Time : 1 Mins **BIOTECHNOLOGY PRINCIPLES AND PROCESS 1** **Marks : 1332**

1. Which of the following enzyme is known as molecular scissors
   a) Ligase b) DNA polymerase c) Restriction enzyme d) Helicase
2. Which of the following processes/techniques can be included under biotechnology?
   (i) In vitro fertilisation
   (ii) Synthesis of a gene
   (iii) Correcting a defective gene
   (iv) Developing a DNA vaccine
   a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (i), (ii), (iii) and (iv)
3. A transgenic food crop which may help in solving the problem of night blindness in developing countries is:
   a) Stralink maize b) Bt soybean c) Golden rice d) Flavr savr tomatoes
4. Rising of dough is due to
   a) multiplication of yeast b) production of CO_2 c) emulsification
   d) hydrolysis of wheat flour starch into sugars.
5. Who among the following was awarded the Nobel Prize for the development of PCR technique?
   a) Herbert Boyer b) Hargovind Khurana c) Kary Mullis d) Arthur Kornberg
6. The Taq polymerase enzyme is obtained from:
   a) Thiobacillus ferroxidans b) Bacillus subtilis c) Pseudomonas putida
   d) Thermus aquaticus
7. In biotechnology what does vector means:
   a) An extra chromosomal DNA that replicates autonomously b) Carrier of disease
   c) Plasmid that can transfer gene to host cell d) Selectable marker
8. The correct sequence of different steps of polymerase chain reaction is
   a) annealing $\rightarrow$ denaturation $\rightarrow$ extension b) denaturation $\rightarrow$ extension $\rightarrow$ annealing
   c) denaturation $\rightarrow$ annealing $\rightarrow$ extension d) extension $\rightarrow$ denaturation $\rightarrow$ annealing.
9. Which of the following statements are correct with respect to a bioreactor?
   (i) It can process large volumes of culture.
   (ii) It provides optimum temperature and pH.
   (iii) It is a completely automated tool.
   (iv) It is a compact thermal cycler
   a) (i) and (ii) b) (i), (ii) and (iii) c) (iii) and (iv) d) (ii) and (iii)

10. Match the terms given in column I with their definitions in column II and select the correct anwser from codes given below.

	Column I		**Column II**
A	Transformation	i	Sequences cut by restriction enzymes
B	Recognition site	ii	Process by which DNA fragments are separated based on their size
C	Gel electrophoresis	iii	Plasmid DNA that has incorporated human DNA
D	Recombinant DNA	iv	Process by which bacteria take up pieces of DNA from the environment

a) A-(iii), B-(i), C-(ii), D-(iv) b) A-(iv), B-(i), C-(ii), D-(iii) c) A-(i), B-(ii), C-(iii), D-(iv)

d) A-(ii), B-(iii), C-(iv), D-(i)

11. _____a crown gall bacterium, is called as 'natural genetic engineer' of plants.
a) Escherichia coli b) Streptomyces a/bus c) Agrobacterium tumefaciens

d) Azotobacter

12. The tumour indusing capacity of Agrobacterium tumaefaciens is located in large-extrachromosomal plasmid and called -
a) Ti - Plasmid b) Ri - Plamid c) Lambda phage d) Plasmid $P^{BR\ 322}$

13. Fill up the blanks and select the correct option.
(i) EcoRI cuts the DNA between bases _____ only when the sequence _____ is present in the DNA duplex.
(ii) Disruption of the cell membranescan be achieved by treating the bacterial cells,plant cellsand fungal cells with enzymesrespectively _____ and _____ .
(iii) Since DNA has a _____ charge, it moves towards the _____ of the electrophoretic chamber.
a) (i) G and A, GAATTC (ii) endonuclease, cellulase, chitinase (iii) negative, anode

b) (i) G and A, GAATTC (ii) lysozyme, cellulase, chitinase (iii) positive, cathode

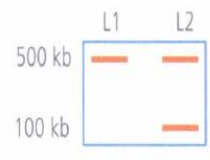
c) (i) G and A, GAATTC (ii) lysozyme, cellulase, chitinase (iii) negative, anode

d) (i) G and A, GAA ATC (ii) lysozyme, cellulase, chitinase (iii) positive, cathode

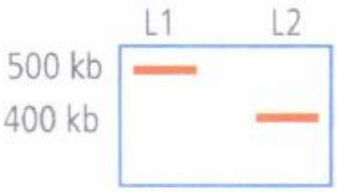
14. Chemical knives of molecular biology are
a) Restriction endonucleases b) Exonuclease c) Reverse transcriptase d) Ligase

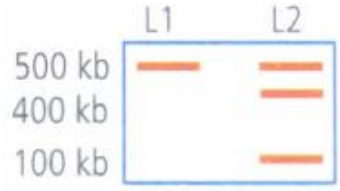
15. The figure shows the restriction enzyme cutting sites (R1-R3) in wild type (n) and mutant (n^-) gene.

If a radioactively labelled probe (that hybridises at a sequence close to R1) is used for detecting the presence of DNA fragments after gel electrophoresis and Southern blotting, which of the following band patterns will your expect?
Note: L1: wild type DNA, L2: mutant DNA

a) 

b) 

c) 

d) 

16. Which of the following is not used to transfer the recombinant DNA into the host?
    a) Micro-injection method b) Gene gun method c) Bioreactors
    d) Disarmed pathogen vectors

17. The restriction enzyme responsible for the cleavage of following sequence is

$$5' - G - T - C \overset{\downarrow}{-} G - A - C\_3'$$
$$3' - C - A - G \underset{\uparrow}{-} C - T - G - 5'$$

    a) EcoRI b) Hindi II c) BamHI d) EcoRII.

18. What map unit (Centimorgan) is adopted in the construction of genetic maps?
    a) A unit of distance between two expressed genes representing 100% crossover.
    b) A unit of distance between genes on chromosomes, representing 1% crossover.
    c) A unit of distance between genes on chromosomes, representing 50% crossover.
    d) A unit of distance between two expressed genes representing 10% crossover.

19. Transgenic plants are the ones:
    a) Grown in artificial medium after hybridization in the field
    b) Produced by a somatic embryo in artificial medium
    c) Generated by introducing foreign DNA in to a cell and regenerating a plant from that cell
    d) produced after protoplast fusion in artificial medium

20. Gene thearpy first used in the treatment of:
    a) Albinism b) Haemophilia c) SCID d) LIQID

21. Polymerase chain reaction technology (PCR- technique) is used for:
    a) DNA identification b) DNA repair c) DNA amplification d) Cleave DNA

22. Genetic engineering is possible, because _____.
    a) the phenomenon of transduction in bacteria is well understood
    b) we can see DNA by electron microscope
    c) We can cut DNA at specific sites by endonucleases like DNAs-I
    d) restriction endonucleases purified from bacteria can be used in vitro

23. An advantage of using yeasts rather than bacteria as recipient cells for the recombinant DNA of eukaryotes is that yeasts can
    a) produce restriction enzymes b) excise introns from the RNA transcript
    c) remove methyl groups d) reproduce more rapidly.

24. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by : _____.

a) Polymerase chain reaction b) Electrophoresis c) Restriction mapping
d) Centrifugation

25. Bacillus thuringiensis forms protein crystals which contain insecticidal protein. This protein:
a) does not kill the carries bacterium which is itself resistant to this toxin
b) binds with epithelial cells of midgut of the insect pest ultimately killing it
c) is coded by several genes including the gene cry
d) is activated by acid pH of the forgut of the insect pest

26. Which of the following is not a direct method of gene transfer in plants:
a) Agreobacterium tumefaciens b) Gene gun method c) Biolistic method
d) Electroporation

27. The source of the restriction enzyme HindIII is
a) Escherichia coli RY 13 b) Escherichia coli RY 13 c) Bacillus amy/oliquefaciens H
d) Streptomyces albus.

28. How many copies of DNA sample are produced in PCR technique after 6- cycle:
a) 4 b) 32 c) 6 d) 16

29. Study the following statements regarding recombinant DNA technology and select the incorrect ones.
(i) Taq polymerase extends the primers using the nucleotides provided in the reaction.
(ii) Antibiotic resistance genes are considered as desirable genes in recombinant DNA technology.
(iii) DNA fragments are separated according to their charge only, in agarose gel electrophoresis.
(iv) Transformation is a procedure through which piece of DNA is integrated in to the genome of a host bacterium.
(v) To produce higher yields of a desired protein, host cells can be multiplied in a continuous culture.
(vi) Downstream processing is one of the steps of polymerase chain reaction.
a) (ii), (iii) and (vi) b) (i), (iii) and (v) c) (ii), (iii) and (v) d) (i), (iv) and (v)

30. Which one of the following technique is used to produce the GM crops?
a) Micropropogation b) Somatic hybridization c) r-DNA technology d) Cross breeding

31. Which vector can clone only a small fragment of DNA?
a) Bacterial artificial chromosome b) Yeast artificial chromosome c) Plasmid d) Cosmid

32. **Assertion:** Genetic engineering can overcome the drawbacks of traditional hybridisation.
Reason: Genetic engineering can create desired DNA sequences to meet specific requirements.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

