CHAPTER 12

Biotechnology and Its Application

PRACTICE QUESTIONS

Biotechnology Application in Agriculture

1. Transgenic plants (genetically modified or GM plants) are produced by inserting desired genes in the plasmid of
(a) E. Coli (b) Pseudomonas (c) Bacillus subtilis (d) Agrobacterium

2. The applications of Biotechnology include
(A) Therapeutics (B) Diagnostics
(C) GM crops for agriculture (D) Processed food
(E) Bioremediation (F) Waste treatment
(G) Energy production
(a) A, B, C, E only (b) C only
(c) B, C, D, E only (d) All of these

3. Golden rice is a
(a) Hybrid (b) GM plant (c) Transgenic plant (d) Both (b) and (c)

4. Which of the GMO is used by biotechnology?
(a) Microbes and fungi (b) Plants
(c) Animals (d) All of these

5. Humulin is a
(a) Natural insulin
(b) Human insulin synthesized by genetically engineered E. coli
(c) Human insulin synthesized by pancreas
(d) Chemically synthesized insulin

6. Critical research areas of biotechnology are
(a) Providing the best catalyst in the form of improved organism usually a microbe or pure enzyme.
(b) Creating optimal condition through engineering for a catalyst to act.
(c) Downstream processing technologies to purify the protein organic compound.
(d) All the above

7. Salt stress, disease resistance and cold stress in plants can be introduced by
(a) Genetic engineering (b) Tissue culture
(c) Hybridoma technology (d) None of these

8. Food production can be increased by
(a) Agro chemical based agriculture (b) Organic agriculture
(c) Genetically engineered based agriculture (d) All of these

9. DNA fingerprinting was developed by
(a) Prof. Alec Jeffrey (b) Arber and Smith
(c) Barbara McClintock (d) Jacob and Monod

10. After Green Revolution how many times does food supply has been increased?
(a) 2 (b) 3 (c) 4 (d) 5

11. Genetic engineering is useful for
(a) Agriculture (b) Medical research
(c) Treatment and diagnosis of diseases (d) All of these

12. Increased yield in Green Revolution is mainly due to
(a) Use of agrochemicals (fertilizers and pesticides)
(b) Use of improved crop varieties
(c) Use of GM crops
(d) All of these

13. DNA fingerprinting needs
(a) Suitable restriction enzyme
(b) DNA probe
(c) Facilities for gel electrophoresis and southern blotting
(d) All the above

14. The following are the advantages of GM crops except
(a) They reduce reliance on chemical pesticides
(b) Increase efficiency of mineral usage
(c) Enhanced nutritional value of food
(d) Post harvest losses are more

15. Bt stands for
(a) Bacterial toxin (b) Botulinum toxin
(c) Bacillus thuringiensis (d) Bacillus toxin

16. Which of the following crops are now genetically modified by Bt-toxin gene?
(A) Cotton (B) Corn
(C) Rice (D) Tomato
(E) Potato (F) Soyabean
(a) A, B and C only (b) D and E only (c) A and F only (d) All of these

17. During electrophoresis, DNA fragments move towards the
(a) Anode (b) Cathode
(c) Both the poles (d) None of these

18. Some strains of Bacillus thuringiensis produce proteins that kill certain insects like
(a) Lepidopterans (b) Coleopterans (c) Dipterans (d) All of these

19. Humulin was first marketed by
(a) Eli Lilly (b) Sun pharma
(c) Nova Industry (d) May and Baker

20. Select the correct matching.

(a) Lepidopterans	Tobacco bud worm, armyworm
(b) Coleopterans	Beetles and bud worm
(c) Dipterans	Flies, mosquitoes, spiders
(d) Aves	Lady bird, hummingbird

21. Antisense transcription is like carrying genes as much as
(a) On sense strand of DNA (b) Antisense strand of DNA
(c) On genetic RNA (d) On tRNA

22. Bt-toxin is insecticidal because
(a) Activated toxin binds to the surface of midgut epithelial cells and creates pores that causes swelling and lysis and eventually cause death of the insect.
(b) It decreases the growth of the nervous system of the insect.
(c) It makes the insects unable to fly
(d) It kills insects by affecting its blood flow.

23. DNA probe is used in
(a) Gel electrophoresis (b) Western blot
(c) DNA profiling technique (d) Interferon synthesis

24. Bt-crops are not affected by Bt-toxin because
(a) Toxin exist as inactive protoxin.
(b) It has special antibodies against toxin.
(c) Its intracellular medium is alkaline so toxin remains inactive.
(d) All the above

25. During DNA fingerprinting, DNA probes helps in
(a) Gel electrophoresis (b) Southern blotting
(c) Autoradiography (d) None of these

26. Select the correct statement.
(a) Most Bt-toxins are insect group non-specific.
(b) Bt-toxin gene is coded with the name 'CRY'.
(c) Genes cryIAc and cryIIAb form protein that control cotton bollworms.
(d) cryIAb gene forms protein that control corn borer.

