

GPLUS EDUCATION

Date :
Time :
Marks :

BIOLOGY

BIOTECHNOLOGY AND ITS APPLICATIONS

Single Correct Answer Type

- The bacterium, *Bacillus thuringiensis* is widely used in contemporary biology as
 - Insecticide
 - Agent for the production of dairy products
 - Source of industrial enzyme
 - Indicator of water pollution
- The technique of DNA fingerprinting was initially developed by
 - Ian Wilmut
 - Har Gobind Khurana
 - Jacques Monod
 - Alex Jeffreys
- Consider the following statements
 - Specific *Bt* toxin gene have been isolated from *Bacillus thuringiensis*
 - Bt* toxin is coded by a gene named *cry*
 - Bt* toxin protein exists as inactive protoxinsWhich of the statements given above are correct?
 - I, II and III
 - I and II
 - I and III
 - II and III
- Silencing of a gene could be achieved by the use of
 - RNAi
 - Antisense RNA
 - Both (a) and (b)
 - None of these
- In callus culture, roots can be induced by the supply of
 - Auxin
 - Cytokinin
 - Gibberellin
 - Ethylene
- Golden rice
 - It is a transgenic variety of rice
 - It contains a good quality of β -carotene (provitamin-A)
 - β -carotene is a principal source of vitamin-A
 - The grains of the rice are yellow in colour due to β -carotene. The rice is commonly called golden riceWhich of the statements given above are correct?
 - I, II and III
 - II, III and IV
 - I, III and IV
 - I, II, III and IV
- GEAC stands for
 - Genetic and Biotechnology Approval Committee
 - Gene Environment Action Committee
 - Genetic Engineering Approval Committee
 - Genome Engineering Action Committee
- The linking of antibiotic resistance gene with the plasmid vector became possible with
 - DNA ligase
 - Endonucleases
 - DNA polymerase
 - Exonucleases
- Genetically modified plants have been useful in increasing
 - Crop yield
 - Nutritional value of food
 - Tolerance against abiotic stresses
 - All of the above
- Transgenic crops are modified through genetic engineering to develop natural resistance to insect pests. Which one is a transgenic plant?
 - Tobacco and cotton
 - Tomato and rice
 - Maize and sugarcane
 - Tomato and wheat
- Golden rice was created by transforming rice with two β -carotene biosynthesis genes, namely,
 - Psy* and *Cry 1* genes
 - LCY-e*
 - CHY-1*
 - CHY-2*
- Which of the following is used in genetic engineering?
 - Plastid
 - Plasmid
 - Mitochondria
 - ER
- Explants before organogenesis, is
 - Photosynthetic
 - Autotrophic
 - Heteromorphic
 - Heterotrophic

