Quiz 1

COURSE NAME: Advanced Genetic Engineering **COURSE NUMBER: BT 503**

Name [redacted] **Roll Number:** [redacted]

DATE: 29th Aug 2023 MARKS: 20 Time-50 mins

Do not tear the question paper from answer script

Q1. Answer the following questions: (1x6=6 marks)

1. While screening positive colonies after transformation, ...is an example of positive selection, ... is an example of insertional inactivation selection.
2. While designing .....primers you need to minimize degeneracy and when designing ..... primers you need to include some degree of degeneracy.
3. Extension time in a PCR cycle can be calculated by .....
4. .....step in PCR helps in deciding amplification of desired amplicon specifically and it is related to the ..... of the primer.
5. The frequency of a 4 base cutter is ... and of a 6 base cutter is ...in any nucleotide sequence.
6. What would be the effect on the amplicon if you increase the temperature of the annealing phase and the length of the elongation phase?

Q2. Answer the following questions: (2x3=6 marks)

1. The genomic DNA sequence of a fungus is given to you, it has only one cellulase gene. Design a strategy to map the location of exons and introns in the cellulase gene?
2. Design a strategy to determine flanking regions of a transposon which has inactivated a bacterial amylase gene which you are trying to express. You are given the sequence of the transposon.
3. **Lesch–Nyhan** syndrome is a genetic disease caused by a malfunction in the HPRT1 gene, which clinically leads to the fatal uric acid urinary stone and symptoms similar to gout. A pregnant lady is suffering from the disease. Design a strategy to check whether the foetus will have the disease or not?

Q3. Answer the following questions: (4x2=8 marks)

1. You are trying to amplify a gene of 7200 base pairs and doing the amplification in duplicates. In tube 1, you added all components of PCR mixture. In tube 2, you added all components except the reverse primer. (i) Draw the agarose gel representation of the end products in tube 1 and tube 2 after 30 cycles. (ii) Explain what will happen in the 1st 2 cycles in both the tubes.
2. After a double digest of a plasmid with EcoRI and HindIII, a gel electrophoresis shows that you have several restriction fragment bands. You see bands of lengths 3kb, 4kb and 5kb. Also, there are *two* EcoRI restriction sites and *two* HindIII restriction sites in the DNA fragment you are studying. (i)How many restriction fragments are really in your reaction? Draw the gel representation of this. (ii) Draw the plasmid showing the restriction maps and the total length of the plasmid.