27. Transfer of rDNA through phage is done by
(a) Diffusion (b) Transformation
(c) Transduction (d) Conjugation

28. The following are all genes except
(a) cryIAc (b) cryIAb (c) ROP (d) SalI

29. Hepatitis-B vaccine is a
(a) First generation vaccine (b) Third generation vaccine
(c) Product of biotechnology (d) Both (b) and (c)

30. Protein encoded gene cryIAb controls
(a) Cotton bollworm (b) Beetles
(c) Corn borer (d) Flies

31. Golden rice is enriched in
(a) Beta carotene (b) Lysine (c) Vitamin C (d) Iron

32. Bt-toxin is obtained from
(a) Bacilli (b) Cocci (c) Vibrio (d) Spirillum

33. Engineered bacteria have successfully been used for the commercial production of
(a) Human insulin (b) Melatonine (c) Thyrosine (d) Testosterone

34. A nematode _____ infects the roots of tobacco plants and causes great reduction in yield.
(a) Ancylostoma (b) Hookworm
(c) Meloidogyne incognita (d) Wuchereria

35. The first transgenic crop plant was
(a) Cotton (b) Cereals (c) Tobacco (d) Pea

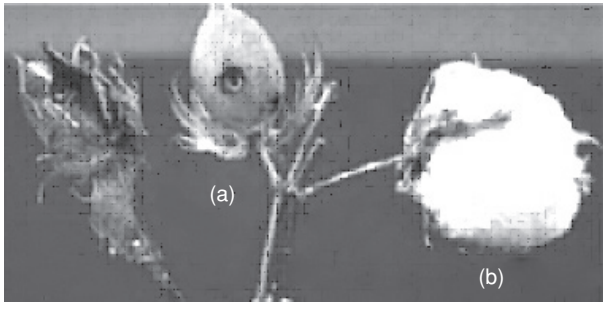
36. RNAi process takes place in
(a) Prokaryotes (b) Unicellular eukaryotes only
(c) Multicellular eukaryote only (d) All eukaryotes

37. Which of the following cuts the DNA at a specific place?
(a) Restriction endonuclease (b) DNA ligase
(c) Exonuclease (d) Alkaline phosphatase

38. Which of the following is true about RNAi process?
(a) It is a method of cellular defense.
(b) It involves silencing of a specific mRNA due to a complementary dsRNA molecule.
(c) Source of complementary RNA in this process may be infection by viruses having RNA genomes.
(d) All are true

39. The most commonly used bacterium in plant genetic engineering is
(a) E. coli (b) Rhizobium
(c) Klebsiella (d) Agrobacterium

40. Identify A and B in the diagram.



(a) A: A fully mature cotton boll, B: Destroyed by bollworms
(b) A: Destroyed by bollworms, B: Fully mature cotton boll
(c) A: Destroyed by virus, B: Immature cotton boll
(d) A: Immature normal cotton boll, B: Destroyed by virus

41. In which of the processes is both the DNA strands transcribed?
(a) PCR (b) DNA replication
(c) RNAi (d) Southern blotting

42. The source of Taq polymerase used in PCR technique is a
(a) Thermophilic fungus (b) Mesophilic fungus
(c) Thermophilic bacteria (d) Halophilic bacteria

43. Which of the following vector is used to transfer nematode specific gene in host plant?
(a) Virus (b) Rhizobium
(c) Agrobacterium (d) Cosmid

44. What is true about Bt-toxin?
(a) The concerned bacillus has antitoxins.
(b) The inactive protoxin gets converted into active form in the insect gut.
(c) Bt-protein exists as active toxin in the bacillus.
(d) The activated toxin enters the ovary of pest to sterilize it and thus prevent its multiplication.

45. RNAi stands for
(a) RNA infection (b) RNA induction
(c) RNA interference (d) RNA inhibition

46. The abbreviation 'B' in Bt-toxin stands for
(a) Biotechnology
(b) Biotoxin
(c) Bacillus
(d) Toxin released by bacterium

47. Which of the following is the source of complementary strand in mRNA silencing?
(a) An infection by viruses having RNA genome
(b) Mobile genetic elements (Transposons)
(c) Both (a) and (b)
(d) Proteins

48. Some of the characteristics of Bt-cotton are
(a) Long fibre and resistance of aphids.
(b) Maximum yield, long fibre and resistance to beetle pests.
(c) High yield and production of toxin protein crystal which kills dipteran pests only.
(d) High yield and resistance to bollworms.

