

## BIOTECHNOLOGY

1. Which of the following should be chosen for best yield if one was to produce a recombinant protein in large amounts?

- 1) Laboratory flask of largest capacity
- 2) A stirred tank bioreactor without inlets and out lets
- 3) A continuous culture system
- 4) PCR

2. A bacterial cell was transformed with a recombinant DNA that was generated using a human gene. However, the transformed cells did not produce the desired protein. Reasons could be

- 1) Human gene may have intron which bacteria can not process
- 2) Amino acid codons for humans and bacteria are different
- 3) Human protein is formed but degraded by bacteria
- 4) Ribosomes are absent in bacterial cell for protein synthesis

3. Which of the following steps are catalysed by taq polymerase in PCR reaction?

- 1) Denaturation of template DNA
- 2) Annealing of primers to template DNA
- 3) Extension of primer and on the template DNA
- 4) Rejoining of template DNA

4. Match the following

**List – I**

- A) Lysozyme
- B) Ti plasmid
- C) Insertional inactivation
- D) Eco RI
- E) Taq DNA polymerase
- F) Gel electrophoresis

**List – II**

- i) Agrobacterium tumifaciens
- ii) Thermus aquaticus
- iii) Bacterial cell
- iv) Agrase
- v)  $\alpha$  - galactosidase
- vi) Escherichia coli Ry13

- |    | A   | B   | C  | D  | E  | F  |
|----|-----|-----|----|----|----|----|
| 1) | iii | i   | v  | iv | ii | vi |
| 2) | i   | iii | v  | vi | ii | iv |
| 3) | iii | i   | v  | vi | ii | iv |
| 4) | i   | iii | ii | iv | vi | v  |

5. Assertion (A): Vectors are engineered to make easy linking of foreign DNA and selection of recombinants from non – recombinants

Reason (R): Antibiotic resistance gene within the vector gets inactivated due to insertion of alien DNA, and helps in selection of recombinants.

- 1) Both A and R are true and R is correct explanation of A
- 2) Both A and R are true and R is not correct explanation of A
- 3) A is true and R is false
- 4) A is false and R is true

6. **Assertion (A): Selection of recombinants due to inactivation of antibiotics is cumbersome procedure**  
**Reason (R): It requires simultaneous plating on two plates having different antibiotics**
- 1) Both A and R are true and R is correct explanation of A
  - 2) Both A and R are true and R is not correct explanation of A
  - 3) A is true and R is false
  - 4) A is false and R is true
7. **The tumor inducing (Ti) plasmid has now been modified into a cloning vector which is no more pathogenic to the plants but is still able to use the mechanisms to deliver genes of our interest into a variety of plants because Ti plasmid has been modified by**
- 1) Adding tumor forming genes
  - 2) Deleting tumor forming genes
  - 3) Adding genes resistant to endonucleases
  - 4) Deleting endonuclease
8. **The most commonly used bioreactor is of stirring type, the stirrer facilitates**
- 1) Temperature control
  - 2) p<sup>H</sup> control
  - 3) Oxygen availability
  - 4) Product removal
9. **After completion of the transformation experiment involving the coding sequence of enzyme  $\alpha$  - galactosidase, the recombinant colonies should**
- 1) Give blue colour
  - 2) not gives blue colour
  - 3) Have active  $\alpha$  - galactosidase
  - 4) die
10. **Insertional inactivation is related to**
- 1) Microinjection
  - 2) Gene gun
  - 3) Gel electrophoresis
  - 4) Selection of recombinants
11. **Which of the following is not applicable to Agrobacterium tumifaciens ?**
- 1) Pathogen of several dicot plants
  - 2) Has ability to transform normal plant cells
  - 3) Delivers gene of our interest
  - 4) Ti plasmid of it is always pathogenic to plants without any exception
12. **Which of the following bacteria are known as 'natural genetic engineers of plants' as gene transfer is happening in nature without human interference?**
- 1) Azotobacter
  - 2) Agrobacterium tumefaciens
  - 3) Escherichia Coli
  - 4) Rhizobium
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14. Which of the following is incorrect match?

