



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

INSTITUTIONAL BASED PROGRAMME (AUGUST SESSION)

EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE

SMA 635: FLUID MECHANICS IV

DATE: WEDNESDAY, 27TH APRIL 2011

TIME: 9.00 A.M. - 12.00 P.M.

INSTRUCTIONS: Answer any THREE questions.

QUESTION ONE

- (a) Briefly discuss flow in leaky aquifers.
- (b) Derive the equation of continuity for flow in a leaky aquifer giving an expression in Hantush notation, hence solve this equation if the flow is steady subject to the boundary conditions $x = 0, s = H - h_o$, and $x = \infty, s = 0$.

QUESTION TWO

Discuss unsteady flow in unconfined aquifers and hence obtain the solution of this problem using Boultons method.

QUESTION THREE

Discuss salt-water interfaces using sketches to assist in the derivation of piezometric expressions and highlight the relevance of this study in the hydrological context for groundwater harvesting.

QUESTION FOUR

Derive the stiffness matrix for the triangular plane element.

QUESTION FIVE

- (a) Explain the general procedure for establishing the stiffness relations for plane finite elements.
- (b) Determine the overall stiffness matrix for the structure give in the Figure.
