P-401[GENETIC ENGINEERING]

1. Answer the following questions. [1 mark]

1. Direct alteration of particular parts of protein as a way of probing the relationship between structure and function is termed as:
a) genetic engineering
b) protein engineering
c) alteration of protein function
d) structure engineering

Answer: b
Explanation: Protein engineering is the direct alteration of parts of protein as a way of probing the relationship between its structure and function. The function of protein is altered in a controlled way.

2. At times, the gene which is cloned is not well known for the protein encoded by it. To access the function, the endogenous gene for the mutant strain is inactivated. This technique is called as _____
a) reverse genetics
b) protein engineering
c) mutation
d) location of function

Answer: a
Explanation: Reverse genetics is the technique by which the exact function of the gene cloned is known. It is done by inactivating the mutant strain in the host.

3. Approaches for creating mutations can be divided into how many types?
a) 1
b) 2
c) 3
d) 4

Answer: b
Explanation: There are basically two approaches to creating mutations. They are relying on restriction enzymes and oligonucleotide-directed DNA synthesis.

4. In the case of deletion of a restriction site, it should be cleaved with the same restriction enzyme.
a) True
b) False

Answer: a
Explanation: For the deletion of a restriction site, it should be cleaved with the same restriction enzyme. As it is cleaved, the restriction site is destroyed and further the staggered ends created are either filled or degraded. After this religation is carried out but the restriction site is destroyed.

5. If there are multiple restriction sites for an enzyme in a given molecule, digestion is carried out in many steps. The initial digestion should be?
a) complete
b) partial
c) carried out by a different enzyme then that the restriction site
d) carried out by a mixture of restriction enzymes

Answer: b
Explanation: If there are multiple restriction sites for an enzyme in a given molecule, the initial digestion would be partial. It is so because molecules cut on one site at an average.

6. If a functional gene is disrupted while disrupting a restriction site _____ is created.
a) frameshift mutation
b) point mutation
c) either of the mutations
d) any other kind of mutation

Answer: a
Explanation: If a functional gene is disrupted while disrupting a restriction site, a frameshift mutation would be created. As it is created, the gene might become dysfunctional.

7. Additional restriction sites can be introduced near the existing restriction site by mutagenesis.
a) True
b) False

Answer: a
Explanation: Additional restriction sites can be introduced near the existing restriction site by mutagenesis. It is done by inserting chemically synthesized oilgonucleotide carrying the appropriate sequence.

8. Restriction site can also be introduced by oligonucleotide directed mutagenesis of a region that is _____ and _____ to the original restriction site.
a) not only similar, also exactly same
b) similar, not same
c) not similar, is entirely different
d) different, near

Answer: b
Explanation: Restriction site can also be introduced by oligonucleotide directed mutagenesis of a region that is similar and is not the same to the original restriction site.

9. Small deletions at a restriction site can be generated by cutting and degrading the _____ with an exonuclease.
a) double stranded ended
b) circular molecules
c) single stranded ends

d) supercoiled molecules

Answer: c
Explanation: Small deletions at a restriction site can be generated by cutting and degrading the single stranded ends with an exonuclease.

10. When a series of deleted regions are replaced by some other DNA fragment of equal length, then it is known as:
a) linker scanning
b) generation of deletions
c) mutation
d) replacement

Answer: a
Explanation: Sometimes, a series of deleted regions are replaced by a fragment of DNA of equal length, then it is called as linker scanning. It is done in order to not disrupt the spacing between control regions.

2.Answer the following questions within 2-3 sentences. [1.5 mark]

1. What is the scope of genetic engineering ?
2. Which techniques of molecular biology involves manipulation of gene ?
3. What are the different types of genetic manipulation ?
4. Distinguish between DNA isolation and DNA purification .
5. What is a cloning vector ?
6. What is meant by expression vector ?
7. What are transgenic animals ?
8. What is RAPD ?
9. What is RFLP ?
10. What are liposomes ?
11. What is a restriction nuclease ?
12. What is *Agrobacterium* –mediated gene transfer ?
13. What is DNA –fingerprinting ?
14. Mention gene knockout .
15. What is RNA interference ?
16. What is siRNA ?
17. What is DNA microassay ?
18. State Sanger's method of DNA sequencing .
19. Mention applications of genetic engineering in medicine.
20. State some industrial applications of genetic engineering.

3. Answer the following questions within 75-100 words. [2 marks]

1. Give the concept of genetic engineering.
2. What are the techniques involved in gene manipulation.
3. What is DNA isolation method ?

4. What are type 1 and type 2 restriction enzyme ?
5. What is type 3 restriction endonuclease ?
6. State about ligase.
7. What are the different types of cloning vectors ?
8. What is genetic transformation ?
9. Mention techniques of gene transformation .
10. What is electroporation is used for ?
11. What is biolistics ?
12. What is microinjection ?
13. What is nucleic acid hybridisation?
14. What is site directed mutagenesis ?
15. What is anti-sense technology ?
16. What is miRNA ?
17. What do you understand by genomic DNA and cDNA libraries ?
18. Mention various methods of DNA sequencing .
19. What do you mean by genetic engineering ?
20. Mention applications of genetic engineering in the field of agriculture.

4. Answer the following questions within 500 words. [6marks]

1. Give the scope and concept of genetic engineering .
2. What are the molecular techniques in gene manipulation.
3. Give the methods of DNA isolation and purification.
4. What are the restriction endonucleases ? Add a note on ligases.
5. Write short note on genetic transformation.
6. What are the different strategies for gene transformation.
7. Describe RAPD and RFLP .
8. What do you understand by nucleic acid hybridisation ?
9. Write a short note on DNA fingerprinting .
10. Describe site –directed mutagenesis.
11. What are the different gene knock out strategies ?
12. What do you understand by RNA interference ?
13. Elaborate anti –sense technologies .
14. What do you mean by siRNA and miRNA ?
15. Give an account on DNA microassay .
16. Describe about genomic and c-DNA libraries .
17. What are different DNA sequencing method.
18. How are genetically modified organisms are produced ?
19. Give the method of production of cloned and transgenic animals.
20. Elaborate application of genetic engineering in medicine , agriculture and industries.
21. Write short note on genetic engineering regulation and guidelines.