



KISII UNIVERSITY
UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF
DOCTOR OF PHILOSOPHY IN CHEMISTRY
SECOND SEMESTER 2022/2023
[MAY, 2023]

DPAP 906: NANOTECHNOLOGY TECHNIQUES

STREAM: Y1 S2

TIME: 3 HOURS

DAY: WEDNESDAY, 9:00 – 12:00 P.M.

DATE: 03/05/2023

INSTRUCTIONS

- 1. Do not write anything on this question paper.***
- 2. Answer FOUR Questions.***

QUESTION ONE

Taking into consideration of the current COVID-19 pandemic, it has been documented that various proteins elicit immunogenicity especially (Membrane, Spike, Nucleocapsid and Envelope) encoded by their respective genes either as potential vaccine candidates or diagnostics. Explain vividly how various Nanotechnologies have been applied to realize this milestone as a delivery agent. (15 Marks)

QUESTION TWO

As Nano science student, you have been assigned a role to synthesize nanoparticles. Discuss relevant characterization methodologies that you could employ. (15 Marks)

QUESTION THREE

In his speech “***There is plenty of a room at the bottom***” Richard Feynman explained the wider scope of Nanotechnology. Critically discuss the key achievements that lead to the development of Nanotechnology. (15 Marks)

QUESTION FOUR

“Nano-ethics” is a subject still aborning many ethical and social ills that seeks to address the hypothetical ramifications of these theoretical technologies.

- a. Explain the Nano-curcumin nanoparticles in the treatment of cancer. (8 Marks)
- b. What methodological strategies are in place to address ethical-social implications? (7 Marks)

QUESTION FIVE

With a well labelled diagrammatical representation explain what biosensors are and vividly explain their applications in health care. (15 Marks)

QUESTION SIX

Discuss the different nanomaterial synthesis methodologies. (15 Marks)