49. How many recombinant therapeutics have been approved for human use all over the world?
(a) 10 (b) 20 (c) 30 (d) 90

50. Which of the following is produced by genetically engineered bacterium?
(a) Tyrosine (b) Insulin (c) Glycogen (d) ADH

51. How many recombinant products are presently being marketed in India?
(a) 10 (b) 20 (c) 12 (d) 30

52. Which of the following is not used as a bioweapon?
(a) Bacillus anthracis (b) Botulinum toxin
(c) Bacillus thuringiensis (d) Small pox

53. The main challenge for the production of insulin using rDNA technique is
(a) Production of A peptide
(b) Production of B peptide
(c) Getting insulin assembled into a mature form
(d) All the above

54. Transgenic plants are produced by
(a) Inducing gene mutation
(b) Arresting spindle fibre formation
(c) Deleting sex chromosome
(d) Introducing foreign genes

55. Peptide A and peptide B is linked by how many disulphide linkages between their proinsulin?
(a) 1 (b) 2 (c) 3 (d) 4

56. Some of the steps involved in the production of humulin are given below. Choose the correct sequence.
(1) Purification of humulin.
(2) Extraction of recombinant gene product from E. coli.
(3) Culturing recombinant E. coli in bioreactors.
(4) Introduction of recombinant plasmid into E. coli.
(5) Synthesis of gene for human insulin artificially.
(6) Insertion of human insulin gene into plasmid.
(a) 2, 1, 4, 3, 5, 6
(b) 1, 3, 5, 6, 2, 4
(c) 5, 6, 4, 3, 2, 1
(d) 3, 5, 2, 1, 6, 4

57. Which American company in 1983 prepared humulin?
(a) Eli Lilly
(b) Ranbaxy
(c) Sun pharma
(d) Glaxosmithkline

58. During the process of prohormone 'proinsulin' into mature insulin synthesis
(a) C-peptide is added to proinsulin
(b) C-peptide is removed from proinsulin
(c) β-peptide is added to proinsulin
(d) β-peptide is removed from proinsulin

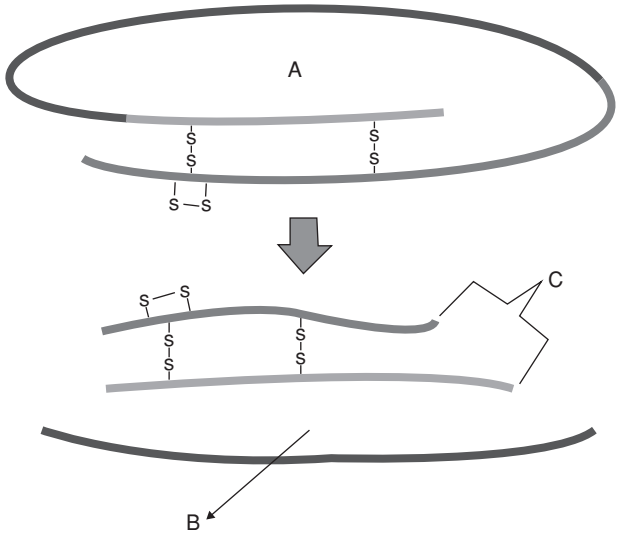
59. Select the true statements from the following.
(1) Insulin from animal source, may develop allergy in some patients.
(2) C-peptide is not present in mature insulin.
(3) Recombinant therapeutics do not induce unwanted immunological response.
(4) Insulin can be administered orally to diabetic patients
(a) 1 and 3 only
(b) 1 and 2 only
(c) 3 and 4 only
(d) 1, 2 and 3 only

60. Cancer is generally caused due to the activation/conversion of _____ to _____ and/or inactivation of _____.
(a) Oncogene, tumour suppressor gene, proto-oncogene
(b) Tumour suppressor gene, oncogene, proto-oncogene
(c) Proto-oncogene, oncogene, tumour suppressor gene
(d) Oncogene, proto-oncogene, tumour suppressor gene

61. Which of the following peptide chain is removed during maturation of pro-insulin into insulin?
(a) A-peptide
(b) B-peptide
(c) C-peptide
(d) B and C peptide

62. The Bt-toxin is not toxic to human beings because
(a) The pro Bt-toxin inactivation requires above human body temperature.
(b) The Bt-toxin recognizes only insect specific target.
(c) The Bt-toxin formation from pro Bt-toxin requires pH lower than that present in the human stomach.
(d) Conversion of pro Bt-toxin to Bt-toxin takes place only in highly alkaline conditions.