14. In RNAi, genes are silenced using
 a) *dsDNA* b) *dsRNA* c) *ssDNA* d) *ssRNA*
15. GAATTC is the recognition site for the restriction endonuclease
 a) *Eco RI* b) *Hind II* c) *Eco RII* d) *Bam HI*
16. Consider the following statements about transgenic tobacco plant
 I. Transgenic tobacco plants contains a gene from a bacterium, *Bacillus thuringiensis*
 II. *Bt* gene is an insecticidal protein which damages the inner lining of the insects and kills it (insect)
 III. The tobacco plants having *Bt* gene produces their own insecticide
 Which of the statements given above are correct?
 a) I and II b) I and III c) II and III d) I, II and III
17. Which gene was introduced in the first transgenic cow?
 a) Human α -lactalbumin b) α -1-antitrypsin c) β -1-antitrypsin d) *cry-IAC*
18. Which bacteria was the first to be used as biopesticide on the commercial scale in the world?
 a) *Bacillus thuringiensis* b) *E. coli*
 c) *Pseudomonas aeruginosa* d) *Agrobacterium tumefaciens*
19. Silk is produced by
 a) Egg of silkworm b) Pupa of silkworm c) Lara of silkworm d) Insect itself
20. Most widely used bioweapon is
 a) *Bacillus subtilis* b) *Pseudomonas putida*
 c) *Bacillus anthracis* d) None of these
21. *Bt* toxin kills insects by
 a) Inhibiting protein synthesis
 b) Generating excessive heat
 c) Creating pores in the midgut epithelial cells, leading to cell swelling and lysis
 d) Obstructing a biosynthetic pathway
22. GM brinjal in India has been developed for resistance against
 a) Virus b) Bacteria c) Fungi d) Insects
23. Which of the following is used as a best genetic vector in plants?
 a) *Bacillus thuringiensis* b) *Agrobacterium tumefaciens*
 c) *Pseudomonas putida* d) None of the above
24. Somaclonal variation appears in plants
 a) Growing in polluted soil or water b) Exposed to gamma rays
 c) Raised in tissue culture d) Transformed by recombinant DNA technology
25. Which of the following cells cannot be grown under tissue which of culture condition?
 a) Hela cells b) Leucocytes c) Kidney cells d) Nerve cells
26. Use of biological resources of other countries without any legal authorization of the countries concerned is called
 a) Biopatent b) Biopiracy c) Bioethics d) All of these
27. Genetic modification has
 I. reduced reliance on chemical pesticides
 II. reduced post-harvest losses
 III. increased efficiency of minerals used by the plants
 IV. enhanced nutritional value of the food
 Which of the statements given above are correct?
 a) I, II, III and IV b) I, II and III c) II, III and IV d) III and IV
28. The function of polymerase chain reaction is
 a) Transduction b) DNA amplification c) Translation d) None of these
29. Gene amplification using primers can be done by
 a) Microinjection b) ELISA

- a) A kind of white blood cells
c) Blood platelets
- b) A kind of red blood cells
d) Plasma cells
45. Blindness can be prevented by use of which crop in poor countries?
a) Golden rice b) Wheat c) Gram d) Pea
46. Variable number of tandem repeats (VNTRs) in the DNA molecule are highly useful in
a) Recombinant DNA technology b) DNA fingerprinting
c) Monoclonal antibody production d) Stem cell culture
47. Why is *Bt* toxin not toxic to human beings?
a) The toxin recognises only insect specific targets
b) *Bt* toxin activation requires temperature above the human body temperature
c) *Bt* toxin formation forms pro *Bt* state which requires pH lower than one present in human stomach
d) Conversion of pro *Bt* to *Bt* state takes place only in highly alkaline condition
48. A clone is
a) Heterozygote obtained asexually b) Homozygote obtained asexually
c) Heterozygote produced by sexual methods d) Homozygote produced by sexual reproduction
49. Humulin is
a) Human insulin b) Animal insulin c) Bacterial insulin d) Fungi insulin
50. In *Bt* cotton, transgenic plant, *Bt* refers to
a) Botanical b) Beta
c) Biotechnology d) *Bacillus thuringiensis*
51. The first time in 1990, M Blease and WF Andresco of National Institute of Health, attempted gene therapy on a 4 year old girl with which of the following enzyme deficiency?
a) Cytosine deaminase (CDA)
b) Adenosine deaminase (ADA)
c) Tyrosine oxidase
d) Glutamate trihydrogenase
52. Secondary cells can't divide because
a) They lose the ability to divide
b) They do not have nucleus
c) They undergo certain irreversible changes during differentiation
d) All of the above
53. Undifferentiated mass of plant cells grown on nutrient medium, is called
a) Callus b) Bud c) Clone d) Scion
54. The first case of IVF-ET technique success, was reported by
a) Louis Joy Brown and Banting Best b) Patrick Steptoe and Robert Edward
c) Robert Steptoe and Gilbert Brown d) Baylis and Starling Taylor
55. Today, transgenic models have been developed for many human diseases, which includes
I. rheumatoid arthritis II. Alzheimer's disease
III. cancer IV. Cystic fibrosis
Choose the correct option
a) I and II b) II and IV c) I, II and IV d) I, II, III and IV
56. Probes, used in DNA fingerprinting, are initially
a) Single stranded RNA b) Mini satellite
c) 19 base long oligonucleotide d) All of the above
57. The decisions regarding the validity of GMO (Genetic Modification of Organism) research and the safety of introducing GM for the public services in India is taken by
a) Genetic Engineering Approval Committee
b) Department of Recombinant DNA Technology
c) Department of Science and Biotechnology