33. The specific palindromic sequence which is recognized by EcoRI is : _____.
    a) 5'- CTTAG -3', 3'GAATTC - 5' b) 5'- GGATCC - 3' 3'_ CCTAGG- 5'
    c) 5'- GAATTC - 3', 3' -CTTAAG - 5' d) 5' -GGAACC-3" 3' -CCTTGG_ 5'
34. Genetic engineering aims at :
    a) Destroying wild gene b) Preserving defective gene
    c) Curing human disease by introducing new gene d) All the above
35. An analysis of chromosomal DNA using the Southern hybridisation technique does not use _____.
    a) Electrophoresis b) Blotting c) Autoradiography d) PCR
36. In gel electrophoresis, separated DNA fragments can be visualized with the help of:
    a) acetocarmine in UV radiation b) ethidium bromide in infrared radiation
    c) acetocarmine in bright blue light d) ethidium bromide in UV radiation
37. Which of the following restriction enzymes produces blunt ends?
    a) Sal I b) Eeo RV c) Xho I d) Hind III
38. Which of the following combination of risk are associated with genetically modified food:
    a) Toxicity b) Allergic reaction
    c) Antibiotic resistance in microorganism present in alimentary canal d) All the above
39. If a person obtains transformants by inserting a recombinant DNA within the coding sequence of enzyme β-galactosidase, he will separate out recombinants from non-recombinants by which of the following observations?
    a)
    Non-recombinant colonies do not produce any colour whereas recombinants give blue coloured colonies.
    b)
    Recombinant colonies do not produce any colour whereas non-recombinants give blue coloured colonies.
    c) Recombinants and non-recombinants both produce blue coloured colonies.
    d) No colonies are formed due to insertional inactivation.
40. Readthe given statements and select the correct option.
    Statement 1 : Restriction endonuclease enzymes recognise a specific palindromic nucleotide sequence in the DNA.
    Statement 2 : Restriction endonuclease enzymes are called as molecular scissors or biological scissors.
    a) Both statements 1 and 2 are correct.
    b) Statement 1 is correct but statement 2 is incorrect.
    c) Statement 1 is incorrect but statement 2 is correct.
    d) Both statements 1 and 2 are incorrect.
41. Arrange the processes that occur in PCR in sequence:
    a) Annealing - deneturation - extension b) Denaturation - annealing - extension
    c) Extension - denaturation - annealing d) Denaturation - extension - annealing

42. Plasmids are important in biotechnology because they contain
    a) Recognition sites on recombinant DNA strands
    b) Provirus incorporated into the host DNA
    c) A vehicle for insertion of recombinant DNA into bacteria
    d) Surface for respiratory process in bacteria

43. Which of the following is not required in the preparation of a recombinant DNA molecule?
    a) Restriction endonuclease b) DNA ligase c) DNA fragments d) E.coli

44. Two microbes found to be very useful in genetic engineering are-
    a) Escherichia coli and Agrobacterium tumefaciens
    b) Vibrio cholerae and a tailed bacteriophage c) Diplococcus sp. and pseudomonas sp.
    d) Crown gall bacterium and caenorhabditis elegans

45. Which one of the following is not a correct match?
    a) Tumour inducing - Ti plasmid b) DNA probe - Identifies the desired DNA fragment
    c) PCR - DNA staining d) Agarose - Sea weeds

46. To isolate DNA fron fungi we have to break the wall. This is done by
    a) Lysozyme b) Cellulose c) Invertase d) Chitinase

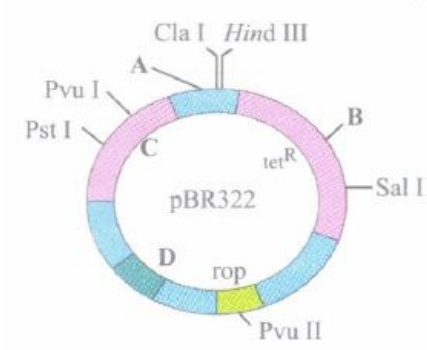
47. If gene of interest was inserted at Sal I site in pBR322 the resulting plasmid will confer resistance to
    a) Ampicillin b) Tetracycline c) Kanamycin d) Both (1) & (3)

48. Identify the plasmid among following
    a) Hind III b) pBR-322 c) λ-phage d) Both (2) & (3)

49. E. coli are used in production on:
    a) Rifampicin b) LH c) Ecdyson d) Interferon

50. Which of the following cuts the DNA from specific places:
    a) Restriction endonuclease b) Ligase c) Exonuclease d) Alkaline phosphate

51. Identify A, B, C and D in the given figure of E. coli cloning vector pBR322 and select the correct option.



a)

A	B	C	D
Hindi	EcoRI	amp^R	ori

b)

A	B	C	D
Hindi	BamHI	kan^R	amp^R

c)

A	B	C	D
BamHI	Psfi	ori	amp^R

d)

A	B	C	D
EcoRI	BamHI	amp^R	ori

52. Transgenic animal has

a) Foreign DNA is all its cells b) Foreign RNA is all its cells

c) Foreign DNA is some of the cells d) Both 2 and 3

53. The term 'molecular scissors' refers to

a) recombinant DNA b) restriction enzymes c) Taq polymerase

d) palindromic nucleotide sequences.

54. Which one of the following is commonly used in transfer of foreign DNA into crop plants?

a) Meloidogyne incognita b) Agrobacterium tumefaciens c) Penicillium expansum

d) Trichoderma harzianum

55. An antibiotic resistance gene in a vector usually helps in the selection of:

a) competent cells b) transformed cells c) recombinant cells d) none of the above

56. Which one in not a restriction enzyme:

a) Eco R_1 b) Chitinase c) Bam H_1 d) Hind - II

57. Which of the following is a restriction endonuclease?

a) Protease b) DNase I c) RNase d) Hind II

58. The letter 'R' in EcoRI is derived from

a) the name of genus b) the name of strain c) the name of species

d) the term 'restriction'.

59. In vitro clonal propagation in plants is characterised by: _____.

a) PCR and RAPD b) Northern blotting c) Electrophoresis and HPLC d) Microscopy

60. Which of the following is the example of direct gene transfer:

a) Micronjection b) Electroporation c) Particle gun d) All the above

61. The gene 'rop' present in pBR322 cloning vector, codes for:

a) the proteins involved in the translation

b) the proteins involved in the replication of the plasmid

c) the proteins involved in the synthesis of ampicillin only

d) the proteins involved in the synthesis of tetracycline only.

62. The linking of antibiotic resistance gene with the plasmid vector became possible with _____.

a) DNAligase b) Endonucleases c) DNA polymerase d) Exonucleases

63. In nematode resistance by RNA interference, some specific genes were introduced which form dsRNA. These were introduced in-

a) Nematode b) Host plant c) Agrobacterium d) All of these

64. Cry 1 endotoxins obtained from Bacillus thuringiensis are effective aganist:

a) Files b) Nematodes c) Boll wormws d) Mosquitoes

65. Choose the correct pair from the following.

a) Nucleases - Separate the two strands of DNA

b) Exonucleases - Make cuts at specific positions within DNA

c) Ligases - Join the two DNA molecules d) Polymerases - Break the DNA into fragments

66. Which of the following statements is not correct regarding EcoRI restriction endonuclease enzyme?

a) It is isolated from Escherichia coli RY13

b) Its recognition sequence is 5'-GAATTC-3', 3'-CTTAAG-5'.

c) It produces complementary blunt ends d) None of these

67. The process of separation and purification of expressed protein before marketing is called _____.

a) Downstream processing b) Bioprocessing c) Post-production processing

d) Upstream processing

68. The taq polymerase enzyme is obtained from _____.

a) Thermus aquaticus b) Thiobacillus ferroxidans c) Bacillus subtilis

d) Pseudomonas putida

69. One of the key factors, which makes the plasmid the vector in genetic engineering is

a) its resistance to antibiotics b) its resistance to restriction enzymes

c) its ability to carry a foreign gene d) its ability to cause infection in the host.

70. Which of the following is not a characteristic of pBR322 vector?

a) It was the first artificial cloning vector constructed in 1977 by Boliver and Rodriguez.

b) It is the most widely used, versatile and easily manipulated vector.

c) It has two antibiotic resistance genes tet^R and amp^R.

d) It does not have restriction site for Sa/I

71. Match column I with column II and select the correct answer from the given codes

	Column - I		**Column - II**
A	arnp^R qene	i	Artificial plasmid
B	Separation of DNA fragments	ii	Selectable marker
C	HindIII	iii	Electrophoresis
D	pBR322	iv	Haemophilus influenzae

a) A-(iii), B-(ii), C-(i), D-(iv) b) A-(iv), B-(i), C-(iii), D-(ii) c) A-(ii), B-(iii), C-(iv), D-(i)

d) A-(ii), B-(iv), C-(i), D-(iii)

72. Find the odd one out:

a) vaccines - immunology b) eco degradation - pesticides

c) solar energy converter - pest control d) recombinant DNA - biotechnology

73. **Assertion:** Restriction enzymes recognise palindromic sequences.
Reason: Palindromic sequences read same in both directions of the two strands.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

74. What will be the effect if pBR322, a cloning vector does not carry 'ori' site?

a) Sticky ends will not produce. b) Transformation will not takes place.

c) The cell will transform into a tumour cell. d) Replication will not takes place.

75. **Assertion:** A bacterial cell with no restriction enzymes will be easily infected and lysed by bacteriophages.
Reason : Restriction enzymes catalyse synthesis of protective coat around bacterial cell that prevents bacteriophage attack.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

76. Second letter of the name of restriction endonuclease came from the:
a) Genus of organism b) Species of organism c) Family of organism
d) Class of organism

77. Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells):
a) an antifeedant b) a toxic protein c) both sense and anti-sence RNA
d) a particular hormone

78. **Assertion :** Asexual reproduction is more important with regard to biotechnology.
Reason : Asexual reproduction preserves the genetic information while sexual reproduction permits variations
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

79. Genetic engineering has been successfuly used for producing:
a) transgenic Cow - Roise which produces high fat milk for making ghee
b) animels like bulls for farm work as they have super power
c) transgenic mice for testing safety of polio vaccine before use in humans
d) transgenic modles for studying new treatments for certain cardiac diseases

80. A transgenic rice (Golden rice) has been developed for increased content of:
a) Vitamin A b) Viamin B_1 c) Vitamin C d) Vitamin D

81. Gene silencing using RNAi technique is applied to make:
a) Nematode resistant plant b) Edible vaccines c) Iron fortified rice
d) Vitamin enriched cereales

82. Which one of the following enzyme is not involved in recombinant DNA technology
a) Exonuclease b) Endonuclease c) Ligase d) Catalase

83. Which of the following is required for micro-injection method of gene transfer?
a) Micro-particles b) Micro-pipettes c) Divalent cations d) UV radiations

84. In recombinant DNA technology, the term vector refers to:
a) the enzyme that cuts DNA into restriction fragments b) the sticky end of a DNA fragment
c) a plasmid used to transfer DNA into a living cell
d) a DNA fragment which carries only ori gene

85. Resdtriction endonuclease-
a) cuts the DNA molecule randomly b) cuts the DNA molecule at specific sites
c) Restricts the synthesis of DNA inside the nucleus d) Synthesizes DNA

86. Which of the following contains the key tools for recombinant DNA technology?
(i) Restriction endonucleases, ligases, vectors
(ii) Ligases, host organism, polymerase enzymes
(iii) Vectors, Taq polymerase, primers
(iv) Restriction exonucleases, ligases, primers, bioreactors
a) (i), (ii) and (iii) b) (i) and (ii) c) (i), (iii) and (iv) d) (iii) and (iv)

87. **Assertion:** Downstream processing is generally considered more difficult and costlier in plants than considered more difficult and costlier in plants than.
Reason : Rhizosecretion is used as a method to facilitate easier recovery of recombinant proteins from plants.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

88. Read the given statements and select the correct option.
Statement 1 : Both bacteria and yeast multiply very fast to form huge populations which express the desired gene.
Statement 2 : In recombinant DNA technology, human genes are often transferred into bacteria (prokaryotes) or yeast (eukaryotes).
a) Both statements 1 and 2 are correct.
b) Statement 1 is correct but statement 2 is incorrect.
c) Statement 1 is incorrect but statement 2 is correct
d) Both statements 1 and 2 are incorrect.

89. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis?
a) The larger the fragment size, the farther it moves
b) The smaller the fragment size, the farther it moves
c) Positively charged fragments move to farther end
d) Negatively charged fragments do not move

90. During isolation of genetic material, the chemical used to precipitate out the purified DNA is
a) bromophenol blue b) chilled ethanol c) ethidium bromide d) both (a) and (c).

91. PCR proceeds in three distinct steps governed by temperature they are in order of:
a) Denaturation, Annealing, Synthesis b) Synthesis, Annealing, Denaturation
c) Annealing, Synthesis, Denaturation d) Denaturation, Synthesis, Annealing

92. The first clinical gene thearpy was given for treating:
a) Rheumatoid arthritis b) Adenosine deaminase deficiency c) Diabetes mellitus
d) Chicken pox

93. Significance of 'heat shock' method in bacterial transformation is to facilitate

a) binding of DNA to the cell wall b) uptake of DNA through membrane transport proteins

c) uptake of DNA through transient pores in the bacterial cell wall

d) expression of antibiotic resistance gene.

94. The DNA fragments separated on an agarose gel can be visualised after staining with _____.

a) Acetocarmine b) Aniline blue c) Ethidium bromide d) Bromophenol blue

95. The Ti plasmid, is often used for making transgenic plants. This plasmid is found in :

a) Yeast as a 2 µm plasmid b) Azotobacter

c) Rhizobium of the roots of leguminous plants d) Agrobacterium

96. What is ture 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 ovaries of the pest to sterilise it and thus prevent its multiplication

97. The prerequisites for biotechnological production of antibiotics is

a) To search an antibiotic producing microorganism b) To isolate the antibiotic gene

c) To join antibiotic gene with E.coli plasmid d) All of the above

98. How many fragments will be generated on the digestion of a closed circular DNA molecule with a restriction enzyme having six recognition sites on the DNA?

a) 5 b) 7 c) 6 d) 9

99. PCR- techinque is used in :

a) Production of transgenic microbes b) Production of genetically modified food

c) Forensic investigation d) r- DNA technique

100. Read the given statements and select the correct option.

Statement 1 : The cloning vector is required to have very few, preferably single, recognition sites for the commonly used restriction enzymes.

Statement 2 : Presence of more than one recognition sites within a cloning vector will generate several fragments, which will complicate the process of gene cloning.

a) Both statements 1 and 2 are correct.

b) Statement 1 is correct but statement 2 is incorrect.

c) Statement 1 is incorrect but statement 2 is correct.

d) Both statements 1 and 2 are incorrect.

101. If a plasmid vector is digested with EcoRI at a single site then

a) one sticky end will be produced b) two sticky ends will be produced

c) four sticky ends will be produced d) six sticky ends will be produced.

102. The term 'recombinant DNA' refers to

a) DNA of the host cell b) DNA with a piece of foreign DNA

c) DNA with selectable marker d) DNA with more than one recognition sites

103. The bacterium Bacillus thurigiensis is widely used in contemporary bioolgy as:
a) Source of industrial enzyme b) Indicator of water pollution c) Insecticide

d) Agent for production of dairy products

104. Which of the following is not a cloning vector?
a) Cosmid b) pBR322 c) Sa/I d) Phagemid

105. Match column I with column II and select the correct answer from the given codes.

	Column - I		**Column - II**
A	Recombinant DNA technology	i	Chilled ethanol
B	Precipitation of DNA	ii	DNA staining
C	Transposons	iii	Jumping genes
D	Ethidium bromide	iv	Genetic engineering

a) A-(iv), B-(i), C-(iii), D-(ii) b) A-(i), B-(iii), C-(ii), D-(iv) c) A-(ii), B-(i), C-(iii), D-(iv)

d) A-(iv), B-(ii), C-(i), D-(iii)

106. Biolistics (gene-gun) is suitable for:
a) Constructing recombinant DNA by joining with vectors b) DNA finger printing

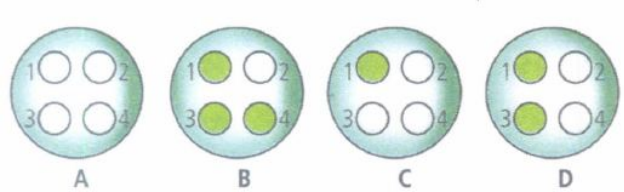
c) Disarming pathogen vectors d) Transformation of plants cells

107. A bacterium commonly used in plant genetic engineering is
a) E.Coli b) Agrobacterium c) Mycobacterium d) Rhizobium

108. GEAC makes decisionregarding
a) the validity of GM research b) the safety of introducing GM organism for public services

c) the validity of biopatents d) more than one options are correct

109. Four mutant strains of bacteria (1 - 4) all require substance S to grow (each strain is blocked at one step in the S-biosynthesis pathway). Four plates were prepared with minimal medium and a trace of substance S, to allow a small amount of growth of mutant cells. On plate A, mutant cells of strain 1 were spread over entire surface of the agar to form a thin lawn of bacteria. On plate B, the lawn was composed of mutant cells of strain 2, and so on. On each plate, cells of each of the four mutant types were inoculated over the lawn, as indicated in the figure by the circles. Dark circles indicate excellent growth. A strain blocked at a later step in the S substance metabolic pathway accumulates intermediates that can 'feed' a strain blocked at an earlier step.



What is the order of genes (1 - 4) in the metabolic pathway for synthesis of substance S?
a) 2 ⟶ 4 ⟶ 3 ⟶ 1 b) 2 ⟶ 1 ⟶ 3 ⟶ 4 c) 1 ⟶ 3 ⟶ 4 ⟶ 2 d) 1 ⟶ 2 ⟶ 4 ⟶ 3

110. Human insulibn is being commercially produced from a transgenic species of:
a) Mycobacterium b) Rhizobium c) Saccharomyces d) Escherichia

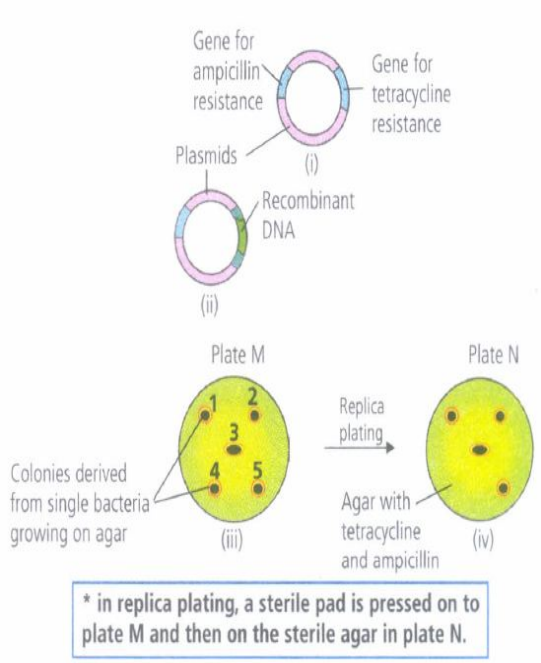
111. Agrobacterium tumefaciens used in Genetic engineering for:
a) DNA - mapping b) DNA - modification c) Gene transfer d) DNA finger printing

112. Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands?
5'_____GAATTC_____3'
3'_____CTTAAG_____5'
What is so special shown in it?
a) Replication completed b) Deletion mutation c) Start codon at the 5' end
d) Palindromic sequence of base pairs

113. DNA ligase is an enzyme that catalyses the:
a) splitting of DNA threads into small bits b) joining of the fragments of DNA
c) denaturation of DNA d) synthesis of DNA

114. The first restriction endonuclease isolated was:
a) EcoRI b) BamHI c) san d) HindII

115. Analyse the given diagram which shows steps involved in the procedure of selecting transformed bacteria.



Identify the bacterial colony which has undergone transformation?
a) Colony 5 b) Colony 2 c) Colony 4 d) Colony 3

116. Genetic material of Retroviruses is
a) DNA b) RNA c) Protein d) ssDNA

117. Read the following four statement (A-D) about certain mistakes in two of them.
(A) The first transgenic buffalo, Rosie produced milk which was human alpha- lactabumin enriched.
(B) Restriction enzymes are used in isolation of DNA form other macro molecules.
(C) Downstream processing is one of steps of R-DNA technology.
(D) Disarmed pathogen vectors are also used in transfer of R-DNA into the host.
Which are the two statement having mistakes?

a) Statement (A) and (B) b) Statement (B) and (C) c) Statement (C) and (D)

d) Statement (A) and (C)

118. Purines found both in DNA and RNA are _____.
a) Adenine and guanine b) Guanine and cytosine c) Cytosine and rhynnine
d) Adenine and thymine

119. Agrobacterium tumefaciens contains contains a large plasmid, which induces tumour in the plants it is termed as-
a) Ti plasmid b) Ri plasmid c) recombinant plasmid d) Shine Delgrano sequence

120. Tumor including plasmid transforms
a) Nematodes b) Bacteria c) Fungi d) Several dicot plants

121. The term 'chemical knife' refers to
a) endonucleases b) cellulases c) polymerases d) endonucleases

122. The bacteria Pseudomonas is useful because of its ability to:
a) Transfer genes from one plant to another

b) Decompose a variety of organic compounds c) Fix atmospheric nitrogen in the soil

d) Produce a wide variety of antibiotics

123. Find out correct recongnisation sequence of following restriction endonuclease enzyme:

a)

