DSCC 12 Recombinant DNA Technology
Semester V

Unit wise model questions

Unit: 1 & 2

Answer the following questions (2 marks each)

1. Name the first biotechnology product to appear in the market. Name the scientists who developed the required plasmid for synthesis of the product.
2. Name the recombinant vaccine widely used in India. Which host cell is used to develop the vaccine?
3. Name the vector used for transposon mutagenesis. How do they function?
4. List the advantages of using eukaryotic host cell over prokaryotic host cell to clone a eukaryotic gene.
5. What are phagemids? Give one example.
6. Explain how we can avoid self-ligation of vectors during cloning.
7. Explain how T-vectors are used to develop transgenic plants.
8. Explain how lambda virus is used as vectors for cloning.
9. You have done a cloning experiment using YAC vector in yeast host cell. How do you select the recombinant yeast cells?
10. State the special features of expression vectors.
11. Which vectors are used to construct genomic libraries & why?
12. What are neoschizomers? Give example.
13. Explain why T4 DNA ligase is used in cloning experiments.
14. How could you check the protein contamination present in your isolated plasmid DNA?
15. What are reporter genes? Explain with an example.
16. What are isochizomers? Give example
17. What type of vectors should we use to get the recombinant protein after cloning? How can we purify these proteins?
18. What is star effect?
19. The size of the foreign DNA insert determines the choice of the particular vector to be used for cloning.....Explain
20. Explain with flow chart how do you clone a mammalian gene into *E.coli.*

Write short notes on (4 marks each)

1. Replica plating technique
2. Artificial chromosomes
3. DNA ligase
4. Blue white screening
5. Restriction endonuclease

Unit 3

Answer the following questions (1 mark each)

1. Which of the chemicals is added to make the recombinant plasmid permeable to DNA molecules?
2. Which enzyme is required for end to end joining of DNA?
3. In which phase of growth does the recipient cell takes up the donor DNA?
4. In which category biolistic transformation falls?
5. Give an example of biological gene transfer method?
6. In which method electric field is applied for gene transfer?
7. What is the size of the virulent plasmid of *Agrobacterium tumefaciens*?
8. Which technique is used to introduce genes into dicots?
9. Which of the following are used as selection marker for the cells transformed with *Agrobacterium?*
10. Who discovered the technique southern blotting?
11. What is the key principle of southern/northern blotting?
12. Which reagent extracts and purifies RNA from solution?
13. Which chemical is used to make RNA fragments linear in northern blotting?
14. Which membrane filter paper is used in Northern blotting?
15. Which membrane filter paper is used in Western blotting?
16. Which protein is used as blocking agent in western blotting?
17. What fusigenic material is used for plant transformation?
18. Which gel electrophoresis is used for protein separation?
19. What is the size of glass micropiette in Microinjection technique?
20. What voltage is used in electroporation techniques?

Answer the following questions (2 marks each)

1. Write the features of Liposome.
2. On what basis proteins are separated in PAGE?
3. For separating the larger protein molecules which factor should be controlled in PAGE
4. Define electrophoretic mobility with equation.
5. Write the function of buffers and ammonium per sulphate in PAGE.
6. What is the chemical composition of agarose?
7. Define DNA Microarray.
8. What are the different types of DNA microarray?
9. What is the basic principle of CaCl2 technique?
10. Why blocking is important in western blotting?
11. Write the differences between Native-PAGE and SDS-PAGE ?
12. Write the differences between Agarose gel electrophoresis and PAGE
13. How proteins are detected in western blotting?
14. Why western blotting is referred as gold-standard?
15. Write the application of microinjection technique.

