



DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

UNIVERSITY EXAMINATIONS 2020/2021 ACADEMIC YEAR

**FOURTH YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN CIVIL ENGINEERING**

ECE 4212: HYDROLOGY II

DATE: 23RD SEPTEMBER 2021

TIME: 11:00AM-1:00PM

INSTRUCTIONS TO CANDIDATES

- Cell phones are **NOT** allowed in the examination room
- This paper contains **FOUR (4)** questions
- Attempt **QUESTION ONE (1)** and any other **TWO** questions
- Question one (1) carries **30 Marks** while the rest carry **20 Marks** each
- Use a scientific non-programmable calculator
- Erasers, pens and pencils will be required
- **ALL** workings **MUST** be shown on the provided answer booklets
- Carefully read and abide by the rubric on the answer booklet
- All symbols have their usual meaning unless otherwise stated

QUESTION ONE (1) (30 MARKS)

- a) Describe two types of surface runoff (5mks)
- b) Describe two types of flow in the unsaturated zone that lead to runoff generation (5mks).
- c) Discuss TWO factors by which hydraulic conductivity contrast affect runoff generation (5mks).
- d) Hydrograph separation method separates runoff into two parts. Describes those parts (5mks).
- e) Describe TWO factors that affect storm hydrograph (5mks).
- f) Describe TWO structural categories of rainfall-runoff models (5mks).

QUESTION TWO (2) (20 MARKS)

The hydrograph below illustrates the flow rate (discharge) or a streamflow in response to a storm in a watershed that drains 1 km². (a) Compute the volume of event flow of the watershed between 0 – 15 hours. Report answers in (10mks)

Cubic meters: _____
 mm: _____

(b) Calculate ET given P=10mm (5mks)

(c) Describe five factors that affect runoff generation in a catchment. (5mks)

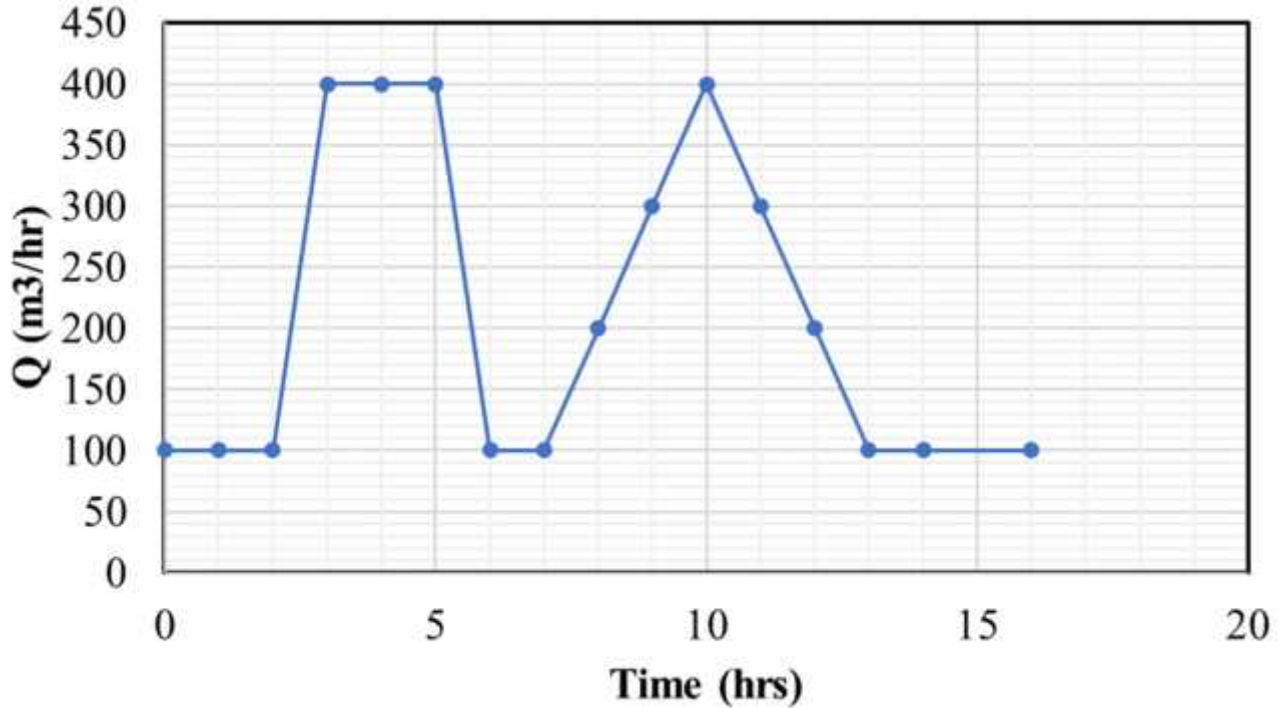


Fig Q2.

QUESTION THREE (3) (20 MARKS)

The following table provides exceedance and non-exceedance probability values of various floods.

Table Q3. Relationship between return period and annual exceedance and non-exceedance probability.

Return Period (Years) T	Annual exceedance probability (p) i.e. 1/T	Annual non-exceedance probability (1-p)
2	0.5 or 50%	0.5
5	0.2 or 20%	0.8
10	0.1 or 10%	0.9

25	0.04 or 4%	0.96
50	0.02 or 2%	0.98
100	0.01 or 1%	0.99

- a) What is the probability (in percent) for a 50-year flood over a 10-year period? (10mks)
- b) What is the probability (in percent) for a 100-year flood over a 50-year period? (10mks)

QUESTION FOUR (4) (20 MARKS)

- a) Discuss FOUR methods of flood control (15mks)
- b) Briefly describe TWO steps of systems hydrologic modeling (5mks)