63. Which part of the diagram shows that insulin in our body is synthesized in immature form?



(a) A and C
(b) B and C
(c) A and B
(d) None of these

64. Why is insulin not administered orally to diabetic patients?
(a) Insulin is bitter in taste.
(b) Insulin is a peptide.
(c) Insulin will lead to sudden decrease in blood sugar if given orally.
(d) Insulin leads to peptic ulcer if given orally.

65. The method of DNA fingerprinting involves the use of
(a) Restriction enzyme
(b) Taq polymerase
(c) Oligonucleotide primers
(d) All of these

66. Pro-insulin contains
(a) A-peptide
(b) B-peptide
(c) C-peptide
(d) All of these

67. What is the source of T_i plasmid which is modified and used as a cloning vector to deliver the desired genes into plant cells?
(a) Agrobacterium tumefaciens
(b) Thermophilus aquaticus
(c) Pyrococcus furiosus
(d) Aedes aegypti

68. The first clinical gene therapy was given in
(a) 1992 (b) 1990
(c) 1995 (d) 1997

69. The thermostable enzyme 'Taq' and 'Pfu' isolated from thermophilic bacteria are
(a) RNA polymerase (b) DNA polymerase
(c) Restriction endonuclease (d) DNA ligase

70. Select the incorrect matching.
(a) ADA → Adenosine Aminase
(b) ELISA → Enzyme Linked Immunosorbent Assay
(c) PCR → Polymers Chain Reaction
(d) PKU → Phenyl Ketonuria

71. The term 'molecular scissor' generally refers to
(a) DNA polymerase (b) RNA polymerase
(c) Restriction endonuclease (d) DNA ligase

72. ADA deficiency is due to
(a) Insertion of gene (b) Deletion of gene
(c) Duplication of gene (d) Translocation of gene

73. Permanent cure for ADA deficiency is
(a) Genetically engineered lymphocyte
(b) Bone marrow transplantation
(c) Enzyme replacement therapy
(d) ADA gene introduced in early embryonic stages

74. The first clinical gene therapy was given to a _____ old girl.
(a) 2 year (b) 6 year
(c) 4 year (d) 8 year

75. The conventional method of diagnosis involves
(a) Urine analysis (b) ELISA
(c) PCR (d) rDNA technology

76. PCR is used in the detection of
(a) HIV (AIDS) (b) Cancer
(c) Genetic disorder (d) All of these

77. When a patient with defective ADA is treated, which of the following steps are performed for gene therapy?
(A) Lymphocytes are obtained from the patients.
(B) Lymphocytes are transferred to culture dishes.
(C) Lymphocytes are transected with normal ADA genes.
(D) The transected cells are returned to the patients.
(a) All the above (b) Only C and D
(c) Only D (d) SCID cannot be treated

78. Which of the following is a benefit to have insulin produced by biotechnology?
(a) It is just as effective and is less expensive (b) It can be produced in large quantity
(c) It is non allergic (d) All of these

79. Which one of the following genes is defective in patients suffering from serve combined immunodeficiency syndrome (SCID)?
(a) RNAase (b) ADA
(c) Carbonic anhydrase (d) DNAase

80. A functional ADA cDNA can be introduced into cells of the patients receiving gene therapy by using vector constituted by
(a) E. coli (b) Reovirus
(c) Retrovirus (d) Agrobacterium

81. Which of the following is used as probe?
(a) Single stranded DNA
(b) dsDNA tagged with a radioactive molecule
(c) Single stranded RNA tagged with a radioactive molecule
(d) dsRNA

82. Which gene does not appear in photographic film in autoradiography?
(a) Housekeeping gene (b) Structural gene
(c) Mutated gene (d) Transcriptionally active gene

83. Which of the following is based on antigen-antibody reaction?
(a) PCR (b) ELISA
(c) Serum analysis (d) Southern blotting

84. Which of the following can be detected in ELISA?
(a) Protein antigen (b) Glycoprotein antigen
(c) Antibodies synthesized against pathogen (d) Any of these

85. Over 95 per cent of all existing transgenic animals are
(a) Pig (b) Mice
(c) Sheep (d) Cow

86. Transgenic organisms are used
(a) To study disease (b) To produce biological product
(c) To test vaccine safety (d) All of these

