Important Questions of Class 12 Biology Biotechnology Principles and Processes Answers at the Bottom

Ch-9 Biotechnology Principles and Processes

1. Technique associated with DNA amplification is
    1. RFLP
    2. DNA fingerprinting
    3. PCR
    4. Southern Blotting
2. Production of large scale recombinant products can be done in
    1. Autoclave
    2. Bioreactors
    3. Thermocycler
    4. Tissue culture labs
3. Which of the following is correct sequence of process of recombinant DNA technology-
    1. Isolation of DNA
    2. Isolation of desired DNA fragment.
    3. Fragmentation of DNA by restriction endonuclease.
    4. Transferring of into host
    5. Ligation of DNA fragment into vector
    6. Culturing in host cell to get desired product.
        1. Step v, vi, iv, iii, ii and i
        2. Step i, iv, iii, ii, v and vi
        3. Step i, iii, ii, v, iv and vi
        4. Step i, ii, iii, iv, v and vi
4. Restriction enzymes belongs to a larger class of enzymes called
    1. Chitinase
    2. Nucleases
    3. Glcucatase
    4. Protease
5. Which of the following is used as selectable marker?
    1. Ampicillin resistance gene
    2. Plasmid resistance gene
    3. Salmonella resistance gene
    4. Penicillin resistance gene
6. What would be the molar concentration of human DNA in a human cell?
7. Using a single template molecule, how many DNA molecules are generated after 10 cycles of amplification in PCR?

8. In the vector and DNA fragments are generated using the same restriction enzyme, how can self ligation be prevented?
9. Besides better aeration and mixing properties, what other advantages do stirred tank bioreactors have over shake flasks?
10. Following is the sequence of nucleotide in two strands of DNA. Observe the strands and answer the preceding questions. 5′–GAATTC–3′,3′–CTTAAG–5′5′ –GAATTC–3′,3′–CTTAAG–5′ (i) Name the special term used for such an arrangement of nucleotide.
    (ii) Name the special type of enzymes which work / function at this specific points.
    (iii) Name the enzyme, that cut DNA between GA sequence.
11. From what you have learnt, can you tell whether enzymes are bigger or DNA is bigger in molecular size? How did you know?
12. Mention the number of primers required in each cycle of polymerase chain reaction (PCR). Write the role of primers and DNA polymerase in PCR.
13. What are bacteriophage vectors? Name the two phage vectors that are commonly used.
14. A recombinant DNA is formed when sticky ends of vector DNA and foreign DNA join. Explain how the sticky ends are formed and get joined?
15. 1. Name the organism in which the vector shown is inserted to get the copies of the desired gene.
    2. Mention the area labelled in the vector responsible for controlling the copy number of the inserted gene.
    3. Name and explain the role of a selectable marker in the vector shown.

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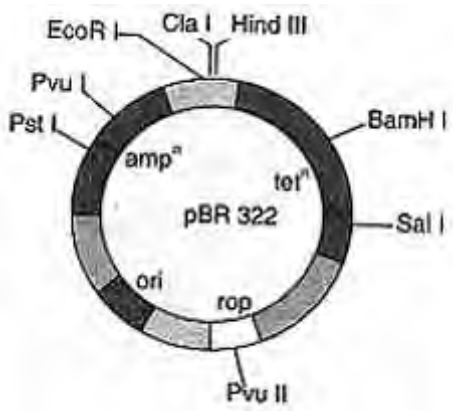

Answer

1. c. PCR, **Explanation:** DNA amplification is done by using the technique of polymerase chain reaction in which millions of copies of DNA segments are produced.
2. b. Bioreactors, **Explanation:** Bioreactor is a large vessels in which large scale raw materials are biologically converted into specific products. Bioreactor is used to produce large scale production.

3.

c. Step i, iii, ii, v, iv and vi, **Explanation:** The correct sequences of process of recombinant DNA technology are Isolation of DNA, fragmentation of DNA by restriction endonuclease, isolation of desired DNA fragment, ligation of DNA fragment into vector, transferring of into host and culturing in host cell to get desired product.

4.

b. Nucleases, **Explanation:** A restriction enzyme (or restriction endonucleases) recognizes a specific base pair sequence in DNA called a restriction site and cleaves the DNA (hydrolyses the phosphodiester backbones) within the sequence. Restriction enzymes are widely found in prokaryotes and provide protection to the host cell by destroying foreign DNA that makes entry to it. It acts as a part of defense mechanism.
Restriction enzymes belong to a larger class of enzymes called nucleases. They are of two types: endonucleases and exonucleases.

5.

a. Ampicillin resistance gene, **Explanation:** The Ampicillin resistance gene is used as selectable marker as it prevents the growth of non-transformants cells and promotes the growth of transformants only

6. In human being the concentration of DNA is 0.4%. It contains 6.6×109bp6.6×109bp
7. 210210 molecules = 1024 molecules
8. By using Alkaline phosphatase enzymes
9. Shake flasks are used for growing microbes and mixing the desired materials on a small scale in the lab. But the large scale production of desired biotechnological product requires large stirred tank bioreactors.
   Besides better aeration and mixing properties, the bioreactors have following advantages –
   1. It has oxygen delivery system
   2. It has a foam control, temperature and pH control system.
   3. Small volumes of culture can be withdrawn periodically.
10.
    1. Palindromes
    2. Restriction endonucleases
    3. EcoRI
    4. Sticky / overhanding strands
11. DNA molecules are bigger in molecular size as compared to molecular size of enzymes. It is because an enzyme is synthesized from a segment of DNA called gene.
12. Two sets of primers and the enzyme DNA polymerase are required in each cycle of polymerase chain reaction.**Role of primers and DNA polymerase :** Primers are necessary to start the functioning of DNA polymerase. DNA polymerase extends the primers using the nucleotides provided in the reaction and the genomic DNA as the template.The segment of DNA can be amplified to approximately billion times. Such repeated amplification is achieved by the use of a thermostable DNA polymerase, which remains active during the high-temperature unduced denaturation of double stranded DNA.

13. Bacteriophages are viruses that infect bacterial cells by injecting their DNA into these cells. The injected DNA is selectively replicated and expressed in the host bacterial cell resulting in a number of phases which burst out of the cell and reinfect neighbouring cells. Their ability to transfer DNA from the phage genome to specific bacterial hosts during the process of bacterial infection give it to the property be used as vectors.
    Examples are – Phase lambda and M 13 phages.
14. Many restriction enzymes cleave the recognition sequence asymmetrically (little away from the centre). As a result, the DNA fragments have short, single stranded overhangs at each end, which are called sticky ends.They are named so because they form hydrogen bonds with their complementary cut counter parts. This stickiness of the ends facilitates the action of DNA ligase.
15.
    1. Escherichia coli / E coli
    2. ori.
    3. amp^R is the marker gene that helps in identification and elimination of the non-transformant growing in ampicillin medium and selectively permitting the growth of the transformant resistant to ampicillin. tet^R is the marker gene that helps in identification and elimination of the non-transformant growing in tetracycline medium and selectively permitting the growth of the transformant resistant to tetracycline.