



BIOLOGY

BOOKS - MBD

BIOTECHNOLOGY AND ITS APPLICATIONS

Example

1. Expand GMO. Give one example.



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2. Name the gene present in *Bacillus thuringiensis* coding for cry protein.



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3. Write one major research area of biotechnology.



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4. Write two useful aspects of GM plants.



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5. List a few genetically modified plants having Bt -toxin gene.



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6. Bt toxin protein exist in which form.



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7. How are two chains of protein insulin linked?



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8. Expand ADA, PCR.



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9. What is the latest routine use of PCR?



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10. Write the name of transgenic protein used to treat emphysema.



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11. Name the transgenic cow which produces human protein enriched milk. Give specific contents of milk.



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12. Explain how a hereditary disease can be corrected. Give an example of first successful attempt made towards correction of such diseases.



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13. Name two human diseases caused due to absence to protein.



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14. What are DNA vaccines?



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15. Write full form of ELISA.



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16. What is gene therapy? What is humulin?



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17. Define gene library.



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18. Explain GEAC.



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19. What are bioresources?



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20. Define bioplasts.



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21. What do you understand by biopiracy?



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22. Crystals of Bt toxin produced by some bacteria do not kill the bacteria because

- A. bacteria are resistant to the toxin
- B. toxin is immature
- C. toxin is inactive
- D. bacteria encloses toxin in a special sac.

Answer:



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23. What are transgenic bacteria? Illustrate using any one example.



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24. Compare and contrast the advantages and disadvantages of production of genetically modified crops.



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25. What are Cry proteins? Name an organism that produce it. How has man exploited this protein to his benefit?



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26. What is gene therapy ? Illustrate using the example of adenosine deaminase deficiency (ADA).



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27. Why is the introduction of genetically engineering lymphocyte into a ADA deficiency patient not a permanent cure? Suggest a possible permanent cure.





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28. Can you suggest a method to remove oil [hydrocarbon) from seeds based on your understanding of rDNA technology and chemistry of oil?



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29. Find out from internet what is golden rice.



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30. Does our blood have proteases and nucleases?



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31. In view of the current food crisis, it is said, that we need another green revolution. Highlight the major limitations of the earlier green revolution.



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32. Expand GMO. How is it different from a hybrid?



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33. Differentiate between diagnostics and therapeutics. Give one example for each category.



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34. Give the full form of ELISA. Which diseases can be detected using it?



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35. Can a disease be detected before its symptoms appear? Name the principle involved.



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36. Write a short note on biopiracy.



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37. Many proteins are secreted in their inactive form. This is also true of many toxic protein produced by microorganisms. Explain how the mechanism is useful for the organisms producing the toxin.



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38. While creating genetically modified organisms, genetic barriers are not respected. How this can be dangerous in the long run?



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39. Why has the Indian Parliament cleared the second amendment of the country's patents bill?



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40. Give any two reasons why the patent on Basamati should not have gone to an American Company.



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41. How was insulin obtained before the advent of rDNA technology? What were the problems encountered?



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42. with respect to understanding disease discuss the importance of transgenic animal models.



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43. Name the first transgenic cow. Which gene was introduced in this cow?



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44. PCR is useful tool for early diagnosis of an infectious disease. Comment.



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45. What is GEAC? What are its objectives?



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46. For which variety of Indian Rice, the patent was filed by a U .S.A. company ?



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47. Discuss the advantages of GMOS.



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48. Gene expression can be controlled with the help of RNA molecule. Explain the method with an example.



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49. Ignoring traditional knowledge can prove costly in the area of biological patenting. Justify.



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50. Highlight any four areas where genetic modification of plants has been useful.



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51. What is a recombinant DNA vaccine? Give two examples.



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52. Why is the time of treatment for a genetic disease different from an infectious disease?



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53. Discuss briefly how a probe is used in molecule diagnostics.



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54. Who was first patient, who was given gene therapy? Why was the given treatment recurrent in nature?



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55. Taking examples from each category, discuss upstream and downstreaming process.



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56. Define Antigen and Antibody . Name any two diagnostic kits based upon them.



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57. Elisa technique is based on antigen and antibody interaction. Can this technique be used in the molecular diagnosis of genetic disorder such as phenylketonuria?



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58. How is a mature, functional insulin hormone different from its pro-hormone form?



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59. Gene therapy is an attempt to correct a genetic defect by providing a normal gene into the individual. By this, the normal function can be restored. An alternate method would be to provide the gene product known as enzyme replacement therapy. It would also restore the function. which in your opinion is a better option? Give reason for your answer.