	Bam HI	Eco RI
(1)	GGATCC	GAATTC
	CCTAGG	CTTAAG

b)

	Bam HI	Eco RI
(2)	GAATCAA	TTGCAAC
	CTTAGTT	AACGTTG

c)

	Bam HI	Eco RI
(3)	GCATGG	AGCTCC
	CGTACC	TCGAGG

d)

	Bam HI	Eco RI
(4)	GACTAA	GCCTTA
	CTGATT	CGGAAT

124. The process of RNA interference has been used in the development of plants resistant to:
a) Nematodes b) Fungi c) Viruses d) Insects

125. Which of the following correctly depicts the recognition site for EcoRI?

a) $G-A-A-T-\overset{\downarrow}{T}-C$ b) $G-T-C\overset{\downarrow}{-}G-A-C$
$C-T-T-A-\underset{\uparrow}{A}-G$ $C-A-G\underset{\uparrow}{-}C-T-G$

c) $G\overset{\downarrow}{-}T-C-G-A-C$ d) $G\overset{\downarrow}{-}A-A-T-T-C$
$C-A-G-C-T\underset{\uparrow}{-}G$ $C-T-T-A-A\underset{\uparrow}{-}G$

126. The most important feature in a plasmid to be used as a vector is:
a) origin of replication (on) b) presence of a selectable marker

c) presence of sites for restriction endonuclease d) its size

127. In bacteria, plasmid is _____.
a) extra - chromosomal material b) main DNA c) non-functional DNA d) repetitive gene

128. If you want to recover many copies of the target DNA, you will choose a vector:

a) which does not have origin of replication b) which has antibiotic resistance gene

c) whose origin supports high copy number d) which has only one restriction site

129. Identify the palindromic sequence in the following.

a) $\frac{GAATTC}{CTTUUG}$ b) $\frac{GGATCC}{CCTAGG}$ c) $\frac{CCTGG}{GGACC}$ d) $\frac{CGATA}{GCTAA}$

130. Which of the following enzyme is used to join DNA fragments:

a) Terminase b) Endonuclease c) Ligase d) DNA polymerase

131. Which of following feature is not necessary for cloning vector-

a) Oringin of replication b) high copy number c) selectable marker d) Cloning sites

132. While isolating DNA from bacteria, which of the following enzymes is not used?

a) Lysozyme b) Ribonuclease c) Deoxyribonuclease d) Protease

133. RNAi results in

a) Silencing of m-RNA translation

b) Silencing of a specific m-RNA due to complementary ds RNA molecule.

c) Silencing of m-RNA molecule d) Silencing of DNA for m-RNA transcription

134. Which one of the following represents a palindromic sequence in DNA?

5'- CATTAG-3' 5'-GATACC-3' 5'-GAATTC-3' 5'-CCAATG-3'

a) 3'-GATAAC-5' b) 3'-CCTAAG-5' c) 3'-CTTAAG-5' d) 3'-GAATCC-5'

135. Who is the father of genetic engineering?

a) Steward Linn b) Stanley Cohen c) Paul Berg d) Kary Mullis

136. Which one of the foolowing has found extensive use in genetic engineering work in plants

a) Bacillus coagulens b) Agrobacterium tumefaciens c) Clotridium septicum

d) Xanthomonas citri

137. 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

a) human gene may have intron which bacteria cannot process

b) amino acid codons for humans and bacteria are different

c) human protein is formed but degraded by bacteria d) all of the above.

138. Which of the following is not a source of restriction endonuclease?

a) Haemophilus influenzae b) Escherichia coli c) Entamoeba coli

d) Bacillus amyloliquifaciens

139. Plasmids are extra-chromosomal genetic material found in

a) Algae b) Mammalian bond c) Bacteria d) Viruses

140. The cutting of DNA at specific locations became possible with the discovery of _____.

a) Probes b) Selectable markers c) Ligases d) Restriction enzymes

141. Read the following statements and select the correct ones.

(i) Same kind of sticky ends are produced when a DNA has been cut by different restriction enzymes.

(ii) Exonucleases make cuts at specific positions within the DNA.

(iii) Hind II was the first restriction endonuclease to be isolated.

(iv) A bacteriophage has the ability to replicate within bacterial cells by integrating its DNA with bacterial DNA.

(v) Presence of more than one recognition sites for a enzyme within the vector complicates the gene cloning.

a) (i), (iii) and (v) b) (i) and (iv) c) (iii) and (iv) d) (ii), (iii) and (iv)

142. In a polymerase chain reaction, temperature required for the steps

(i) Denaturation,

(ii) Annealing and

(iii) Extension are respectively

a) (i) 94°C (ii) 40^0C (iii) 72°C b) (i) 40^0C (ii) 72^0C (iii) 94^0C c) (i) 94^0C (ii) 72^0C (iii) 40^0C

d) (i) 72^0C (ii) 94^0C (iii) 40^0C

143. Gel electrophoresis is used for _____.

a) cutting of DNA into fragments. b) separation of DNA fragments according to their size.

c) construction of recombinant DNA by joining with cloning vectors.

d) isolation of DNA molecules.

144. The restriction enzyem ECO RI has the property of

a) endonuclease activity b) exonuclease activity c) ligation activity

d) correcting the topology of replicating DNA

145. The stickiness of DNA ends facilitates the action of which enzyme:

a) DNA polymerase b) DNA Ligase c) Restriction endonuclease

d) Alkaline phosphatase

146. Which of the following tools of recombinant DNA technology is incorrectly paired with its use?

a) EcoRI - Production of sticky ends b) DNA ligase - Multiplication of rDNA molecules

c) ori- copy number d) Selectable marker - Identification of transformants

147. A device in which large volume of living cells are cultured in order to get a specific product is called

a) PCR b) agitator c) bioreactor d) assimilator

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

a) Laboratory flask of largest capacity

b) A stirred-tank bioreactor without in-lets and out-lets c) A continuous culture system

d) Any of the above

149. Which of the following bacteria is used as a vector for plant genetic engineering?

a) Agrobacterium tumefaciens b) Bacteriophages c) Thermus aquaticus

d) Pyrococcus furiosus

150. Bt-cotton has which of the following special features?

a) This plant is completely resistant to insects b) It requires less fertilizers

c) It's leaf is resistant to pest but boll is destroyed by bollworms

d) This plant is resistant to certain insects

151. In EcoRI, R is stand for
a) Strain b) Species c) Genus d) order

152. The DNA molecule to which the gene of interest is integrated for cloning is called _____.
a) Vector b) Template c) Canier d) Transformer

153. Micro-injection is a method used to
a) produce sticky ends of DNA b) provide protection against pathogen c) purify the DNA
d) inject recombinant DNA into the nucleus of an animal cell.

154. Using recombinant DNA technology, genes from a donor cell can be inserted into a bacterium for DNA replication and protein synthesis. The kind of cells that can be used as gene donors in this technology are
a) bacteria only b) either yeast or bacteria c) eukaryotic cells only d) any of these.

155. Which one is used as a vector for gene transfer clonning gene?
a) Salmonella typhimurium DNA b) Ti plasmid c) Antibiotic resistance Amp' and Ter' loci
d) Ori minus pBR 322

156. **Assertion:** All expression vectors are cloning vectors and vice versa.
Reason: Expression vectors have at least the regulatory sequences i.e., promoters, operators, ribosomal binding sites, etc. having optimum function in the chosen control but not origin of replication.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

157. The term "competent" refers to:
a) increasing the competition between cells b) making cells impermeable for DNA
c) increasing the efficiency with which DNA enters the bacterium through pores in its cell wall
d) making cells permeable for divalent cations.

158. During the processing of the prohormone "proinslin" into the mature " insulin"
a) C - peptide is added to proinsulin b) C - peptide is removed from proinsulin
c) B - peptide is added to proinsulin d) B - peptide is removed from proinsulin

159. "Transgenic" plants are produced by:
a) Inducing gene mutation b) Arresting spindle fibre formation
c) Deleting sex chromosomes d) Introducing foreign genes

160. In RDT, the term vector refers to
a) Plasmids that can transfer foreign DNA into a living cell
b) Plasmids that can cut DNA at specific bases
c) Plasmids that can join DNA at specific bases
d) Plasmids that can degrade harmful proteins

161. Genetic modification (GM) has been used to:

a) Create tailer made plants b) Supply alternative resources to industries

c) Enhanced nutritional value of food d) All of the above

162. The restriction enzyme(s) used in recombinant DNA technology making staggered cuts in DNA leaving sticky ends is/ are:
a) Eco RI b) HIndIII c) BamHI d) All of the above

163. Which of the following is the example of chemical scissors:
a) ECo - RI b) Hind - III c) Bam - I d) All the above

164. The nucleic acid extracted from animal liver is loaded and run on agarose gel. After staining, it shows following pattern:

If the remaining sample is treated with RNAse and loaded in gel what result would you expect?

a)  b) 

c)  d) 

165. Which of the following method is not used for gene transfer in plants?
a) Biolistics b) Micropropagation c) Microinjection d) Agrobacterium co-culture

166. Read the following statements and select the correct ones.
(i) Electrophoresis is a technique used for the separation of molecules based on their size and charge.
(ii) Plasm ids are extra-chromosomal, self-replicating, usually circular, double stranded DNA molecules found naturally in many bacteria and also in some yeast.
(iii) It is not advisable to use an exonuclease enzyme while producing a recombinant DNA molecule.
(iv) In EcoRI, the roman numeral I indicates that it was the first enzyme isolated from E.coli RY 13.
a) (i) and (ii) b) (iii) and (iv) c) (i), (ii) and (iv) d) (i), (ii), (iii) and (iv)

167. **Assertion:** Special methods are used for transformation i.e., incorporation of recombinant DNA into host.
Reason: DNA is a hydrophilic molecule.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

168. Which of the following is required to perform polymerase chain reaction?
a) Primers, dNTPs and DNA polymerase b) DNA, $CaCl_2$ and nuclease c) Mg^{+2}, DNA
d) Both (a) and (c)

169. Match the scientists in column I with their related discoveries in column II and select the correct option from the given codes.

