



MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIFTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 522: DAM DESIGN AND CONSTRUCTION

DATE:

TIME:

INSTRUCTIONS: Answer questions **ONE** and any other **TWO** questions.

QUESTION ONE (20 MARKS)

- a) Define the following terminologies as used in dam design and construction (5 marks)
- Dam
 - Breach
 - Cutoff
 - Drawdown
 - Spillway
- b) A masonry dam with a height of 5 m retains earth having a unit weight of 19.6 kN/m^3 with angle of shearing resistance of 28° . Using Rankine's theory, calculate the active lateral thrust acting on the wall. (15 marks)

QUESTION TWO (20 MARKS)

Fig. 2 is a cross-section of a masonry dam retaining water against its vertical face. Analyze the stability condition of the dam. Unit weight of the dam is 21.6 kN/m^3 . (20 marks)

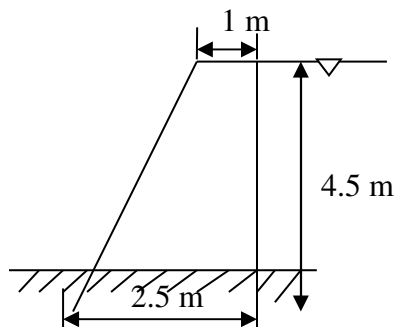


Fig. 2

QUESTION THREE (20 MARKS)

Q3. **Fig. 3** is a section of a reinforced concrete dam supporting a cohesionless soil with properties thus: unit weight of soil = 19.8 kN/m^3 , angle of wall friction or shearing resistance = 30° . Unit weight of concrete = 24.5 kN/m^3 . Determine the following:

- a) Position of the resultant ground reaction along the base. (6 marks)
- b) Ground bearing pressures (8 marks)
- c) Factor of safety against sliding. (6 marks)

Note: angle of wall friction = angle of shearing resistance

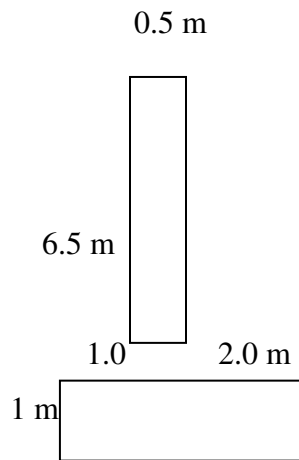


Fig. 3

QUESTION FOUR (20 MARKS)

- a) Discuss Coulomb's wedge theory. (8 marks)
- b) With the aid of a neat sketch show the plane of rupture and all the forces acting on a masonry dam retaining soil having a shearing resistance of 27.5° . (12 marks)

QUESTION FIVE (20 MARKS)

Q5. **Fig. 5** shows plan of a dam. Using First Angle Orthographic Projection, draw section A-A to a scale of 1:50 given that base width of dam = 6 m, top width = 1 m, vertical height = 4 m. The side slopes are 1:2.5. The freeboard is at 0.5 m from the top of the dam. (20 marks)

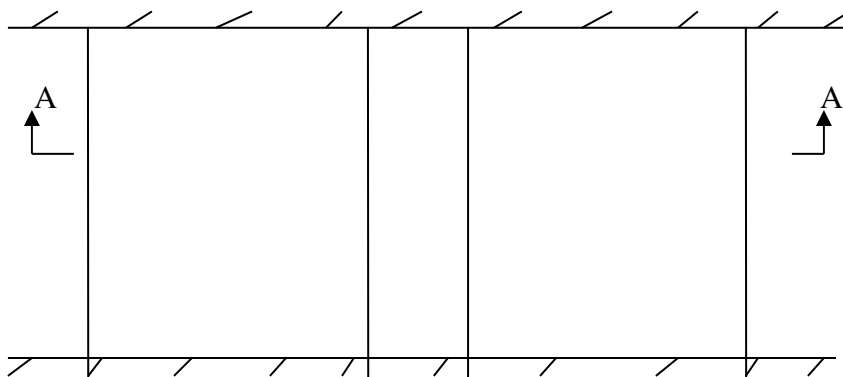


Fig. 5