NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCES HONOURS	
QUALIFICATION CODE: 08BOSC	**LEVEL:** 8
COURSE CODE: BPM821S	**COURSE NAME:** BIOSYNTHETIC PATHWAYS AND MOLECULAR BIOLOGY
SESSION: JANUARY 2019	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SUPPLEMENTARY/SECOND OPPORTUNITY QUESTION PAPER	
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MODERATOR:	DR. EMMANUEL NEPOLO

INSTRUCTIONS

1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.
4. Answer each question in a separate sheet of paper
5. All written work **MUST** be done in **BLUE** or **BLACK** ink.

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES
(Including this front page)

QUESTION 1 **[12]**

a) As a research scientist you have been tasked to generate Ideal qRT-PCR primers for the amplification of the MSH3 gene. Briefly state **FIVE (5)** factors you would consider when designing these primers. (5)

b) What are some of the strategies you could use in designing universal primers? (7)

QUESTION 2 **[14]**

a) State **FOUR (4)** characteristics of a genome database systems (4)

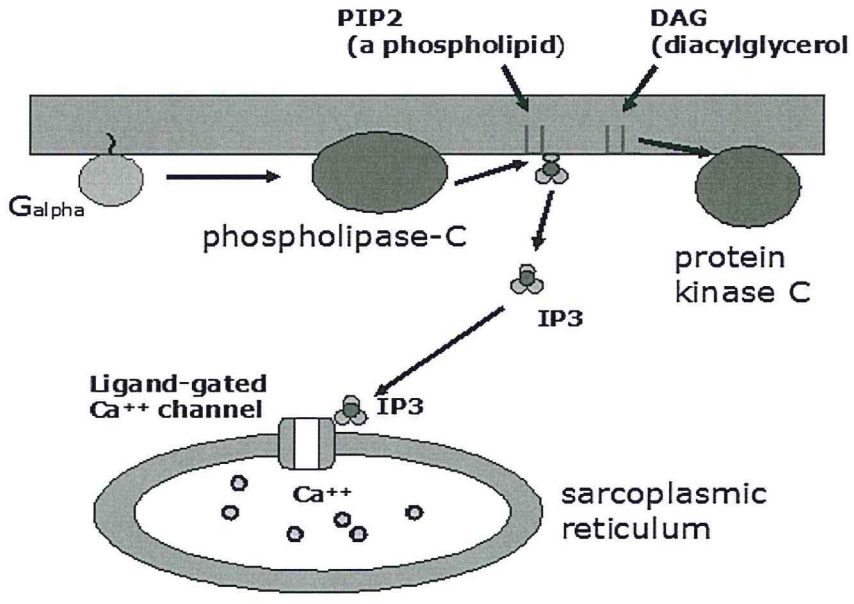
b) Briefly describe the following chemical signals: (5)

I. Pheromones Signals
II. Neuroendocrine Signals
III. Autocrine Signals
IV. Neural Signals
V. Paracrine Signals

c) Describe Tyrosine-Kinase receptors in cell signaling. (5)

QUESTION 3 **[18]**

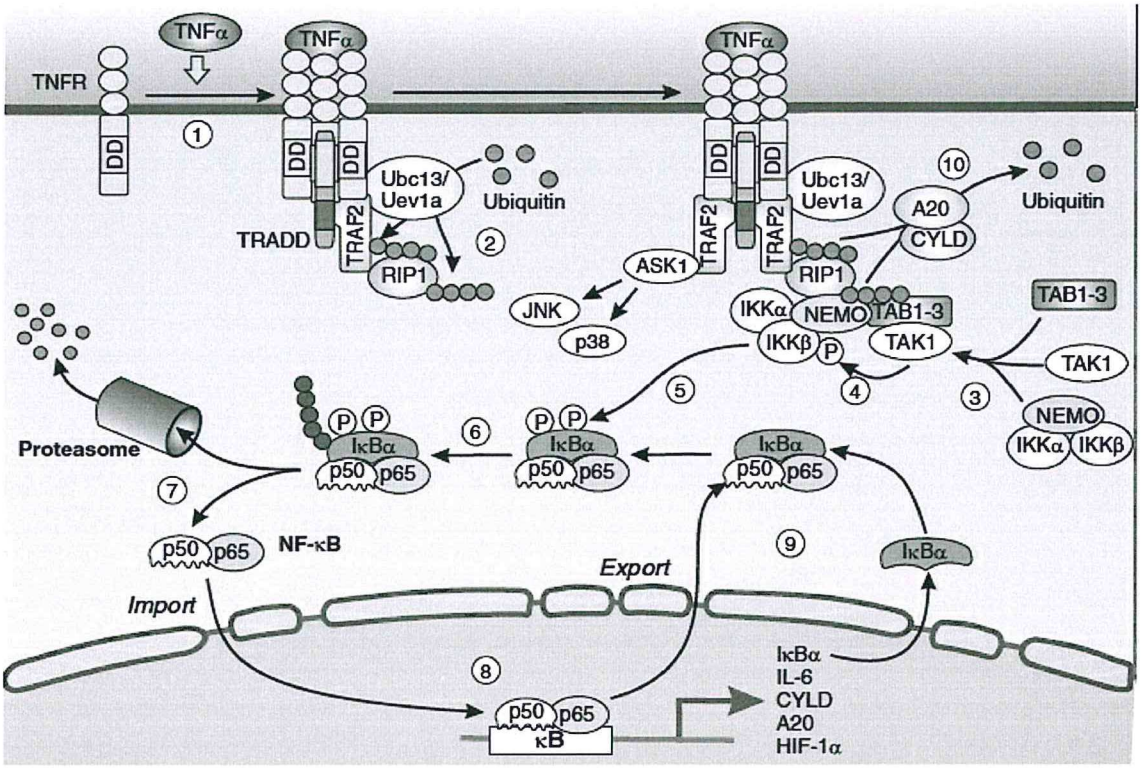
a) Inositol triphosphate (IP3) and diacylglycerol (DAG) are all small molecules that can be found inside most cells, yet they are known to be important second messengers that can increase or decrease in response to a wide variety of signals. However, each signal often produces completely different responses. Explain how such responses occur based on the signalling pathway below. (10)



b) Discuss signal transduction (8)

QUESTION 4 [12]

The signalling pathway below is responsible for controlling processes such as inflammation, cell proliferation and apoptosis.



a) Name the signalling pathway (2)

b) Briefly describe the activation of the signalling pathway (10)

QUESTION 5 [15]

a) State **FIVE (5)** reasons why cancer staging is important? (5)

b) Discuss how the co-ordination of the eukaryotic cell cycle phases is dependent on a series of cell cycle checkpoints. (10)

QUESTION 6 **[17]**

a) Define the following terminologies: (4)

I. Oncogenesis
II. Metastasis
III. Hayflick phenomenon
IV. Cancer biomarker

b) If HeLa cells are cancer cells, how are they useful for research into anything other than cancer? (5)

a) Briefly discuss the following hallmarks of cancer. (8)

I. Evading growth suppressors
II. Enabling replicative immortality
III. Inducing angiogenesis
IV. Evading Immune Destruction

QUESTION 7 **[12]**

a) State **FOUR (4)** characteristics of an ideal screening Biomarker (4)

b) State **EIGHT (8)** reasons why cancer biomarkers are missing the mark in cancer prognosis and diagnosis (8)

END