MAASAI MARA UNVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SCHOOL OF NATURAL RESOURCES, ENVIRONMENTAL STUDIES AND AGRICULTURE
BACHEOR OF ARTS IN GEOGRAPHY AND GEOSPATIAL TECHNOLOGIES

COURSE CODE: GEO 2220-1
COURSE TITLE: HYDROLOGY AND WATERSHED RESOURCES

DATE: 22/4/2024 **TIME: 1430-1630 HRS**

INSTRUCTIONS TO CANDIDATES

Answer **ALL** questions in Section A, and any **THREE** questions in Section B

Use illustrations where appropriate. A simple calculator required during this examination. Borrowing of any materials from others is strictly not allowed.

This paper consists of 3 printed pages. Please turn over

SECTION A : (20 MARKS)

Q1

(a)Describe novel index that a local chief could use to quantify the severity of a drought that has lasted for about six months in your home area.

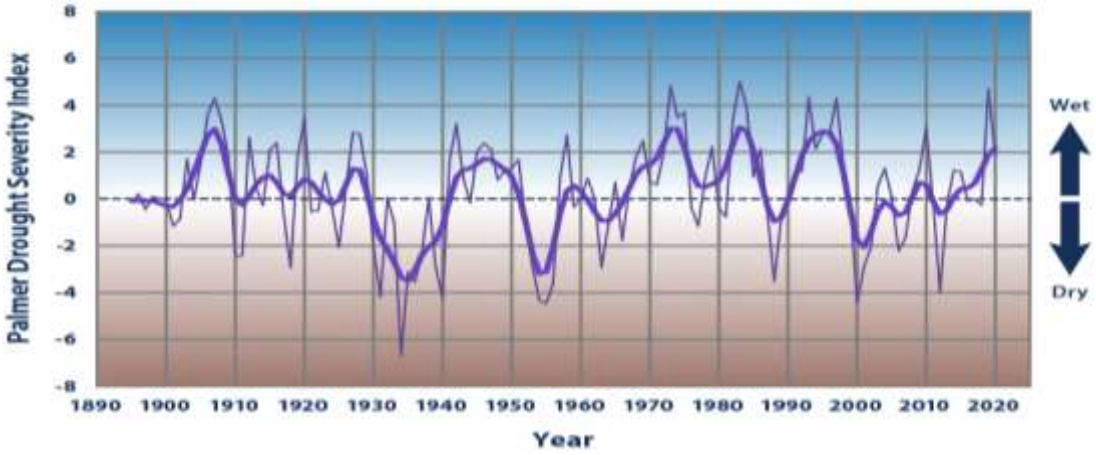
(2 marks)

(b) Describe two major water-related problems that may be in area illustrated in the figure below. (4 marks)

(c) The observations below are for the period 1895- 2020. This chart shows annual values of the Palmer Drought Severity Index, averaged over the entire catchment area. Positive values represent wetter conditions, while negative values represent drier conditions. A value between -2 and -3 indicates moderate drought, -3 to -4 is severe drought, and -4 or below indicates extreme drought. The thicker line is a nine-year weighted average.

(i) Compute the return period for a 5- year extreme droughts. (2 marks)

(ii) Compute the return period for a 10- year extreme droughts. (2 marks)



(d) Using your own hypothetical data and a suitable sketch, demonstrate how this equation could be useful while handling evaporation data. (**4 marks)**

$$Px = \frac{Nx}{m}\left[\frac{P1}{N1} + \frac{P2}{N2} + \cdots + \frac{Pm}{Nm}\right]$$

(e)The data in the table below was obtained during a field work exercise. The area up-stream of the gauging station is one acre.

(i)Plot a suitable graph and label the rising limb, and the recession curve. (2 marks)

(ii)Use one suitable method to obtain an estimate of the corresponding surface runoff in the catchment. (4 marks)

Time (hr)	Q (cfs)	Time (hr)	Q (cfs)
0	102	8	210
1	100	9	150
2	98	10	105
3	220	11	75
4	512	12	60
5	630	13	54
6	460	14	48.5
7	330	15	43.5

SECTION B (30 MARKS)

Q2 Describe strategies towards the alleviation of any five of the water pollution problems listed below. (10 Marks)

Nutrient pollution	Microbiological pollution	Oxygen-depletion pollution	Salt water intrusion
Chemical pollution	Illegal brown water disposal	Surface water pollution	Groundwater pollution

Q3 Discuss the important measures required to minimize water-logging and flooding in agricultural watersheds. **[10 marks]**

Q4 Discuss the socio-economic impacts of human over- exploitation of freshwater lake resources. **(10 marks)**

Q5] "Every public university must have its own very independent sewage treatment system". Justify this statement. **[10 marks]**

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