87. Match the columns

Column-I	**Column-II**
A. Emphysema	1. Test to detect antigen or antibody
B. Rosie	2. α-1 antitrypsin
C. ELISA	3. Protein enriched milk
D. ROP	4. Codes for proteins involved in plasmid replication

(a) A-2, B-3, C-1, D-4 (b) A-1, B-3, C-4, D-2
(c) A-1, B-2, C-3, D-4 (d) A-4, B-3, C-2, D-1

88. Transgenic animals are prepared for the following disease analysis except
(a) Cancer (b) Cystic fibrosis and Alzheimer's
(c) Rheumatoid arthritis (d) AIDS

89. 'Rosie' a transgenic cow known to produce a type of milk which has all the following characteristics except
(a) Protein content of 2.4 gm/litre
(b) Has human α-lactalbumin
(c) More balance diet than normal milk for babies
(d) Rich in cholesterol

90. Rosie was produced in the year
(a) 2000 (b) 1999 (c) 1997 (d) 2007

91. GMO/transgenic animal are used in testing safety of polio vaccine before they are used on human?
(a) Transgenic sheep (b) Transgenic cow
(c) Transgenic viruses (d) Transgenic mice

92. How many varieties of rice have been estimated to be present in India?
(a) 200 (b) 20,000 (c) 200,000 (d) 2,000,000

93. The use of bioresources by multinational companies and other organizations, without proper authorization from the countries and people concerned without compensatory payment, is called
(a) Bioethics (b) Biopiracy (c) Bioterror (d) Bioweapon

94. Which variety or rice was patented by a US company even though the highest number of varieties of this rice is found in India?
(a) Sharbati Sonora (b) Co-667
(c) Basmati (d) Lerma Roja

95. The Government of India took what step to cater to the requirement of patent terms and other emergency provisions with regard to biopiracy?
(a) Biopiracy act (b) India Patents Bill
(c) RTI Act (d) Negotiable Instruments Act

96. Which Indian plants have either been patented or attempts have been made to patent them by western nations for their commercial use?
(a) Basmati rice (b) Turmeric
(c) Neem (d) All of these have been targeted

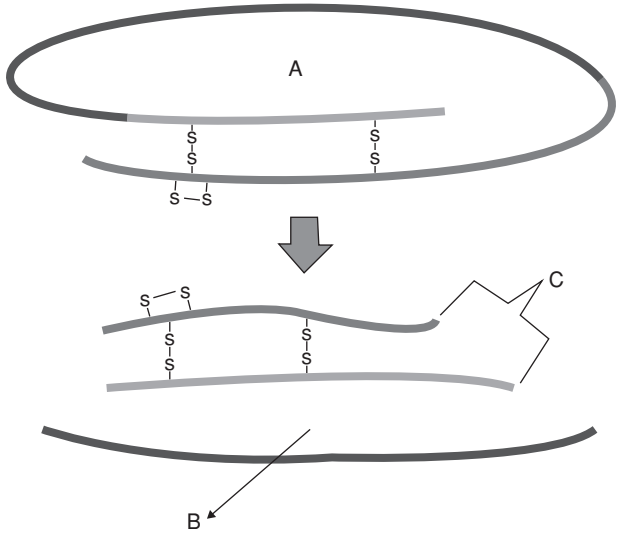
97. Golden rice is
(a) A variety of rice grown along the yellow river in China.
(b) Long stored rice having yellow colour tint.
(c) A transgenic rice having gene for β-carotene.
(d) Wild variety of rice with yellow coloured grains.

98. In RNAi, genes are silenced using
(a) ssDNA (b) dsDNA (c) dsRNA (d) ssRNA

99. The first clinical gene therapy was done for the treatment of
(a) AIDS
(b) Cancer
(c) Cystic fibrosis
(d) SCID (Servere Combined Immuno Deficiency resulting from the deficiency of ADA)

100. ADA is an enzyme which is deficient in the genetic disorder SCID. What is the full form of ADA?
(a) Adenosine deoxyaminase
(b) Adenosine deaminase
(c) Aspartate deaminase
(d) Arginine dearginase

101. Silencing of a gene could be achieved through the use of
(a) Short interfering RNA (RNAi)
(b) Antisense RNA
(c) By both
(d) None of these



102. Identify A, B and C in the diagram.
(a) A Proinsulin, B Free C peptide, C Insulin
(b) A Free C peptide, B Proinsulin, C Insulin
(c) A Insulin, B Proinsulin, C Free C peptide
(d) A Free C peptide, B Insulin, D Proinsulin

103. Crystals of Bt-toxin produced by some bacteria do not kill the bacteria themselves because
(a) Bacteria are resistant to the toxin
(b) Toxin is immature
(c) Toxin is inactive
(d) Bacteria encloses toxin in a special sac

ASSERTION AND REASON QUESTIONS

*Read the **assertion** and **reason** carefully to mark the correct option out of the options given below:*

(a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
(b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
(c) If the assertion is true but the reason is false.
(d) If both the assertion and reason are false.

