



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF APPLIED AND HEALTH SCIENCES
DEPARTMENT OF PURE & APPLIED SCIENCES
UNIVERSITY EXAMINATION FOR:
DIPLOMA IN ANALYTICAL CHEMISTRY
DAC 15S

ACH2302 : VACUUM AND GLASS BLOWING TECHNOLOGY
SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Pick Date Sep 2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

- (a) State the use of high vacuum in vacuum technology. (6marks)
- (b) Give (i) NINE finishing operations that are done on a newly made glass product before it is used. (9marks)
- (ii) FOUR reasons why borax is added during glass making process. (4marks)
- (c) State the color that is imparted by the following oxides in glass products. (i) SeO (5marks)
- (ii) CoO and NiO (iii) Fe₂O₃ (iv) CoO (5marks)
- (d) Define the following terms. (i) Outgassing (ii) Ebullism (4marks)
- (e) Why is outgassing products considered dangerous in space missions. (2marks)

Question TWO

- (a) Explain why even if all matter is removed from a vacuum it would still not be empty. (6marks)
- (b) Define (i) vacuum in terms of quantum mechanics and quantum field theory. (2marks)
- (ii) Quantum electrodynamic (QED) (2marks)
- (c) State (i) FOUR type of gauges that area used for measuring vacuum. (4marks)
- (ii) State TWO types ion gauges. (2marks)

Question THREE

- (a) Give (i) SIX raw materials of glass that make it have very many uses. (6marks)
- (ii) FIVE uses of borosilicate during glass making process. (5marks)
- (b) State the uses of ultra high vacuum in vacuum systems. (4marks)

Question FOUR

- (a) State any THREE areas where chemical inertness produced by vacuum can be used. (3marks)
- (b) Give the theories of free space in the theory of classical electromagnetism. (12marks)

Question FIVE

- (a) State (i) THREE properties of lead glass. (3marks)
- (ii) FOUR uses of lead glass. (4marks)
- (iii) State THREE sources of Na_2O that is used in glass making. (3marks)
- (iv) TWO uses of Al_2O_3 that is used in glass making. (2marks)
- (b) List THREE factors that control diameter and thicknes of glass wall of a glass tubing during its production. (3marks)