

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**YEAR III SEMESTER II EXAMINATION FOR THE BACHELOR OF SCIENCE IN BIOCHEMISTRY AND MOLECULAR BIOLOGY**

**HBB 2351: MOLECULAR BIOLOGY I**

**DATE: APRIL, 2015 TIME: 2 HOURS**

**INSTRUCTIONS: Answer Question ONE(Compulsory) and any TWO other questions\_\_\_\_\_\_\_**

**Question One (30 Marks)**

i. Define the following terms used in molecular biology;

1. Plasmid copy number [2 marks]
2. Transformation and transfection [2 marks]
3. Micro-array analysis [2 marks]
4. Phenol:chloro form: isoamyl alcohol (PCI 25:24:1) [2 marks]
5. Highlight the structural difference between thymine and uracil. [1 mark]

ii. Which bond is stronger between A-T and G-C? Support your answer and state base content recommendation during manual primer design. [4 marks]

iii. a) State two main challenges of RNA molecules? How is each related to the concept of information flow? [3 marks]

b) How can you assess the quality of total RNA after extraction? [2 marks]

iv. What are the three major types of RNA molecules? How is each related to the concept of

information flow? [3 marks]

v. Describe Watson-Crick model of DNA structure. [8 marks]

vi. Why were 32P and 35S chosen for use in the Hershey- Chase experiment? [2 marks]

**Question Two (20 Marks)**

Starting with a circular plasmid, PRSET-A, write a protocol for cloning 450 bp insulin gene for transforming *E. coli* DH5. Explain the reasons for formation of blue-white colonies on LB-Agan plate after overnight incubation.

**Question Three (20 Marks)**

Write short notes:

a) Restriction digestion [10 marks]

b) Recombinant DNA technology [10 marks]

**Question Four (20 Marks)**

Write a general protocol for identification of a new species of butterfly collected from Kakamega rain forest. Describe necessary molecular biology techniques and procedures for the study.

**Question Five (20 Marks)**

Discuss in detail the main characteristics of genetic material.