HYDROLOGY

DATE: 25TH APRIL 2023 **TIME: 8 – 10 A.M**

INSTRUCTIONS:

1. This paper contains FOUR questions
2. Answer question ONE (compulsory) and any other TWO question
3. Examination duration is **2 Hours**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION 1 [30 Marks]

(a) Differentiate between Mass Curve and Rating Curve [3marks]

(b) The data pertaining to stream-gauging operation at gauging site are given below. The rating Equation of the current metre is V = 0.5 N + 0.02 m/s. Calculate the discharge in the stream [20 Marks]

Distance from the left Water edge (m)	0	3	6	9	12	15	18	21	24
Depth (m)	0	1.5	2.0	2.2	3.0	2.4	1.8	1.0	0
Revolutions at 0.2 depth	0	57	74	140	160	120	90	60	0
Revolutions at 0.6 depth	0	40	60	100	140	95	66	46	0
Revolutions at 0.8 depth	0	39	58	100	130	90	60	40	0
Duration of Observation (s)	0	140	145	140	146	145	145	143	0

(c) A reservoir with an average surface spread of 3.0 km^2 in October has the surface temperature of 27.5^{0}C and relative humidity of 45%, Wind velocity measured at 3.5m above the ground at a nearby observatory is 25 km/h. Using Mayers equation, calculate the total depth and volume of evaporation loss for the month of October, take saturation vapour pressure of 27.54 [7 marks]

QUESTION 2 [20 Marks]

(a) Briefly discuss the Seven forms of Precipitations [7 marks]

(b) Using Muskingum method for flood routing, determine the following hydrograph through a river reach for which K=11.0h and x = 0.12. At the start of the inflow flood, the outflow is 9.5m^3/s. [13 Marks]

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22	24
Inflow(m^3/s)	14	22	36	42	48	54	62	56	44	38	34	22	16

QUESTION 3 [20Marks]

(a) Differentiate between the direct runoff and surface runoff [3 marks]

(b) On a catchment of 20 km^2, after an hour storm, the time and discharge of a river is given below. Derive and draw the Unit hydrograph. [17 Marks]

Time(hr)	0	3	6	9	13	15	18	21	24	26	28	31	36
Discharge(m^3/s)	5	4.5	6	9	14	17	23	19	15	13	11	9	6

QUESTION 4 [20 Marks]

(a) Discuss in detail the structural flood control measures [12 marks]

(b) A 40 cm well tapping an unconfined aquifer and having an initial saturated thickness of 19 m is pumped at a rate of 180 l/min until a steady state cone of depression is established. The drawdowns measured at two wells situated at a distance of 30m and 70m from the pumped well are found to be 3 m and 2.0m. Determine

i. The hydraulic conductivity of the aquifer [3 Marks]

ii. The drawdown of the pumping well [5 Marks]