16. Write the different detection method after probe hybridization in blotting?
17. Write the different artificial methods for DNA transfer with one example

Write short notes with diagram on (4 marks each)

1. Southern blotting
2. Northern blotting
3. Dot blotting
4. Elctroporation
5. Gene gun
6. Microarray

Unit 4

Answer the following questions (1 mark each)

1. What are Primers?
2. What does a reaction mixture of PCR consists?
3. Write down the characteristics of Taq polymerase?
4. Which activity is absent in Taq polymerase?
5. What was the first significant DNA sequence obtained?
6. What is the main enzyme component of Sanger Sequencing?
7. What acts as a chain terminator in Sanger sequencing?
8. What is a klenow fragment?
9. How many types of deoxynucleotide tri phosphates are used in Sanger sequencing?
10. What is the characteristic of a sequencing gel?
11. What is the molarity of urea in the sequencing gels?
12. What is the function of urea in sequencing gel?
13. What is Hot Start PCR?

Answer the following questions (2 marks each)

1. Primer and polymerases are added again during the reaction because they get consumed as the reaction proceeds. Justify whether true or false.
2. Explain how PCR technique can be used to amplify a DNA fragment?
3. Explain how PCR technique can be used to incorporate a mutation in a DNA fragment?
4. Explain how a PCR product can be sequenced.
5. What are the factors on should consider while designing a primer?
6. How can u empirically determine the annealing temperature of a PCR reaction?
7. Is it possible to get PCR amplification if only forward primers are used? Explain.
8. Both forward and reverse primers are essential for sequencing a DNA fragments. Justify whether true of false.
9. What are the properties of Real Time PCR assay?
10. What are the applications of RT-PCR?

11. How can you decide between one step RT-PCR and two steps RT-PCR?
12. State the differences between real time PCR and RT PCR.
13. Why primer annealing temperature should be chosen carefully?
14. How can PCR Product be cloned into a vector.

Unit 5

Answer the following questions (1 mark each)

1. First genomic DNA Library was cloned in what?
2. Why DNA is restricted to make a genomic library?
3. What do you understand by a genomic library?

Answer the following questions (2 marks each)

1. Write short note on cDNA library.
2. Justify whether true or false – colony hybridization is a technique that can be used to detect the presence of a specific DNA sequence in a cell.
3. How would you generate a genomic library and identify a known gene A in the library?
4. Write short note on colony hybridization.
5. State the role of RNase H in construction of a cDNA Library.
6. Which vectors are used for construction of genomic libraries? Why?

Unit 6

Answer the following questions in one to two words (1 mark each)

1. What is gene therapy?
2. Name two widely used vectors of gene therapy.
3. What is humulin?
4. Name two eukaryotic hosts suitable for production of recombinant insulim.
5. What is pre-pro insulin?
6. What are follitropin alpha and follitropin beta?
7. What do you mean by protein engineering?
8. What are GM crops?

Answer the following short questions (2 marks each)

1. Differentiate between in vivo gene therapy and ex vivo gene therapy.
2. What are lipoplexes? Explain the chief difficulty in using them.
3. What are Flavr-savr tomatoes?

4. What is t-DNA?
5. Differentiate between antigene and antisense therapy.
6. What are amplicon vectors?
7. Recombinant proteins are often made as fusion construct with a polyhistidine stretch. Explain the reason.
8. What are Adeno Associated Vectors? Why are they more safe than adenoviral vectors?
9. State the significance of cry gene in agriculture.
10. How can you cleave your

Answer the following broad questions (more than 2 marks)

1. Depending upon the nature of vaccine, how many types of recombinant vaccines are there? Discuss in brief. 5
2. Explain why DNA vaccines are superior to other vaccines in eliciting host immune response. 3
3. State the advantages of using adenoviral vectors in gene therapy. 3
4. Explain how you can use Polymerase Chain Reaction to introduce mutations in specific regions of a gene thus altering specific amino acids in the corresponding protein. 4
5. What are inclusion bodies? State an experimental strategy to recover your recombinant protein from inclusion bodies. (1+3)
6. What are the chief difficulties in cloning a pre pro insulin cDNA straightaway into an expression vector for production of recombinant insulin? How has been the problem/s solved? (2+3)