	Column - I		Column - II
A	Kary Mullis	i	Father of genetic engineering
B	Paul Berg	ii	Nobel prize for the discovery of restriction endonucleases
C	Stanley Cohen and Herbert Boyer	iii	Developed polymerase chain reaction
D	Arber, Smith and Nathan	iv	Isolated an antibiotic resistant gene from a plasmid of the bacterium Salmonella typhimurium

a) A-(iii), B-(i), C-(iv), D-(ii) b) A-(iii), B-(iv), C-(i), D-(ii) c) A-(iv), B-(ii), C-(iii), D-(i)

d) A-(i), B-(iii), C-(iv), D-(ii)

170. Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?

a) 5'_____GAATTC_____3' / 3'_____CTTAAG_____5'

b) 5'_____CACGTA_____3' / 3'_____CTCAGT_____5'

c) 5'_____CGTTCG_____3' / 3'_____ATGGTA_____5'

d) 5'_____GATATG_____3' / 3'_____CTACTA_____-5'

171. DNA cannot pass through a cell membrane as

a) it is too big to cross the membrane b) it is a hydrophilic molecule

c) membrane does not have specific proteins to facilitate the transport d) none of these.

172. The different steps of recombinant DNA technology are given below randomly.

(i) Isolation of the DNA fragments or genes to be cloned

(ii) Introduction of the recombinant DNA into a suitable cell (usually E. coli) called host (transformation)

(iii) Multiplication/expression of the introduced gene in the host

(iv) Selection of the transformed host cells, and identification of the clone containing the desired gene/DNA fragment

(v) Insertion of the isolated gene in a suitable plasmid vector Which of the following represents the correct sequence of steps?

a) (i) $\rightarrow$ (iii) $\rightarrow$ (ii) $\rightarrow$ (iv) $\rightarrow$ (v) b) (iii) $\rightarrow$ (ii) $\rightarrow$ (i) $\rightarrow$ (v) $\rightarrow$ (iv)

c) (i) $\rightarrow$ (v) $\rightarrow$ (ii) $\rightarrow$ (iv) $\rightarrow$ (iii) d) (v) $\rightarrow$ (i) $\rightarrow$ (iii) $\rightarrow$ (iv) $\rightarrow$ (ii)

173. The transfer of genetic material from one bacterium to another through the mediation of a vector like virus is termed as

a) transduction b) conjugation c) transformation d) translation

174. Match the following columns:

	Column I		Column II
A	Golden rice	i	Eli Lily
B	PCR	ii	Herbert boyer
C	Insulin	iii	Kary mullis
D	Recombin	iv	peter Bayer

a) A-iv, B-iii, C-i, D-ii b) A-iv, B-iii, C-ii, D-i c) A-iii, B-iv, C-i, D-ii d) A-iii, B-iv, C-ii, D-i

175. Two bacteria found to be very useful in genetic engineering experiments are _____.

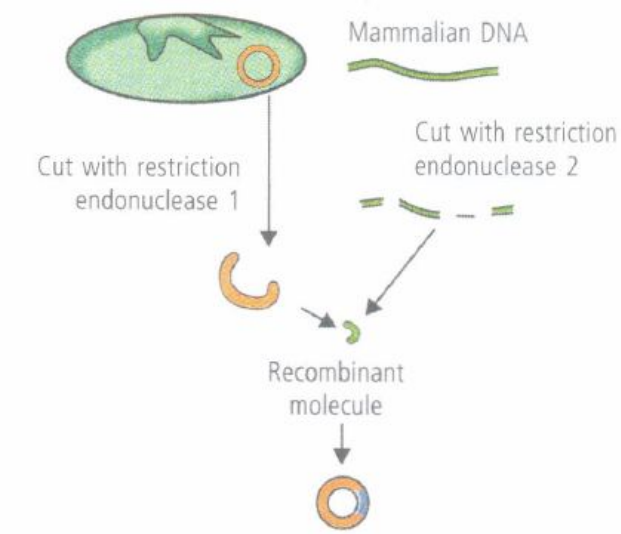
a) Nitrosomonas and Klebsiella b) Escherichia and Agrobacterium
c) Nitrobacter and Azotobaoter d) Rhizobium and Diplococcus

176. Which of the following steps are catalysed by Taq polymerase in a PCR reaction?
a) Denaturation of template DNA b) Annealing of primers to template DNA
c) Extension of primer end on the template DNA d) All of the above

177. Taq - prolymerase which is used for amplification of DNA related with:
a) Hybridoma techique b) PCR - technique c) Gene cloning d) r- DNA technology

178. Genetically engineered human insulin is called:
a) Humulin b) Haematin c) Hybridoma d) Hybrid

179. The basic procedure involved in the synthesis of recombinant DNA molecule is depicted below. The mistake in the procedure is



a) Enzyme polymerase is not included. b) The mammalian DNA is shown double stranded.
c) Two different restriction enzymes are used. d) Only one fragment is inserted.

180. **Assertion:** E.coli having pBR322 with DNA insert at BamHI site cannot grow in medium containing tetracycline.
Reason: Recognition site for BamHI is present in tet^R region of pBR322.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

181. Which of the following statements are correct?
(i) Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome site, but between the same two bases on the opposite strands.
(ii) Hind II always cuts DNA molecules at a particular point by recognising a specific sequence of six base pairs.
(iii) Separated DNA fragments cannot be visualised without staining on an agarose gel electrophoresis.
(iv) 'Ori' is the sequence responsible for controlling the copy number.
(v) DNA is a positively charged molecule.
a) (i), (iii) and (v) b) (i), (ii), (iii) and (iv) c) (iii), (iv) and (v) d) (i), (ii), (iii), (iv) and (v)

182. The sticky ends of a fragmented DNA molecule are made of
a) calcium salts b) endonuclease enzyme c) unpaired bases d) methyl groups

183. Who is given the credit for constructing first artificial recombinant molecule?
a) Hargobind Khorana b) Stanley Cohen and Herbert Boyer c) Linus Pauling
d) Arber and Nathans

184. In recombinant DNA technology, a plasmid vector is cleaved by:
a) modified DNA ligase b) a heated alkaline solution
c) the same enzyme that cleaves the donor DNA
d) the different enzymethan that cleaves the donor DNA

185. Which is pallindromic sequence:

GAATTC	GCAAAG	ATCGGC	ATCGCT
a) CTTAAG	b) CGTTTC	c) TAGCCG	d) TAGCGA

186. Read the given statements and select the correct option.
Statement 1: The tumour inducing plasmid (Ti plasmid) acts as a cloning vector in recombinant DNA technology.
Statement 2: The Ti plasmid which is used in the mechanisms of delivering genes to a cell remains pathogenic.
a) Both statements 1 and 2 are correct.
b) Statement 1 is correct but statement 2 is incorrect.
c) Statement 1 is incorrect but statement 2 is correct.
d) Both statements 1 and 2 are incorrect.

187. During insertional inactivation, the presence of a chromogenic substrate gives blue coloured colonies if the plasmid in the bacteria does not have an insert. The blue colour is produced by the enzyme
a) Both statements 1 and 2 are correct.
b) Statement 1 is correct but statement 2 is incorrect.
c) Statement 1 is incorrect but statement 2 is correct.
d) Both statements 1 and 2 are incorrect.

188. A genetically engineered micro- organism used successfully in bioremediation of oil spills is a species of:
a) Pseudonas b) Trichoderma c) Xanthomonas d) Bacillus

189. The specific DNA sequence where EcoRI cuts is
a) GATTCG b) GAATTC c) GTTCAA d) TTCCAA

190. Process used for amplification or multiplication of DNA in DNA fingerprinting is
a) polymerase chain reaction b) southern blotting c) northern blotting d) none of these.

191. Bacteria possessing restriction endonucleases remain:
a) Affected by bacteriophages b) Resistant to bacteriophages c) Resistant to drugs
d) Resistant to heat

192. The tumor inducing capacity of _A_ is located in large extra-chromosomal plasmid called Ti plasmid. Choose the option which correctly fills up the blanks _A_
a) Thermus aquaticus b) Salmonella typhimurium c) E.coli
d) Agrobacterium tumefaciens

193. Which one of the following techniques made it possible to genetically engineer living organism?
a) Hybridization b) Recombinant DNA techniques c) X- ray diffration
d) Heavier isotope labelling

194. The C - preptide is
a) not present in proinsulin b) present in mature insulin
c) removed during maturation of insulin d) also present in artificial insulin

195. Manipulation of DNA in genetic engineering became possible due to the discovery of:
a) Restriction endonuclease b) DNA ligase c) Transcriptase d) Primase

196. The protin products of the following Bt toxin genes crylAc and cryIIAb are responsible for controlling:
a) Bolloworm b) Roundworm c) Moth d) Fruit fly

197. Which of the following microbes transform normal plant and animal cells to cancerous cells respectively?
a) Retroviruses and Rhizobium b) Escherichia coli and Agrobacterium tumefaciens
c) Agrobacterium tumefaciens and Retroviruses
d) Agrobacterium tumefaciens and A.rhizogenes

198. What is antisense technology?
a) A cell displaying a foreign antigen used for synthesis of antigens.
b) Production of somaclonal variants in tissue cultures.
c)
When a piece of RNA that is complementary in sequence is used to stop expression of a specific gene.
d) RNA polymerase producing DNA.

199. Restriction enzymes are:
a) Not always required in genetic engineering b) Essential tool in genetic engineering
c) Nucleases that cleave DNA at specific sites d) (2) and (3) both

200. Which of the following is not required in PCR-
a) DNA primer b) DNA template c) RNA primer d) Taq polymerase

201. In addition to Taq polymerase enzyme which other thermostable DNA polymerases have been isolated to be used in polymerase chain Reaction (PCR)?
a) Pfu polymerase isolated from Pyrococcus furiosus
b) Tti polymerase (vent polymerase) isolated from Thermococcus litoralis
c) Both (a) and (b) d) None of these

202. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of _____.
a) Insertional inactivate of alpha-galactosidase in non-recombinant bacteria
b) Insertional inactivation of alpha-galactosidase in recombinant bacteria
c) Inactivation of glycosidase enzyme in recombinant bacteria
d) Non-recombinant bacteria containing beta-galactosidase

203. Restriction enzyme Eco RI cuts the DNA between bases G and A only when the sequence DNA is:
a) GATATC b) GAATTC c) GATTCC d) GAACTT

204. Having become an expert on gel electrophoresis, you are asked to examine a gel. Where would you find the smallest segments of DNA?
a) Near the positive electrode, farthest away from the wells
b) Near the negative electrode, close to the wells
c) Near the negative electrode, farthest away from the wells
d) Near the middle, they tend to slow down after the first few minutes.

