TEST BSB3583 (60 MARKS)

PART A

Answer all questions.

QUESTION 1

Rational design was the earliest approach of enzyme engineering and is still the most widely used way to introduce desired properties into an enzyme of interest. In rational protein design the target structure or ensemble of structures of the enzyme must be known beforehand.

(a) Discuss **THREE (3)** approaches of getting the enzyme structure information for the rational design purpose.

(6 Marks)

(b) Discuss in general how Polymerase Chain Reaction (PCR) approach can be manipulated for rational design in order to introduce desired properties into a protein of interest.

(9 Marks)

QUESTION 2

The use of enzymes in laundry and automatic dish washing detergents provides consumers with well proven benefits both in the washing process itself and in terms of the wider environment.

(a) Describe how the use of enzymes can benefit the detergent industry.

(6 Marks)

(b) Laundry washing is one of the activities that consume the most energy in an ordinary household. By using suitable enzymes washing can be done at low temperature which will provide a lot of benefits to environment.

i. Discuss **FIVE (5)** effects of low temperature on enzyme structure and

(5 Marks)

ii. Explain how enzymes that can survive at low temperature do their structural adaptation strategies.

(9 Marks)

QUESTION 3

(a) Heterologous enzyme expression might be intracellular or extracellular production.

i. Discuss why extracellular production is much preferable compared to intracellular production.

(5 Marks)

ii. Outline a characteristic required for the heterologous system to perform extracellular production and **FIVE (5)** advantages of using that system.

(6 Marks)

(b) Compare between random mutagenesis methods and gene recombination methods of directed evolution.

(4 Marks)

(c) Discuss the safety concerns associated with enzymes.

(5 Marks)

QUESTION 4

Life Scan company has developed a biosensor to estimate the blood glucose level. List out **FIVE (5)** basic requirements of this biosensor with its function.

(5 Marks)

END OF QUESTION PAPER