- d) National Biotechnology Board
58. Some strains of *Bacillus thuringiensis* produces proteins that kills insects like
a) Lepidopterans b) Coleopterans c) Dipterans d) All of these
59. Golden rice is
a) A type of rice grown along the yellow river in China b) A transgenic rice having gene for β -carotene (pro-vitamin-A)
c) Normal variety of rice with golden coloured grains d) Wild and long sized rice having golden tint
60. In order to obtain virus-free plants through tissue culture, the best method is
a) Protoplast culture b) Embryo rescue c) Anther culture d) Meristem culture
61. Which of the following genes were introduced in cotton to protect it from cotton bollworms?
a) *CryAc* and *cryAb*
b) *BtAc* and *BtAb*
c) *CryI Ac* and *cryII Ab*
d) *Nif* genes
62. Which of the following techniques are related with gene therapy?
I. Bone marrow transplantation
II. Enzyme replacement therapy
III. Gel electrophoresis technique
IV. Hybridoma technique
Choose the correct option
a) I and II b) II and III c) I, II and III d) II, III and IV
63. The SCID patient has a defective gene for the enzyme Adenosine Deaminase (ADA). He/She lacks functional and therefore, fails to fight the infecting pathogens
a) B-lymphocytes b) Phagocytes c) T-lymphocytes d) Both (a) and (b)
64. The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as a/an
a) Indicator of water pollution b) Insecticide
c) Agent for production of dairy products d) Source of industrial enzyme
65. The enzymes, commonly used in genetic engineering, are
a) Restriction endonuclease and polymerase b) Endonuclease and ligase
c) Restriction endonuclease and ligase d) Ligase and polymerase
66. In plant biotechnology, PEG is used in
a) Protoplast isolation b) Cell culture preparation
c) Protoplast fusion d) Hardening
67. Differentiation of shoot is controlled by
a) High gibberellin – auxin ratio b) High gibberellin – cytokinin ratio
c) High auxin – cytokinin ratio d) High cytokinin – auxin ratio
68. Which one of the following is used as vector for cloning genes into higher organisms?
a) Baculovirus b) *Salmonella typhimurium*
c) *Rhizopus nigricans* d) Retrovirus
69. Main objective of production/use of herbicide resistant GM crops is to
a) Eliminate weeds from the field without the use of manual labour
b) Eliminate weeds from the field without the use of herbicides
c) Encourage eco-friendly herbicides
d) Reduce herbicide accumulation in food articles for health safety
70. Golden rice is a transgenic crop of the future with which of the following improved trait?
a) High lysine (essential amino acid) content b) Insect resistance
c) High protein content d) High vitamin-A content
71. 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*
72. Molecular scissors are
 a) Restriction endonucleases
 b) DNA polymerase
 c) DNA ligase
 d) RNA polymerase
73. Producing a giant mouse in the laboratory was possible through
 a) Gene manipulation b) Gene mutation c) Gene synthesis d) Gene duplication
74. Which of the following nematode infects the roots of the tobacco plants which reduce the production of tobacco?
 a) *Wuchereria* b) *Manduca sexta*
 c) *Meloidegyne incognitia* d) *Enterbius*
75. 'Roise' cow known to produce a type of milk which has all the following characteristics
 I. protein content of 2.4 g/L
 II. human α -lactalbumin
 III. more nutritionally balanced for human babies than natural cow milk
 Which of the above statements are correct?
 a) I and II b) I and III c) II and III d) I, II and III
76. The protein toxin producing bacteria, used to control biological pest, is
 a) *E. coli* b) *Agrobacterium* c) *Mycobacterium sp.* d) *B. thuringiensis*
77. Which one of the following is correct explanation for autobiography?
 a) It is used for the detection of mutated genes b) Clone which have mutated genes will no appear on the photographic film
 c) The probe used will have only complementary genes with unmuted protein of DNA d) All of the above
78. A kind of biotechnology involving manipulation of DNA is
 a) DNA replication b) Genetic engineering c) Denaturation d) Renaturation
79. Which one of the following can help in the diagnosis of a genetical disorder?
 a) ELISA b) ABO blood group c) PCR d) NMR
80. A infects the roots of tobacco plants which reduce the production of tobacco
 a) Nematode (*Meloidegyne incognitia*) b) Coleopterans (beetles)
 c) Lepidopterans (armyworm) d) Dipterans (mosquitoes)
81. *Bt* toxins are initially inactive protoxins but after ingestion by the insects their inactive toxin becomes active due to the
 a) Alkaline pH of the gut b) Acidic pH of the gut
 c) Temperature of the gut d) Hormone present in the gut
82. The term 'totipotency' refers to
 a) The capability of organism to regenerate its lost parts
 b) Capability of somatic cells to produce complete organism
 c) The introduction of foreign gene in a cell's DNA
 d) The technique of growing immature embryos
83. Mixture of biogas contains
 a) Carbon dioxide, nitrogen and methane b) Nitrogen, methane and hydrogen
 c) Methane, carbon dioxide and carbon monoxide d) Hydrogen, butane and carbon dioxide
84. An efficient oil eating 'Super bug' developed through genetic engineering used in cleaning of oil-spill polluted sites is a species of
 a) *Arthrobacter* b) *Citrobacter* c) *Pseudomonas* d) *Thiobacillus*
85. Consider the following statements
 I. *Flavr savr* is a genetically modified tomato, which remains fresh and retains its flavour much longer