104. **Assertion:** ELISA is used to detect infection by pathogen, that can be detected by the presence of antigens or by detecting the antibodies synthesized against the pathogen.
Reason: ELISA is based on the principle of anitgen-antibody interaction.

105. **Assertion:** GEAC is genetic engineering approval committee.
Reason: GEAC will make decisions regarding the validity of GM research.

106. **Assertion:** rDNA therapeutic are better than similar products isolated from non-human sources.
Reason: rDNA therapeutic do not induce unwanted immunological responses.

107. **Assertion:** Alpha - 1 – antitrypsin is used to treat emphysema.
Reason: Transgenic mice are being used to test the safety of the polio vaccine.

108. **Assertion:** PCR and ELISA are techniques that serve the purpose of easily diagnosis.
Reason: For the treatment of a disease, early diagnosis is very important.

109. **Assertion:** Biopiracy is the team used to refer to the use of bio-resources by multinational companies and other organizations without proper authorization from the countries and people concerned without compensatory payment.
Reason: Bioprospecting is the process of discovery and commercialization of new products based on biological resources.

110. **Assertion:** ADA deficiency can be cured by bone marrow transplantation.
Reason: ADA deficiency can be treated by enzyme replacement therapy.

111. **Assertion:** Bt toxin do not kill bacillus.
Reason: Bt toxin protein exists in bacillus as inactive prototoxins.

112. **Assertion:** RNAi takes place in all eukaryotic organism as a method of cellular defence.
Reason: RNAi method involve silencing of a specific mRNA due to complementary dsRNA molecule that binds to and prevent translation of the mRNA (silencing).

113. **Assertion:** Genetic modification will enhance nutritional value of food.
Reason: Vitamin A enriched rice is GMO.

114. **Assertion:** GM plants are useful to us.
Reason: We have introduced many useful characters in GM plants like resistance to abiotic stress, enhanced nutritional value of food.

115. **Assertion:** Bt toxin is produced by fungus *Bacillus thuringienesis*.
Reason: Bt toxin is polysaccharide.

116. **Assertion:** serum and urine analysis is not sensitive methods of diagnosis
Reason: Early detection of pathogen is not possible by these methods.

117. **Assertion:** PCR is now routinely used to detect HIV in suspected AIDS patient.
Reason: Very low concentration of Virus can be detected by the amplification of the nucleic acid by PCR

118. **Assertion:** Transgenic animals are made that carry genes which makes them more sensitive to toxic substances than non transgenic animals.
Reason: Toxicity testing in such animals will allow us to obtain result in less time.

119. **Assertion:** ELISA is used to detect antigen or antibody.
Reason: ELISA is a method of molecular diagnosis based on antigen- antibody reaction.

120. **Assertion:** A double stranded DNA or RNA tagged with radioactive molecule is used as probe.
Reason: Because double stranded DNA or RNA is easily hybridised with single stranded DNA.

121. **Assertion:** Why oral insulin is not administered to diabetic people.
Reason: Insulin is digested by our digestive enzymes.

122. **Assertion:** A functional ADA c DNA is introduced in lymphocyte using retroviral vector.
Reason: Disarmed retrovirus is use to deliver gene in animal cells.

PREVIOUS YEAR QUESTIONS

1. Which one of the following is used as vector for cloning genes into higher organisms?
[AIPMT PRE 2010]
(a) Baculovirus (b) Salmonella typhimurium
(c) Rhizopus nigricans (d) Retrovirus

2. DNA or RNA segment tagged with a radioactive molecule is called
[AIPMT PRE 2010]
(a) Vector (b) Probe
(c) Clone (d) Plasmid

3. Genetic engineering has been successfully used for producing
[AIPMT PRE 2010]
(a) Transgenic mice for testing safety of polio vaccine before used in humans.
(b) Transgenic models for studying new treatments for certain cardiac diseases.
(c) Transgenic cow Rosie which produces high fat milk for making ghee.
(d) Animals like bulls for farm work as they have super power.

4. Some of the characteristics of Bt cotton are
[AIPMT PRE 2010]
(a) Long fibre and resistance to aphids.
(b) Medium yield, long fibre and resistance to beetle pests.
(c) High yield and production of toxic protein crystals which kill dipteran pests.
(d) High yield and resistance to bollworms.