- 1) Gene therapy : An abnormal gene is replaced by normal gene
- 2) Cloning : Ability to multiply copies of antibiotic resistance gene in *E. coli*
- 3) Restriction enzymes: Molecular scissors
- 4) Exonucleases : Molecular glue

15. Plant, bacteria, fungi & animals whose genes have been altered by manipulation are called genetically modified organisms (GMO). Which of the following statement is not applicable to GM plants?

- 1) Reduced reliance on chemical pesticides
- 2) Prevent early exhaustion of fertility of soil
- 3) Crops less tolerant to abiotic stress (cold, drought, salt, heat)
- 4) Enhanced nutritional value of food

16. In case of *Bacillus thuringiensis*, Bacillus itself is not killed by toxic protein crystals produced by it because

- 1) Bt toxin protein is not produced in the bacillus
- 2) Bt toxin protein is produced in very less amount in the bacillus
- 3) Bt toxin exist as the inactive toxin
- 4) Bt toxin can't cause any damage to bacillus

17. Bt toxin kills the insect by

- 1) Blocking the nerve conduction
- 2) Damaging the surface of Trachea
- 3) By creating pores in the tracheal system
- 4) By creating pores in the mid gut

18. Which of the following cry gene codes for the protein which can control the corn borer effectively?

- 1) Cry I Ac                      2) cry II Ab
- 3) Cry I Ab                      4) cry II Ac

19. RNA interference (RNAi) technique has been devised to protect the plants from the nematode. In this technique mRNA of nematode is silenced by produced by the host plant

- 1) dsDNA                      2) ssDNA
- 3) dsRNA                      4) Target proteins

20. Which of the following peptide chain is removed during maturation of pro-insulin into insulin?

- 1) A peptide                      2) B peptide
- 3) C peptide                      4) A & C peptide

21. Eli Lilly an American company prepared two DNA sequences corresponding to A & B chains of human insulin & introduced them in plasmids of E.coli to produce insulin chains. Chains A & B were produced separately, extracted & combined by creating

- 1) Peptide bonds              2) Ionic bonds
- 3) H-bonds                      4) Disulphide bonds

22. The first clinical gene therapy was given in 1990 to a 4-year old girl with which of the following enzyme deficiency?
- 1) Adenosine deaminase
  - 2) Tyrosine oxidase
  - 3) Monamine oxidase
  - 4) Glutamate dehydrogenase
23. Animals that have had their DNA manipulated to possess & express an extra gene are known as
- 1) Foreign animals
  - 2) Superior animals
  - 3) Transgenic animals
  - 4) Intergenic animals
24. Which of the following is not a true statement w.r.t Bt cotton?
- 1) Bt toxin is produced by a bacterium Bacillus thuringiensis
  - 2) It is an example of bio-pesticide
  - 3) Bt toxin gene has been cloned in plants to provide resistance to insects
  - 4) Bt cotton could decrease the amount of pesticide used
25. Which of the following technique is based upon the principle of antigen-antibody interaction?
- 1) PCR
  - 2) ELISA
  - 3) Recombinant DNA technology
  - 4) RNA interference
26. Which of the following transgenic protein product has been used to treat emphysema?
- 1)  $\alpha$ -1-antitrypsin
  - 2)  $\alpha$ -Lactalbumin
  - 3) Cry protein
  - 4) C-peptide
27. How many varieties of rice have been estimated to be present in India?
- 1) 2,000
  - 2) 20,000
  - 3) 200,000
  - 4) 2,000,000
28. The use of bioresources by multinational companies & other organisations without proper authorisation from the countries & people concerned without compensatory payment is called
- 1) Bioethics
  - 2) Biopiracy
  - 3) Bioterror
  - 4) Bioweapon
29. Which biotechnology company is credited with the synthesis of genetically engineered human insulin for the first time?
- 1) Celera genomics
  - 2) Cipla
  - 3) Eli Lilly
  - 4) Ranbaxy
30. Which step of Government of India has taken to cater to the requirement of patent terms and other emergency provisions in this regard?
- 1) Biopiracy act
  - 2) Indian patents bill
  - 3) RTI act
  - 4) Negotiable instruments act
31. What is another term used for GMO (Genetically Modified Organisms)?
- 1) Hybrid organisms
  - 2) Geomorphic organisms
  - 3) Transgenic organisms
  - 4) Conjoint twins