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60. Transgenic animals are the animals in which foreign gene is expressed. Such animals can be used to study the fundamental biological processes, phenomena as well as for producing products useful for mankind. Give one example for each type.



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61. When foreign DNA is introduced into an organisms, how is it maintained in the host

and how is it transferred to the progeny of organism?



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62. Bt cotton is resistant to pests, such as lepidoterans, dipterans and coleopterans. Is Bt cotton also resistance to other pests as well?



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63. Define transgenic animals. Explain any four areas where they can be utilised.



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64. Make a flow chart of the steps that you would follow to transfer this gene organism



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65. Highlight five areas where biotechnology has influenced our lives.



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66. List the disadvantages of insulin obtained from the pancreas of slaughtered cows and pigs..



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67. List advantages of recombinant insulin.



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68. What is meant by the term biopesticide?

Name and explain the mode of action of a popular bio-pesticide.



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69. Name the four tools for accomplishing the tasks of recombinant DNA technology. Also mention the function of each tools.



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70. Bt cotton is not :

- A. A GM plant
- B. Insect resistant
- C. A bacterial gene expression system

D. Resistant to all pesticides.

Answer:



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71. C-peptide of human insulin in:

A. A part of mature insulin

B. Responsible for formation of disulphide
bridges

C. Removed during maturation of pro-insulin to insulin

D. Responsible for its biological activity.

Answer:



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72. GEAC stands for:

A. Genome Engineering Action Committee

B. Ground Environment Action Committee

C. Genetic

Engineering

Approval

Committee

D. Genetic

and

Environment

Approval

Committee.

Answer:



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73. $\alpha - 1$ antitrypsin is:

A. An antacid

B. An enzyme

C. Used to treat arthritis.

D. Used to treat emphysema

Answer:



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74. A probe which is a molecules used to locate specific sequences in a mixture of DNA or RNA molecules could be:

- A. A single stranded RNA
- B. A single stranded DNA
- C. Either RNA or DNA
- D. Can be as DNA but not ss RNA

Answer:



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75. Choose the correct option regarding Retrovirus.

- A. An RNA virus that can synthesise DNA during infection
- B. A DNA virus that can synthesise RNA during infection
- C. A ssDNA virus
- D. A dsRNA virus.

Answer:



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76. The site of production of ADA in the body for genetheraphy is:

A. Bone marrow

B. Lymphocytes

C. Blood plasma

D. Monocytes

Answer:



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77. A protoxin is:

- A. A primitive toxin
- B. A denatured by protozoa
- C. Toxin produced by protozoa
- D. Inactive toxin

Answer:



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78. 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

Answer:



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79. The trigger for activation of toxin of *Bacillus thuringiensis* is:

A. Acidic pH of stomach

B. High temperature

C. Alkaline pH of gut

D. Mechanical action in the insect gut

Answer:



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80. 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 - carote \neq
- D. Wild variety of rice with yellow coloured grains.

Answer:



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81. In RNAi, genes are silenced using:

A. ssDNA

B. dsDNA

C. dsRNA

D. ssRNA

Answer:



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82. The first clinical gene therapy was done for the treatment of :

A. AIDS

B. Cancer

C. Cystic fibrosis

D. SCID

Answer:



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83. Name two diseases that can be treated by producing biological compound in transgenic animal.



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84. List a few genetically modified plants having Bt -toxin gene.



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85. How is Bt toxin converted into active form?



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86. How Bt- toxin causes death of insect?



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87. Name a few forms of cry gene.



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88. Name a nematode which infect roots of tobacco plant and its effect.



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89. Name a nematode which infect roots of tobacco plant and its effect.



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90. Mention the chemical change that proinsulin undergoes, to be able to act as mature insulin.



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91. What is complementary DNA (cDNA)?



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92. List three critical research areas of biotechnology.



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93. Define Genetically Modified Organisms (GMO). Name two factors on which their behaviour depends.



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94. Give the few characteristics of GMOs.



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95. List a few transgenic organisms and their potential application.



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96. What are Cry proteins? Name an organism that produce it. How has man exploited this

protein to his benefit?



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97. Enlist different cry genes of *B. thuringiensis* and their target insects.



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98. How is transgenic tobacco plant protected against *Meloidogyne incognita*? Explain the process.



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99. How does RNA interference help in developing resistance in tobacco plant against nematode infection?



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100. Write the mechanism that enables *Agrobacterium tumefaciens* to develop tumours in their host dicot plant.