5. Bacillus thuringiensis forms protein crystals which contain insecticidal protein. This protein
[AIPMT MAINS 2011]
(a) Binds with epithelial cells of midgut of the insect pest ultimately killing it.
(b) Is coded by several genes including the gene cry.
(c) Is activated by acid pH of the foregut of the insect pest.
(d) Does not kill the carrier bacterium which is itself resistant to this toxin.

6. Silencing of mRNA has been used in producing transgenic plants resistant to
[AIPMT MAINS 2011]

(a) Bollworms (b) Nematodes
(c) White rusts (d) Bacterial blights

7. Read the following four statements (A to D) about certain mistakes in two of them.
(A) The first transgenic buffalo, Rosie produced milk which was human alpha-lactalbumin enriched.
(B) Restriction enzymes are used in isolation of DNA from other macromolecules.
(C) Downstream processing is one of the steps of rDNA technology.
(D) Disarmed pathogen vectors are also used in transfer of rDNA into the host.
[AIPMT MAINS 2011]
Which of the two statements have mistakes?
(a) B and C (b) C and D (c) A and C (d) A and B

8. The process of RNA interference has been used in the development of plants resistant to
[AIPMT PRE 2011]
(a) Fungi (b) Viruses (c) Insects (d) Nematodes

9. Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells)
[AIPMT MAINS 2012]
(a) A particular hormone (b) An antioxidant
(c) A toxic protein (d) Both sense and anti-sense RNA

10. Which of the following Bt crops is being grown in India by the farmers?
[AIPMT 2013]
(a) Maize (b) Cotton (c) Brinjal (d) Soybean

11. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of
[AIPMT 2013]
(a) Non-recombinant bacteria containing β-galactosidase.
(b) Insertional inactivation of α-galactosidase in non-recombinant bacteria.
(c) Insertional inactivation of α-galactosidase in recombinant bacteria.
(d) Inactivation of glycosidase enzyme in recombinant bacteria.

12. Which of the following Bt crops is being grown in India by the farmers?
[AIPMT 2013]
(a) Maize (b) Cotton
(c) Brinjal (d) Soybean

13. The first human hormone produced by recombinant DNA technology is
[AIPMT 2014]
(a) Insulin (b) Oestrogen
(c) Thyroxin (d) Progesterone

14. Which body of the Government of India regulates GM research and safety of introducing GM organism for public services?
[AIPMT 2015]
(a) Bio-safety committee
(b) Indian Council of Agricultural Research

(c) Genetic Engineering Approval Committee
(d) Research Committee on Genetic manipulation

15. In Bt cotton the Bt toxin present in plant tissue as pro-toxin is converted into active toxin due to

[AIPMT 2015]

(a) Alkaline pH of the insect gut
(b) Acidic pH of the insect gut
(c) Action of gut microorganisms
(d) Presence of conversion factors in insect gut

16. The crops engineered for glyphosate are resistant/tolerant to

[AIPMT 2015]

(a) Fungi (b) Bacteria
(c) Insects (d) Herbicides

17. The introduction of tDNA into plants involves

[RE-AIPMT 2015]

(a) Altering the pH of soil, then heat-shocking the plants.
(b) Exposing the plants to cold for a brief period.
(c) Allowing the plant roots to stand in water.
(d) Infection of the plant by Agrobacterium tumefaciens.

18. The two polypeptides of human insulin are linked together by:

(a) Hydrogen bonds (b) Phosphodiester bond
(c) Covalent bond (d) Disulphide bridges

19. Which part of the tobacco plant is infected by *Meloidogyne incognita*?

(a) Flower (b) Leaf
(c) Stem (d) Root

20. Which kind of therapy was given in 1990 to a four-year-old girl with adenosine deaminase (ADA) deficiency?

(a) Chemotherapy (b) Immunotherapy
(c) Radiation therapy (d) Gene therapy

NCERT EXEMPLAR QUESTIONS

1. Bt cotton is not
(a) A GM plant
(b) Insect resistant
(c) A bacterial gene expressing system
(d) Resistant to all pesticides

2. C-peptide of human insulin is
(a) A part of mature insulin molecule.
(b) Responsible for the formation of disulphide bridges.
(c) Removed during the maturation of pro-insulin to insulin.
(d) Responsible for its biological activity.