205. Which is not correctly matched:
a) Agrobacterium ⇒ Ti- plasmid b) Cosmid ⇒ Vector DNA
c) Rhizobium ⇒ Asymbiotic N_2- fixer d) Albinism ⇒ Autosomal recessive gene

206. Which one of the following characteristics is generally not preferred for a cloning vector?
a) An origin of replication b) An antibiotic resistance marker c) Multiple restriction sites
d) A high copy number

207. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using:
a) Eeo RI b) Taq polymerase c) Polymerase III d) Ligase

208. What is ture of plasmid?
a) Found in viruses b) Contains genes for vital activities c) Part of nuclear chromosome
d) Widely used in gene transfer

209. If a recombinant DNA bearing gene for resistance to antibiotic ampicillin is transferred to E.coli cells, the host cells become transformed into ampicillin resistant cells. If such bacteria are transferred on agar plates containing ampicillin, only transformants will grow and the untransformed recipient cells will die. The ampicillin resistant gene in this case is called as
a) selectable marker b) recombinant protein c) cloning site d) chemical scalpels

210. Chromosomes in bacterial cell can be 1-3 in number and _____.
a) can be circular as well as linear within the same cell. b) are always circular.
c) are always linear. d) can be either circular or linear, but never both within the same cell.

211. Silencing of mRNA has been used in producing transgenic plants resistant to:
a) Bacterial blights b) Bollowerms c) Nematodes d) White rusts

212. Consumption of which one of the following foods can prevent the kind of blidness associated with vitamin 'A' deficiency?
a) Golden rice b) Bt-Brinjal c) Flaver savr'tomato d) Canolla

213. A giant rat is formed in the laboratory, what is the reason:
a) Gene mutation b) Gene synthesis c) Gene manipulation d) Gene replication

214. Which of the following is not a component of downstream processing?
a) Separation b) Purification c) Preservation d) Expression

215. Commonly used vectors for human genome sequencing are _____.
a) T-DNA b) BAC and YAC c) ExpressionVectors d) kT/A Cloning Vectors

216. **Assertion:** The matrix used in gel electrophoresis should have controllable pore size.
Reason : Agarose concentration can be changed to change pore sizes.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertionis true but reason is false. d) If both assertionand reason are false.

217. Which one of the following is a case of wrong matching?
a) Somatic hybridization - Fusion of two diverse cells
b) Vector DNA - Site for tRNA synthesis
c) Micro propagation - In vitro production of plants in large numbers
d) Callus - Unorganized mass of cells

218. A single strand of nucleic acid tagged with a radioactive molecule is called _____.
a) Vector b) Plasmid c) Selectable marker d) Probe

219. The term "molecular scissors" generally refers to:
a) DNA polymerases b) RNA polymerases c) Restriction endonucleases
d) DNA ligases

220. **Assertion:** Genetic engineering requires both nudeases and ligases.
Reason: Ligases produce the nick in the recombinant DNA molecule.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

221. Cultivation od Bt cotton has been much in the news. The perfix "Bt" means:
a) "Barium - treated" cotton seeds.
b) "Bigger thread" variety of cotton with batter tensile strength.
c) Produced by "biotechnology" using restriction enzymes and ligases.
d) Carrying an endotoxin gene from Bacillus thuringienasis.

222. The use of bio - resources by multinational companies & other organisations without proper authorisation from the countries & people concerned, is known as-
a) Biopatent b) Biopiracy c) Biower d) Biodiversity

223. Which of the following sequence is palindromic?
GAATTC ATGCAG ATGCAG TGCATC
a) CTTAAG b) TACGTC c) TACGTC d) ACGTAG

224. The microinjection of desired genes from other organism into fertilized eggs of animals results in?

a) monstrosities b) free Martins c) transgenic animals d) twins

225. A restriction endonuclease breaks bonds between the
a) base pairs of a DNA molecule b) base pairs of a DNA-RNA hybrid molecule
c) sugar and phosphate components of a nucleic acid molecule
d) exons and introns of a DNA molecule.

226. In a polymerase chain reaction after the denaturation step why the mixture needs to cool down to a lower temperature?
a) To permit specific annealing of the primers b) To give a halt to the reaction mixture
c) To increase the activity of enzyme Taq polymerase
d) To obtain the multiple copies of the DNA

227. Which of following is not true for cloning vector
a) more than two origin site of replication b) Vector should have selectable marker gene
c) single recognition site for the commonly used restriction enzyme
d) pBR-322 have tetracycline resistance

228. In the isolation of DNA, removal of protein and RNA is carried out by enzymes_____and _____respectively.
a) lysozyme, ribonuclease b) protease, cellulase c) protease, ribonuclease
d) ribonuclease, chitinase

229. Gel electrophoresis is used for
a) construction of recombinant DNA by joining with cloning vectors
b) isolation of DNA molecules c) cutting of DNA into fragments
d) separation of DNA fragments according to their size.

230. BACs and YACs are:
a) Natural DNA obtained from bacteria and yeast
b) Useful vectors foreucaryotic gene transfer
c) Artificial DNA obtained from bactericial and yeast d) (2) & (3) both

231. Bt - cotton is resistant for:
a) Round - Worm b) Fluke - Worm c) Boll - Worm d) Pin - Worm

232. The polymerase chain reaction is a technique used for
a) amplification of DNA b) amplification of enzymes c) amplification of proteins
d) all of these.

233. Identify the wrong statement with regard to restriction enzymes.
a) They are useful in genetic engineering.
b) sticky ends can be joined by using DNA ligases.
c) Each restriction enzyme functions by inspecting the length of a DNA sequence.
d) They cut the strand of DNA at palindromic sites.

234. Which one of following is method of gene silencing
a) tRNA b) rRNA c) RNAi d) mRNA

235. **Assertion :** In a chemical engineering process, it is necessary to prepare sterile ambience.
Reason : Sterile ambience inhibits the growth of undesirable microbes during manufacture of product like antibiotics, vaccines and enzymes

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

236. In the process of insertional inactivation:

a)

a recombinant DNA is inserted within the coding sequence of enzyme f3-galactosidase, resulting in inactivation of the enzyme

b)

a recombinant DNA is inserted within the coding sequence of proteins involved in the replication of the plasmid

c) a recombinant DNA is inserted within the recognition site for EcoRI

d) none of the above.

237. When the genotype of an organism is improved by the addition of foreign gene, the process is called?

a) Tissue culture b) Genetic diversity c) Genetic Engineering d) Plastic surgery

238. DNA or RNA segment tagged with a radioactive molecule is called _____.

a) Vector b) Probe c) Clone d) Plasmid

239. Select the correct option to fill up the blanks.

(i) _____ is a natural polymer extracted from_____.

(ii) The DNA fragments purified by gel electrophoresis are used in constructing _____by joining them with _____.

(iii) The ligation of alien DNA is carried out at a _____present in one of the two _____in a plasmid vector.

(iv) _____ enzyme remains active during the high temperature induced denaturation of ds DNA.

(v) DNA fragments are resolved according to their _____through_____in agarose gel electrophoresis.

a)

(i) Agarose, sea weeds (ii) recombinant DNA, cloning vector (iii) restriction site, antibiotic resistance genes (iv) Taq polymerase (v) size, sieving effect

b)

(i) Agarose, sea weeds (ii) Restriction site, antibiotic resistance genes (iii) recombinant DNA, cloning vector (iv) Taq polymerase (v) size, sieving effect

c)

(i) Agarose, sea weeds (ii) restriction site, antibiotic resistance genes (iii) recombinant DNA, cloning vector (iv) Taq polymerase (v) size, sieving effect

d)

(i) Size, sieving effect (ii) agarose, sea weeds (iii) recombinant DNA, cloning vector (iv) Taq polymerase (v) restriction site, antibiotic resistance genes

240. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of _____.

a) Silver or Platinum b) Platinum or Zinc c) Silicon or Platinum d) Gold or Tungsten

241. The correct order of steps in Polymerase Chain Reaction (PCR) is :

a) Denaturation, Extension, Annealing b) Annealing, Extension, Denaturation

c) Extension, Denaturation, Annealing d) Denaturation, Annealing, Extension

242. Important objective of biotechnology in agriculture section is

a) To produce pest resistant varieties of plants b) To increase the nitrogen contant

c) To decrease the seed number d) To increase the Plant weight

243. Given table gives an account of differences between PCR and gene cloning. Which of the following points shows the incorrect difference?

	Parameter	**PCR**	**Gene cloning**
1.	Efficient	More	Less
2.	Apparatus Requirement	DNA	Restriction enzyme, ligase, vector, bacterial cell
3.	Manipulation	in vitro	in vitro and in vivo
4.	Cost	More	Less
5.	Automation	Yes	No
6.	Error probability	Less	More
7.	Time for a typical experiment	2-4 days	4 hours
8.	Application	More	Less

a) 1 and 3 b) 4, 5 and 6 c) 4 and 7 d) 4, 7 and 8

244. T-DNA for gene transfer is present in:

a) Bacillus thuringiensis b) Meloidogyne incognitia c) Agrobacterium tumefaciens

d) E.Coli

245. First transgenic plant:

a) Potato b) Tomato c) Tobacco d) Maize

246. Which of the following is used as a best genetic vector in plants:

a) Bacillus thuriengenesis b) Agrobacterium tumifaciens c) Pseudomonas putida

d) All of these

247. Which of the following is not a feature of the plasmid?

a) Single stranded b) Independent replication c) Circular structure

d) Small, circular double-stranded

248. Primers are

a) chemically synthesised oligonucleotides that are complementary to the regions of DNA

b)
chemically synthesised oligonucleotides that are not complementary to the regions of DNA

c) chemically synthesised, autonomously replicating circular DNA molecules

d) specific sequences present on recombinant DNA.