32. Which GMO is now being developed in order to be used in testing the safety of Polio vaccines before they are used in humans?
- 1) Transgenic sheep
  - 2) Transgenic cow
  - 3) Transgenic mice
  - 4) Transgenic viruses
33. 'Silencing' of m-RNA molecule in order to control the production of a harmful protein has been used in protection of plants from
- 1) Nematodes
  - 2) Beetles
  - 3) Mosquitoes
  - 4) Flies
34. Which step proved to be the main challenging obstacle in the production of human insulin by genetic engineering?
- 1) Removal of C-peptide from active insulin
  - 2) Getting insulin assembled into a mature form
  - 3) Addition of C-peptide to pro-insulin
  - 4) Splitting A and B polypeptide chains
35. What is the disadvantage of using porcine insulin (from pig pancreas) in diabetic patients?
- 1) It leads to hypercalcaemia
  - 2) It may cause allergic reactions
  - 3) It is expensive
  - 4) It can lead to mutations in human recipients
36. Which Indian plants have either been either patented or attempts have been made to patent them by western nations for their commercial use?
- 1) Basmati rice
  - 2) Turmeric
  - 3) Neem
  - 4) All of these have been targeted
37. Why is usually insulin not administered orally to a diabetic patient?
- 1) Insulin is bitter in taste
  - 2) Insulin is a peptide
  - 3) Insulin will lead to a sudden decrease in blood sugar if given orally
  - 4) Insulin leads to peptic ulcer orally
38. Which technique would you expect to be completely curative in SCID?
- 1) Gene therapy in adult stage
  - 2) Gene therapy in embryonic stage
  - 3) Bone marrow transplantation
  - 4) Enzyme replacement therapy
39. Match the following genes in Column-I with the insect that can be protected from with their coded protein in Column-II.
- | Column-I         | Column-II           |
|------------------|---------------------|
| a. cry I Ac      | (i) Cotton bollworm |
| b. cry I Ab      | (ii) Beetles        |
| c. Bt toxin gene | (iii) Corn borer    |
- 1) a(i), b(iii), c(ii)
  - 2) a(ii), b(i), c(iii)
  - 3) a(i), b(ii), c(iii)
  - 4) a(ii), b(iii), c(i)

40. 'Rosie' a transgenic cow is known to produce a type of milk which has all the following characteristics except
- 1) Protein content of 2.4 gm/litre
  - 2) Has human  $\alpha$ -Lactalbumin
  - 3) More balanced diet than normal cow milk for babies
  - 4) Was produced for the first time in year 2001
41. According to the latest estimates, how many documented varieties of Basmati rice are grown in India?
- 1) 30      2) 27      3) 118      4) 125
42. Which ingredient was present in high concentrations in genetically modified (GM) rice as compared to the usual rice?
- 1) Protein
  - 2) Carbohydrates
  - 3)  $\text{Na}^+$  ions
  - 4) Vitamin A

**Assertion - Reason Type Questions**

In the following questions, a statement of assertion (A) is followed by a statement of reason (R)

- (1) If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1).
  - (2) If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2).
  - (3) If Assertion is true statement but Reason is false, then mark (3).
  - (4) If both Assertion and Reason are false statements, then mark (4).
43. A : RNAi takes place in all eukaryotic organisms as a method of cellular defense.  
R : Complementary dsRNA molecule binds to specific mRNA & prevents its translation (silencing).
44. A : Bt toxin are protein crystals containing insecticidal protein  
R : *B. thuringiensis* forms these protein crystals throughout continuously during their growth period.
45. A : Transgenic mice are being used to test the safety of the polio vaccine.  
R : It could replace the use of monkeys to test the safety of batches of the vaccine.

**KEY**

1. 3    2.1    3.3    4.3    5. 1    6.1    7.2    8.3    9.2    10.4

11.4    12.2    13.2    14.4    15.3    16.3    17.4    18.3    19.3    20.3

21. 4    22.1    23.3    24. 3    25.2    26.1    27.3    28.2    29.3    30.2

31. 3    32. 3    33.1    34. 2    35. 2    36.4    37. 2    38.2    39. 1    40. 4

41. 2    42.4    43.2    44.3    45.2

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