3. GEAC stands for
(a) Genome Engineering Action Committee
(b) Ground Environment Action Committee
(c) Genetic Engineering Approval Committee
(d) Genetic and Environment Approval Committee

4. α-l antitrypsin is
(a) An antacid
(b) An enzyme
(c) Used to treat arthritis
(d) Used to treat emphysema

5. A probe which is a molecule is used to locate specific sequences in a mixture of DNA or RNA molecules, it could be
(a) A single stranded RNA
(b) A single stranded DNA
(c) Either RNA or DNA
(d) Can be ssDNA but not ssRNA

6. Choose the correct option regarding Retrovirus:
(a) An RNA virus that can synthesize DNA during infection
(b) A DNA virus that can synthesize RNA during infection
(c) An ssDNA virus
(d) A dsRNA virus

7. The site of production of ADA in the body is
(a) Erythrocytes
(b) Lymphocytes
(c) Blood plasma
(d) Osteocytes

8. A protoxin is
(a) A primitive toxin
(b) A denatured toxin
(c) Toxin produced by protozoa
(d) Inactive toxin

9. Pathophysiology is the
(a) Study of physiology of pathogen
(b) Study of normal physiology of host
(c) Study of altered physiology of host
(d) None of the above

10. The trigger for activation of toxin *Bacillus thuringiensis* is
(a) Acidic pH of stomach
(b) High temperature
(c) Alkaline pH of gut
(d) Mechanical action in the insect gut

11. Golden rice is
(a) A variety of rice grown along the yellow river in China
(b) Long stored rice having yellow colour tint
(c) A transgenic rice having gene for b-carotene
(d) Wild variety of rice with yellow coloured grains

12. In RNAi, the genes are silenced using
(a) ssDNA (b) dsDNA (c) dsRNA (d) ssRNA

13. The first clinical gene therapy was done for the treatment of
(a) AIDS
(b) Cancer
(c) Cystic fibrosis
(d) SCID (Severe Combined Immunodeficiency resulting from the deficiency of ADA)

14. ADA is an enzyme which is deficient in a genetic disorder SCID. What is the full form of ADA?
(a) Adenosine deoxy aminase
(b) Adenosine deaminase
(c) Aspartate deaminase
(d) Arginine deaminase

15. Silencing of a gene could be achieved through the use of
(a) RNAi only
(b) Antisense RNA only
(c) By both
(d) None of the above

Answer Keys

Practice Questions

1. (d)	2. (d)	3. (d)	4. (d)	5. (b)	6. (d)	7. (a)	8. (d)	9. (a)	10. (b)
11. (d)	12. (a)	13. (d)	14. (d)	15. (c)	16. (d)	17. (a)	18. (d)	19. (a)	20. (a)
21. (b)	22. (a)	23. (c)	24. (a)	25. (c)	26. (c)	27. (c)	28. (d)	29. (d)	30. (c)
31. (a)	32. (a)	33. (a)	34. (c)	35. (c)	36. (d)	37. (a)	38. (d)	39. (d)	40. (b)
41. (c)	42. (c)	43. (c)	44. (b)	45. (c)	46. (c)	47. (c)	48. (d)	49. (c)	50. (b)
51. (c)	52. (c)	53. (c)	54. (d)	55. (b)	56. (c)	57. (a)	58. (b)	59. (d)	60. (c)
61. (c)	62. (d)	63. (c)	64. (b)	65. (a)	66. (d)	67. (a)	68. (b)	69. (b)	70. (a)
71. (c)	72. (b)	73. (d)	74. (c)	75. (a)	76. (d)	77. (a)	78. (d)	79. (b)	80. (c)
81. (c)	82. (c)	83. (b)	84. (d)	85. (b)	86. (d)	87. (a)	88. (d)	89. (d)	90. (c)
91. (d)	92. (c)	93. (b)	94. (c)	95. (b)	96. (d)	97. (c)	98. (c)	99. (d)	100. (b)
101. (c)	102. (a)	103. (c)							

Assertion and Reason Questions

104. (a)	105. (b)	106. (a)	107. (b)	108. (b)	109. (b)	110.(b)	111. (a)	112. (b)	113. (b)
114. (a)	115. (d)	116. (a)	117. (a)	118. (a)	119. (a)	120. (d)	121. (a)	122. (a)	

Previous Year Questions

1. (d)	2. (b)	3. (a)	4. (d)	5. (a)	6. (b)	7. (d)	8. (d)	9. (d)	10. (b)
11. (a)	12. (b)	13. (a)	14. (c)	15. (a)	16. (d)	17. (d)	18. (d)	19. (d)	20. (d)

NCERT Exemplar Questions

1. (d)	2. (c)	3. (c)	4. (d)	5. (c)	6. (a)	7. (b)	8. (d)	9. (c)	10. (c)
11. (c)	12. (c)	13. (d)	14. (b)	15. (c)					