249. Which of the following is not a genetically modified plant?
a) Bt-cotton b) Flacvr savr tomato c) Pusa swarnim d) Golden rice

250. Modern biotechnology consist:
a) Genetic enginearing b) tissue culture c) Microbiology d) All the above

251. What is true forplasmid?
a) Plasmids are widely used in gene transfer. b) These are found in virus.
c) Plasmid contains gene for vital activities. d) These are main part of chromosome.

252. Which of the following statements does not hold true for restriction enzyme?
a) It recognises a palindromic nucleotide sequence. b) It is an endonuclease.

c) It is isolated from viruses.

d) It produces the same kind of sticky ends in different DNA molecules.

253. Plasmid has been used as vector because:
a) It is circular DNA which have capacity to join to eukeryotic DNA.

b) it can move between prokaryotic and eukary- otic cells. c) Both ends show replication.

d) It has antibiotic resistance gene.

254. The function of polymerase chain reaction (PCR) is:
a) translation b) transcription c) DNA amplification d) None of these

255. A kind of Biotechnology involving manipulation of DNA is
a) DNA replication b) Genetic engineering c) Denaturation d) Renaturation

256. Restriction endonucleases are used in genetic engineering to form
a) Recombinant molecule of protein b) Recombinant molecule of DNA

c) Recombinant molecule of protein & DNA d) Recombint cell

257. An improved variety of transgenic basmati rice:
a) is completely resistant to all insept pests and diseases of paddy

b) gives high yield but has no charactristic aroma

c) dose not require chemical fertilizers and growth hormones

d) gives high yield and is rich in vitamin A

258. Which kind of therapy was given in 1990 to a four year old girl with adenosine deaminase (ADA) deficiency?
a) Gene therapy b) Chemotherapy c) Immunotherapy d) Radiation therapy

259. Stirred tank bioreactors have been designed, for _____.
a) addition of preservatives to the product. b) purification of the product.
c) ensuring anaerobic conditions in the culture vessel.
d) availability of oxygen throughout the process

260. Which of the following is correct match

	Column - I		Column - II
A	ADA - deficiency	i	α-1 antitrypsin
B	Emphysema	ii	Bone marrow transplatation
C	Insulin	iii	Diabetes mellitus
D	insect resistance	iv	T_1 - Plasmid

a) A(ii), B(i), C(iii), D(iv) b) A(i), B(ii), C(iii), D(iv) c) A(iii), B(iv), C(ii), D(i)

d) A(iv), B(iii), C(ii), D(i)

261. Which of the following statements are correct for the enzyme Taq polymerase?
(i) It remains active during the high temperature induced denaturation of dsDNA.
(ii) It requires primers for carrying out the process of polymerisation.
(iii) It synthesises the RNA region between the primers, using dNTPs and Mg^{2+}.
a) (i) and (ii) b) (ii) and (iii) c) (i), (ii) and (iii) d) None of these

262. Read the given statements and select the correct option.
Statement 1 : In insertional inactivation, blue colour produced by bacterial colonies indicates that the plasmid does not have an insert into the bacterial genome.
Statement 2 : Presence of insert results into insertional inactivation of β-galactosidase enzyme and the colonies do not produce any colour.
a) Both statements 1 and 2 are correct.

b) Statement 1 is correct but statement 2 is incorrect.

c) Statement 1 is incorrect but statement 2 is correct.

d) Both statements 1 and 2 are incorrect.

263. **Assertion:** A piece of DNA inserted into an alien organism generally does not replicate if not inserted into a chromosome.
Reason: Chromosomes have specific sequences called 'ori' region where DNA replication is initiated.
a) If both assertion and reason are false.

b) If both assertion and reason are true and reason is the correct explanation of assertion.

c) If both assertion and reason are true but reason is not the correct explanation of assertion.

d) If assertion is true but reason is false.

264. Which vector is commonly used in the transfer of gene in a crop plant.
a) Plasmids of B. Subtilis b) Bacteriohages c) Ti - Plasmids of Agrobacterium

d) E. Coli Phages

265. There is a restriction endonuclease called EcoRI. What does "co" part in it stand for?
a) colon b) coelom c) coenzyme d) coli

266. Genetic engineering is:
a) study of extra nuclear gene b) Manipulation of genes by artificial method

c) Manipulation of RNA d) Manipulation of enzymes

267. In agarose gel electrophoresis, DNA molecules are separated on the basis of their
a) separated on the basis of their b) size only c) charge to size ratio d) all of the above.

268. Which of the following peptide chain in not present in mature insulin.
a) A- peptide b) B- peptide c) C- peptide d) A & B peptideli

269. Which of the following is not a tool of genetic engineering?
a) Cloning vector b) Restriction enzyme c) Foreign DNA d) GMO

270. The process of replication in plasmid DNA, other than iniriation, is controlled by _____.
a) mitochondrial gene b) bacterial gene c) plasmid gene d) None of the above

271. Maximum number of existing transgenic animals is of:
a) Fish b) Mice c) Cow d) Pig

272. A suitable vector for gene cloning in higher organism is
a) Baculovirus b) Retrovirus c) Salmonella typhimurium d) Neurospora crassa

273. **Assertion :** Restriction enzymes Hin and Hpa are produced from two different genera of bacteria.
Reason: Hin is produced from Haemophilus while Hpa is produced from Hematococcus.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

274. The term 'chimeric DNA' refers to:
a) DNA with overhanging stretches b) DNA with palindromic sequence
c) a recombinant DNA d) molecular scissors

275. In genetic engineering, the antibiotics are used.
a) As selectable markers b) To select healthy vectors
c) As sequences from where replication starts d) To keep the culture free ofinfection

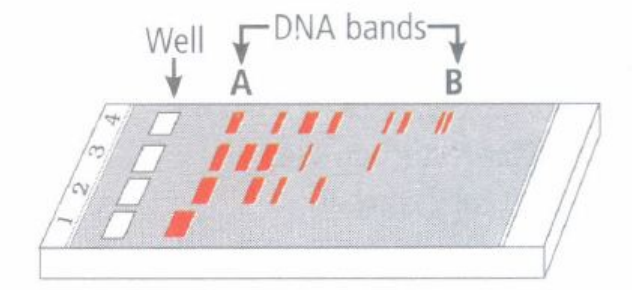
276. Which one is true statement regarding DNA polymerase used in PCR?
a) It is used to ligate introduced DNA in recipient cell b) It serves as a selectable marker
c) It is isolated from a virus d) It remains active at high temperature

277. Cry - gene which synthesize crystal protein isolated from:
a) Bacillus thuriengensis b) Rhizbium c) Bacillus polymyxa d) Colostridium

278. Plasmid used to construct the first recombinant DNA was isolated from which bacterium species?
a) Escherichia coli b) Salmonella typhimurium c) Agrobacterium tumefaciens
d) Thermus aquaticus

279. Stirred-tank bioreactors have advantages over shake flasks because they
a) provide high temperature and pH b) provide better aeration and mixing properties
c) do not allow the entry of CO_2 d) are easy to operate.

280. Study the given figure carefully and select the incorrect statements regarding this.



(i) It represents a typical agarose gel electrophoresis in which lane 1 contains undigested DNA.

(ii) Smallest DNA bands are formed at A and largest DNA bands are formed at B.

(iii) The separated DNA fragments can be visualized after staining in the visible light.

(iv) The separated DNA bands are cut out from the agarose gel and extracted from the gel piece. This step is known as elution.

a) (i) and (ii) b) (ii) and (iii) c) (ii) and (iv) d) (i) and (iv)

281. Agarose extracted from seaweeds finds use in _____.

a) Spectrophotometry b) Tissue culture c) PCR d) Gel electrophoresis

282. The role of DNA ligase in the construction of a recombinant DNA molecule is:

a) formation of phosphodiester bond between two DNA fragments

b) formation of hydrogen bonds between sticky ends of DNA fragments

c) ligation of all purine and pyrimidine bases d) none of the above

283. Chimeric DNA is :

a) DNA which contains uracil b) DNA synthesized from RNA c) Recombinant DNA

d) DNA which contains single strand

284. Which one of the following is used as vector for cloning genes into higher organism?

a) Baculovirus b) Salmonellatyphimurium c) Rhizopus nigricans d) Retrovirus

285. In biolistic method of gene transfer, the microparticles coated with foreign DNA are bombarded into target cells at a very high velocity. These microparticies are made up of:

a) silver or tungsten b) arsenic or silver c) gold or tungsten d) none of these

286. Bt.toxin dose not show harmful effect on human and not target insect, because:

a) It is non toxic to animal and human b) It's receptors are not present in humans

c) Human and other animals have resistance against Bt. toxins

d) Acidic nature of stomach and absence of specific receptor on human gut.

287. Which of the following steps should be performed by a person in order to visualise the bands of DNA fragments obtained from gel electrophoresis?

a) Exposure of DNA fragments to UV radiations.

b) Staining with bromophenol blue followed by exposure to UV radiations.

c) Staining with ethidium bromide followed by exposure to UV radiations.

d) Person can see the bands without staining.