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101. State how *Agrobacterium tumefaciens* and some retroviruses have been modified as useful cloning vectors.



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102. Gene therapy can cure the important genetic disorders in humans. Comment.



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103. "Species Bt Toxin gene is incorporated into cotton plant so as to control infestation of Bollworm". Mention the organism from which the gene was isolated and explain its mode of action.



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104. Define 'Germ line gene therapy'.



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105. What are advantages of molecules diagnostic over conventional methods?



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106. List two uses of cloned genes in molecular diagnostics.



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107. How is ELISA test carried out?





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108. Why are transgenic animals so called?



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109. How to check vaccine safety?



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110. Explain the role of transgenic animals in biological products with the help of example each.



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111. Explain structure of Insulin. How insulin is synthesised in human (or mammals)? Why is proinsulin so called? How is insulin different from it?



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112. Define gene library.



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113. Define probes.



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114. Why is the use of probes considered better than conventional diagnostic tools for

disease diagnosis?



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115. What is reporter or marker gene?



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116. Name three different marker genes used in gene transfer in animal cells.



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117. Name different transfection methods.



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118. You have obtained a high yielding variety of tomato. Name and explain the procedure that ensures retention of the desired characteristics repeatedly in large populations of future generations of the tomato crop.



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119. Write the advantages of recombinant therapeutics. How many of them have been approved world over for human use and how many are available in Indian market?



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120. What are the ethical concerns of biotechnology?



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121. Describe the responsibility of GEAC, set up by the Indian Government.



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122. Write a short note on

Production of human growth hormone by E.coli.



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123. Write a short note on

Animals as organ donors for humans.



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124. Write a short note on

Plant Variety Protection and Farmer's Right
Act.



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125. Explain the following terms very briefly :Intellectual property rights, Humulin and Biofortified foods.



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126. How infestation of *Meloidogyne incognita* was prevented in Tobacco plant?



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127. What is silencing of mRNA?



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128. What is the sources of complementary strand in mRNA silencing?



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129. Why is the introduction of genetically engineering lymphocyte into a ADA deficiency

patient not a permanent cure? Suggest a possible permanent cure.



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130. How did Eli Lilly synthesise the human insulin? Mention one difference between this insulin and the one produced by the human pancreas.



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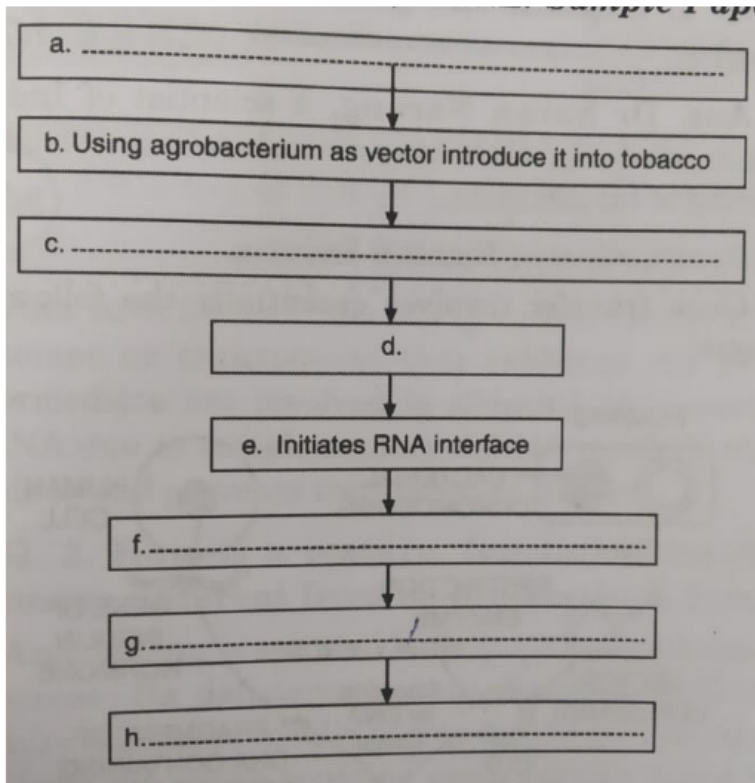
131. What is GMO? List any five possible advantages of GMO to a farmer.



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132. Two of the steps involved in producing nematode resistant tobacco plants based on the process of RNAi are mentioned below. Write the missing steps in its proper

sequence.



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133. Explain the following terms in not more than 70 words.

