



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF SPATIAL PLANNING
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN
WATER RESOURCE AND ENVIRONMENTAL MANAGEMENT
SEMESTER 2016/2017 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: PWE 3322

**COURSE TITLE: GROUND WATER ASSESSMENT, DEVELOPMENT AND
MANAGEMENT**

EXAM VENUE: STREAM: SPATIAL PLANNING

DATE: EXAM SESSION:

TIME: 2 HOURS

Instructions:

- 1. Answer question 1 (compulsory) and ANY other 2 questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE

- (a) Discuss hydrologic cycle processes. (9 marks)
- (b) With the aid of a sketch discuss the zones of underground water. (9 marks)
- (c) Differentiate between the following terms:
 - i. Porosity and specific yield. (2 marks)
 - ii. Confined and unconfined aquifer. (2 marks)
 - iii. Flowing artesian well and non-flowing artesian well (2 marks)
- (d) Discuss the construction features of a strainer well. (6 marks)

QUESTION TWO

- (a) Define Darcy's Law and explain its assumptions and limitations. (5 marks)
- (b) Describe assumptions and limitations of Dupuit's theory for unconfined aquifer. (6 marks)
- (c) Calculate the discharge from a well 1.5 m in diameter for which pumping at a steady rate gives a drawdown of 3.0 m. the height of the aquifer from the bottom of the well is 16 m and the bottom is near the impervious stratum. The radius of influence is 160 m and the value of the coefficient of permeability is 24.5 m/day. (9 marks)

QUESTION THREE

- (a) Explain how well development is carried out and outline its objectives. (10 marks)
- (b) Explain the purpose of pumping test and describe a procedure for carrying it. (10 marks)

QUESTION FOUR

- (a) Discuss any three methods of artificial recharge of ground water. (10 marks)
- (b) Explain saltwater intrusion. (4 marks)
- (c) Discuss the construction features of cavity type tube well. (6 marks)

QUESTION FIVE

- (a) Discuss conjunctive use of surface and groundwater. (5 marks)
- (b) Discuss possible sources of groundwater contamination and their remediation. (8 marks)
- (c) Derive an expression for discharge from a well fully penetrating a confined aquifer. (7 marks)