



**MASENO UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2015/2016**

**FOURTH YEAR SECOND SEMESTER EXAMINATIONS FOR THE  
DEGREE OF BACHELOR SCIENCE IN EARTH SCIENCE WITH  
INFORMATION TECHNOLOGY**

**MAIN CAMPUS**

**NGA 405: DAMS AND HYDRAULIC STRUCTURES**

Date: 26<sup>th</sup> April, 2016

Time: 11.00 - 1.00 pm

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**INSTRUCTIONS:**

- Answer question ONE and any other TWO questions.
- Sketch maps and diagrams should be used whenever appropriate.



### NGA 405: DAMS AND HYDRAULIC STRUCTURES

1. a) Examine the main causes of dam failures. (10 marks)

b) Evaporation loss has been measured by a pan evaporimeter (pan coefficient =0.7) placed near a reservoir area  $3.2\text{km}^2$ . After a year the surface area of the reservoir reduces to  $2.6\text{km}^2$ . Determine the annual quantity of water lost by evaporation when the pan evaporation is known as follows:

| Month                 | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Evaporation loss (cm) | 15.7 | 14.1 | 16.9 | 24.0 | 27.5 | 21.4 | 15.7 | 16.2 | 16.2 | 20.5 | 15.7 | 15.4 |

(6 marks)

c) Explain the importance of experts and tools during feasibility study of a hydraulic structure. (14 marks)

2. Discuss factors influencing the selection of a dam site. (20 marks)

3. a) Distinguish between mass inflow curve and demand curve. (4 marks)

b) The following table gives mean monthly runoff of a river. Draw a mass curve and find the capacity of the reservoir for a 100% utilization of water at a constant regulated flow.

| Month | 1  | 2  | 3 | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12  |
|-------|----|----|---|----|----|----|----|----|----|----|----|-----|
| 8     | 80 | 40 | 9 | 10 | 20 | 40 | 30 | 20 | 40 | 50 | 60 | 120 |

(16 marks)

4. Examine the importance of small dams and hydraulic structures. (20 marks)

5. a) Explain causes of silting of reservoirs. 8 marks

b) Discuss methods of sedimentation control in reservoirs. 12 marks

6. Examine main problems caused by large dams in Africa. (20 marks)