Biopatent



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134. Explain the following terms in not more than 70 words.

Bioethics



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135. Explain the following terms in not more than 70 words.

Biopiracy



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136. Explain the following terms in not more than 70 words.

Genetically modified food.



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137. Briefly explain why are Transgenic animals produced?



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138. Describe hazards of transgenic animals.



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139. With an example, Explain how biotechnology has been applied in each of

following :

In curing diabetes mellitus.



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140. Which example, explain how biotechnology has been applied in each of the following:

In raising pest resistant plants



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141. Which example, explain how biotechnology has been applied in each of the following:

In producing more nutritionally balanced milk.



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142. Do you think it is ethical to manipulate organisms for human benefits? Justify your answer.



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143. Explain the process of synthesis of insulin.



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144. State the role of transposons in silencing of mRNA in eukaryotic cells



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145. How is a mature, functional insulin hormone different from its pro-hormone form?



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146. Write the function of adenosine deaminase enzyme. State the cause ADA deficiency in humans. Mention a possible permanent cure for a ADA deficiency patient.



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147. How have transgenic animals proved to be beneficial in:

Production of biological products



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148. How have transgenic animals proved to be beneficial in:

Chemical safety testing.



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149. Transgenic animals are the animals in which foreign gene is expressed. Such animals can be used to study the fundamental biological processes, phenomena as well as for producing products useful for mankind. Give one example for each type.



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Exercise

1. ADA is an enzyme which is deficient in a genetic disorder SCID. What is the full of ADA?

A. Adenosine deoxy aminase

B. Adenosine deaminase

C. Aspartate deaminase

D. Arginine deaminase

Answer:



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2. 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 the above

Answer:



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3. Differentiate between diagnostics and therapeutics. Give one example for each category.



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4. List any four applications of biotechnology.



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5. Give the few characteristics of GMOs.



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6. List a few transgenic organisms and their potential application.



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7. What are transgenic bacteria? Illustrate using any one example.



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8. List three critical research areas of biotechnology.



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9. What are transgenic bacteria? Illustrate using any one example.



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10. Discuss the various biotechnological applications in agriculture.



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11. Show the steps involved in the transfer of gene for production of human insulin.



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12. applications. of genetically engineered microbes



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13. Use of biology in industrial process and for improving quality of life is called:

- A. Biotechnology
- B. Microbiology
- C. Genetic Engineering

D. Eugenics.

Answer:



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14. What is the reason of formation of embryoid from pollen grain in tissue culture medium?

A. Cellular totipotency

B. Organogenesis

C. Double fertilization

D. Test tube culture

Answer:



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15. A cybird is a hybrid carrying:

A. cytoplasm of two different plants.

B. genome and cytoplasm of two different plants

C. cytoplasms of two different plants and
genomes of one plant

D. genomes of two different plants

Answer:



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16. In plants, how is alien DNA introduced into
host cell?



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17. Provide one word or one sentence information about 'plasmid' with respect to its:

(i) chemical nature

(ii) its duplication



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18. How is action of exonuclease different from that of endonuclease?



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19. Name any two cloning vectors. Describe the features required to facilitate cloning into a vector.



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20. What are transgenic bacteria? Illustrate using any one example.



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21. Name a natural genetic engineer of plants.

How it engineers the genome?



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22. Mention the role of selectable marker in facilitating recombinant DNA technology.



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23. Which character of DNA facilitates electrophoresis?



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24. Vectors with single or very few recognition sites for a particular restriction enzyme are preferred in recombinant DNA technology (RDT). Justify.



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25. Differentiate between pro-insulin and mature insulin.



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26. Define biopiracy . How can it be prevented?



[Watch Video Solution](#)

27. What are Cry proteins? Name an organism that produce it. How has man exploited this protein to his benefit?



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28. What do you understand by the term selectable marker?



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29. EcoRI is a restriction endonuclease. How is it named so?



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30. Write the sequence of DNA bases that this enzyme recognises?



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31. Explain with reference PCR

A specific enzyme helps in amplification in PCR.

Name the bacterium which is extracted? State how is its Thermostable nature is helpful?



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32. Explain with reference PCR

Explain its role in molecular diagnosis.





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33. With a simple sketch show the steps of recombinant DNA technology.



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34. With an example, Explain how biotechnology has been applied in each of following :

In curing diabetes mellitus.



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35. Which example, explain how biotechnology has been applied in each of the following:
In producing more nutritionally balanced milk.



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36. How DNA fragments of different sizes can be separated and isolated?