288. Which of the following sequences is recognised by restriction enzyme BamHI?

a) $5' - G\overset{\downarrow}{A}ATTC - 3'$
$3' - CTTAA\underset{\uparrow}{G} - 5'$

b) $5' - A\overset{\downarrow}{A}GCTA - 3'$
$3' - TTCG\underset{\uparrow}{A}T - 5'$

c) $5' - G\overset{\downarrow}{G}ATCC - 3'$
$3' - CCTA\underset{\uparrow}{G}G - 5'$

d) $5' - CCC\overset{\downarrow}{A}AT - 3'$
$3' - GGG\underset{\uparrow}{T}TA - 5'$

289. Golden rice is a promising transgenic crop. When released for cultivation, it will help in
a) Alleviation of vitamin A deficiency b) pest resistance c) Herbicide tolerance
d) Producing a petrol - like fuel from rice

290. Which of the following has popularised the PCR (polymerase chain reactions)?
a) Easy availability of DNA template b) Availability of synthetic primers
c) Availability of cheap deoxyribonucleotides
d) Availability of 'thermostable' DNA polymerase

291. Function of restriction endonuclesase enzyme is:
a) Useful in genetic engineering b) protects the bacterial DNA againest foreign DNA
c) Helpful in transcription d) Helpful in protein synthesis

292. pBR322 was the first artificial cloning vector to be constructed. What does "BR" stands for?
a) Bacteriophage and Recombinant b) Boliver and Rodriguez c) Boyer and Replicative
d) None of these

293. Which of the following is not naturally occuring gene:
a) cry - gene b) Bt - gene c) RNAi, gene d) Celluar defense gene

294. First artifically synthesysed hormone is:
a) Secretin b) Insulin c) Glucagen d) Renin

295. Which of the following is related to genetic engineering?
a) Mutation b) plasmid c) Plastid d) Heterosis

296. The sequence that controls the copy number of the linked DNA in the vector, is termed.
a) Palindromic sequence b) Recognition site c) Selectable marker d) Ori site

297. The name of durg used in cancer treatment produced by biotechnology is
a) Interferon b) [HGH] Human growth hormone c) TSH d) insulin

298. What is the source of the Ti (Tumor inducing) plasmid which is modified and used as a cloning vector to deliver desirable genes into plants cells?
a) Agrobacterium tumifaciens b) Thermophilus aquaticus c) Pyrococcus furiosus
d) Aedes aegypti

299. According to EFB, "The integration of natural science and organisms, cells, parts thereof and molecular analogues for products and services," is known as:
a) Biochemistry b) Bioinformatics c) Biotechnology d) Biology

300. Polyethylene glycol method is used for _____.
a) biodiesel production. b) seedless fruit production. c) energy production from sewage.
d) gene transfer without a vector.

301. Match column I (enzyme) with column II (characteristic/ activity) and select the correct answer from the given codes.

	Column I		**Column II**
A	Taq DNA polymerase	i	Cleaves the ends of linear DNA
B	Exonuclease	ii	Breakdown of fungal cell wall
C	Protease	iii	Stable above 90^0C
D	Chitinase	iv	Made only by eukaryotic cells
		v	Degradation of proteins

a) A-(iii), B-(iv), C-(i), D-(ii) b) A-(iv), B-(iii), C-(i), D-(ii) c) A-(ij), B-(i), C-(v), D-(iii)

d) A-(iii), B-(i), C-(v), D-(ii)

302. Which of the given statements is correct in the context of observing DNA separated by agarose gel electrophoresis?

a) DNA can be seen in visible light. b) DNA can be seen without staining in visible light.

c) Ethidium bromide stained DNA can be seen in visible light.

d) Ethidium bromide stained DNA can be seen under exposure to UV light.

303. 'Restriction' in restriction enzyme refers to

a) cleaving of phosphodiester bond in DNA by the enzyme

b) cutting of DNA at specific position only

c) prevention of the multiplication of bacteriophage in bacteria d) all of the above.

304. Gel electrophoresis is a

a) technique of separation of charged molecules under the influence of magnetic field

b)
technique of incorporation of DNA molecules into the cell through transient pores made due to electrical impulses

c)
technique of separation of DNA fragments through the pores of agarosegel underthe influence of electric field

d) technique of separation and purification of gene products.

305. The correct sequence of making a cell competent is

a)
treatment with divalent cations $\rightarrow$ incubation of cells with recombinant DNA on ice$\rightarrow$ heat shock (42°C)$\rightarrow$ placing on ice

b)
heat shock (42°C)$\rightarrow$ incubation of cells with recombinant DNA on ice$\rightarrow$ treatment with divalent cations$\rightarrow$ placing on ice

c)
treatment with divalent cations$\rightarrow$ placing on ice$\rightarrow$ incubation of cells with recombinant DNA on$\rightarrow$ ice heat shock (42°C)

d)
incubation of cells with recombinant DNA on ice$\rightarrow$ heat shock (42°C)$\rightarrow$ treatment with divalent cations$\rightarrow$ placing on ice

306. Gnetically engineered bacteria have been used in commercial production of
a) Thyroxin b) testosterone c) Human insulin d) Melatonium

307. **Assertion :** Use of chitinase enzyme is necessary for isolation of DNA from yeast cells but not in case of Spirogyra.
Reason: Fungal cell wall is made up of fungal cellulose or chitin.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true and reason is the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

308. An enzyme catalysing the removal of nucleotides from the ends of DNA is
a) endonuclease b) exonuclease c) DNA ligase d) Hind ll

309. Thermal cycle takes place in which technique
a) Gel electrophoresis b) PCR- techinque c) Centrifugation d) Southern blotting

310. Which of the following bonds are formed by action of DNA ligase?
a) Sugar-phosphate bond b) Phosphodiester bond c) Phosphate-phoshphate bond
d) Both (1) & (2)

311. Some of the characteristics of Bt cotton are :
a) High yield and production of toxic protein crystals which kill dipteran pests
b) High yield and resistance to bolloworms c) Long fibre and resistance to aphids
d) Medium yield, ling fibre and resistance to beetle pests

312. PCR and Restriction Fragment Length Polymorphism are the methods for _____.
a) Study of enzymes b) Genetic transformation c) DNA sequencing
d) Genetic Fingerprinting

313. Match column I with column II with respect to the nomenclature of restriction enzyme EcoRI and select the correct answer from the given codes.

	Column - I		**Column -II**
A	E	i	1st in order of identification
B	o	ii	Name of genus
C	R	iii	Name of species
D	I	iv	Name of strain

a) A-(iii), B-(i), C-(ii), D-(iv) b) A-(ii), B-(i), C-(iii), D-(iv) c) A-(i), B-(ii), C-(iii), D-(iv)
d) A-(ii), B-(iii), C-(iv), D-(i)

314. The genetically-modified (GM) brinjal in india has been developed for:
a) Enhancing mineral content b) Drought - resistance c) Insect - resistance
d) Enhancing shelf life

315. pBR- 322 which is freqently used as a vector for cloning gene is-
a) an original bacterial plasmid b) a modified bacterial plasmid c) a viral genome
d) a transposon

316. Which struture involved in genetic engineerting:
a) Plastid b) Plasmid c) Codon d) None

317. Recombinant DNA is obtained by cleaving the pro - DNA by _____.
a) primase b) exonucleases c) ligase d) restriction endonuclease

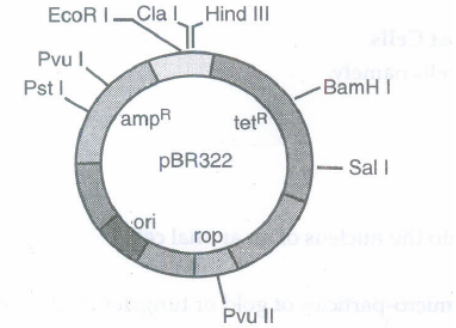
318. Introduction of foreign genes for improving genotype is called
a) Biotechnology b) Tissue culture c) Genetic engineering d) Both (1) & (3)

319. In pBR322, tetracycline resistance gene (tet^R) has recognition site for which of the following restriction endonuclease?
a) HindIII b) BamHI c) EcoRI d) PstI

320. A researcher identifies a naturally occuring variant possessing characteristics of interest. This plant is selectively bred. This is an example of
a) Traditional plant breeding b) Transgenic technology c) Mutant selection
d) Cross breeding

321. Read the following statements and select the incorrect ones.
(i) When the transformed cells on agar plates containing ampicillin are spread, both transformed and untransformed cells will grow.
(ii) Restriction enzymes are used in isolation and separation of DNA from other macromolecules.
(iii) Downstream processing is one of the steps of rDNA technology.
(iv) Disarmed pathogen vectors are also used in transfer of rDNA into the host.
a) (ii) and (iii) b) (iii) and (iv) c) (i) and (iii) d) (i) and (ii)

322. The given figure is the diagrammatic representation of E.coli vector pBR 322.



Which one of the given options correctly identifies its certain component(s)?
a) Ori - original restriction enzyme b) Rop - Reduced osmotic pressure
c) Hind III, EcoR I - selectable markers d) AmpR, tetR - antibiotic resistance genes

323. A piece of nucleic acid using to find out a gene, by forming hybrid with it, is called as :
a) Sticky end b) Blunt end c) c - DNA d) DNA probe

324. Introduction of food plants developed by genetic engineering is not desirable because _____.
a) economy of developing countries may suffer.
b) these products are less tasty as compared to the already existing products.
c) this method is costly.
d) there is danger of entry of viruses and toxins with introduced crop.

325. Restriction endonucleases are enzymes which _____.
a) make cuts at specific positions within the DNA molecule.
b) recognize a specific nucleotide sequence for binding of DNA ligase.
c) restrict the action of the enzyme DNA polymerase.
d) remove nucleotides from the ends of the DNA molecule.

326. DNA product is used for:
a) DNA finger printing b) Detection of pathogenic bacteria
c) Medical genetics to find whether a person carries a particular gene or not
d) All the above

327. Characteristics of vector include all, except
a) Presence of 'ori' b) Presence of antibiotic resistance gene as selection marker
c) Large size d) MCS

328. A genetically manipulated organism containing in its genome one or more inserted gene of another species is called :
a) Transposon b) Gene expression c) Transgenic organism d) Retroposons

329. Stirred-tank bioreactors have been designed for:
a) Purification of product b) Addition of preservatives to the product
c) Availability of oxygen throughout the process
d) Ensuring anaerobic conditions in the culture vessel

330. A gene whose expression helps to identify transformed cell is known as :
a) Selectable marker b) Vector c) Plasmid d) Structural gene

331. Main objective of production/use of herbicide resistant GM crops is to:
a) Eliminate weeds from the filed without the sus of herbicides
b) Encourage eco-friendly herbicides
c) Reduce herbicide accumulation in food articles for health safety
d) Eliminate weeds from the field without the use of manual labour

332. Enzyme 'Taq polymerase' used in peR, has been isolated from bacterium:
a) Agrobacterium tumefaciens b) Thermus aquaticus c) Streptomyces a/bus
d) Escherichia coli

333. **Assertion:** PCR primers must not have self complementary regions.
Reason: Self complementary regions result in hairpin structures adversely affecting the PCR.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If assertion is true but reason is false.