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37. Use of GM plants is not universally accepted . Write down some of its criticisms.



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38. How does a transgenic plant of tobacco protect it self from nematode parasites?



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39. EcoRI enzymes form 'sticky ends' in cut DNA strands Explain .



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40. A bacterium showed mutation and the mutant gene was found to be beneficial for a cereal plant. Scientists isolated the mutant gene and incorporated it into the cereal plant. Name the process used and diagrammatically explain it.





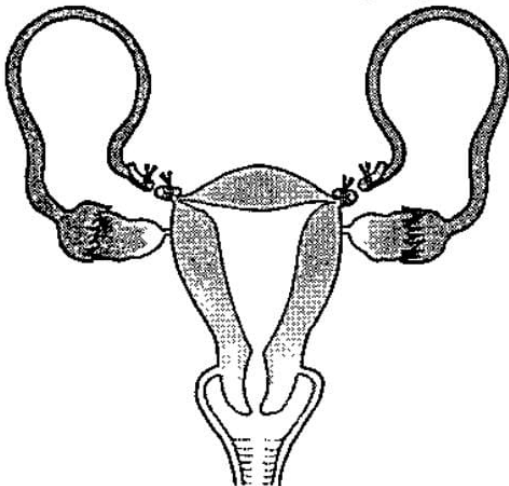
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41. Nam two genetically modified crops.



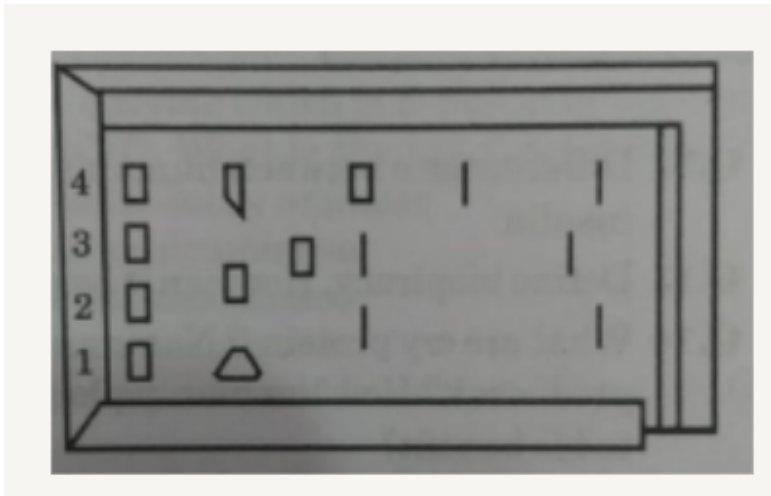
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42. what does the following figure depict?



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43. What is meant by largest and smallest figure in gel electrophoresis?



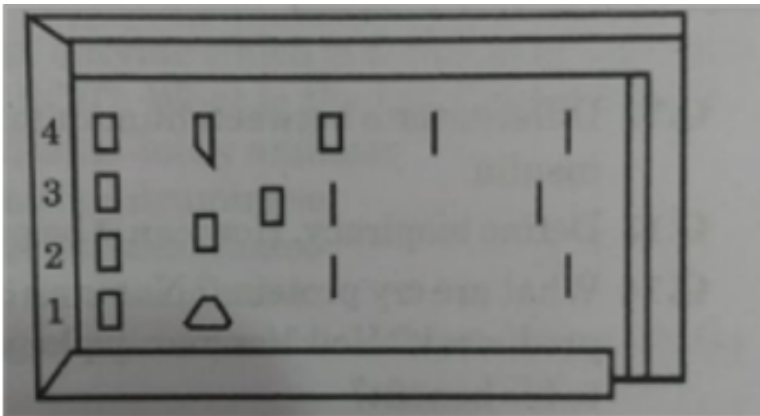
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44. Name the compound used to visualise them DNA fragments in gel electrophoresis



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45. Define elution.



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46. Transgenic animals are proving to be a boon in various areas. Justify.



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47. Why is it essential to maintain microbial contamination free environment in biotechnology labs?



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48. Name the technique used to amplify a gene of interest. Elaborate the steps involved in the process.



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49. Why Taq polymerase is preferred over E.coli DNA polymerase in PCR technique?



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50. What are vectors?



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51. How can gene therapy help in correcting ADA deficiency disease? Can it cure the disease permanently?



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52. Discuss the ethical animal issues concerned with the use of biotechnology.



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53. What are recombinant proteins?



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54. How desired recombinant proteins can be produced on a large scale?



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