than the normal tomato due to blocking of synthesis of fruit softening enzyme polygalacturonase

II. Recently, the US Government has patented the Indian 'basmati' rice as Rice-tec

III. Viruses, bacteria and some other harmful organisms can be used as bioweapons in biological warfare

Which of the statements given above are correct?

- a) I and II b) I and III c) II and III d) I, II and III

86. DNA fingerprinting refers to

- a) Molecular analysis of profiles of DNA samples
 b) Analysis of DNA samples using imprinting device
 c) Techniques used for molecular analysis of different specimens of DNA
 d) Techniques used for identification of fingerprints of individuals

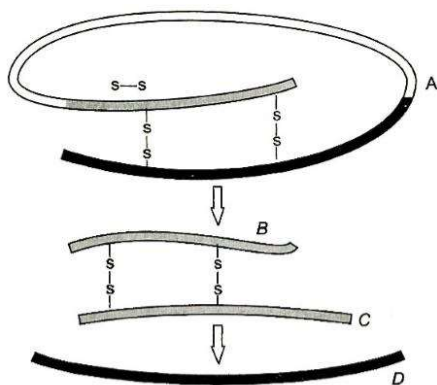
87. Insect resistant transgenic cotton has been produced by inserting a piece of DNA from

- a) An insect b) A bacterium
 c) A wild relative of cotton d) A virus

88. Somatic hybrids are produced by

- a) Protoplast fusion b) Tissue culture c) Pollen culture d) Hybridoma process

89. The below diagram show a diagrammatic sketch of maturation of insulin. Select the correct set of the names labelled A, B, C and D



- a) A-A-peptide, B-B-peptide, C-Proinsulin, D-Free C-Peptide
 b) A-Proinsulin, B-A peptide, C-B peptide D-free C-Peptide
 c) A-Free C-Peptide, B-A-peptide, C-B-peptide, D-Proinsulin
 d) A-A-peptide, B-B-peptide, C-Free C-peptide, D-Proinsulin

90. A technology, which has found immense use in solving cases of disputed parentage, is

- a) Polymerase chain reaction b) DNA fingerprinting
 c) Monoclonal antibody production d) Recombinant DNA technology

91. Emasculation is related to

- a) Pureline b) Mass selection c) Clonal selection d) Hybridization

92. An extrachromosomal DNA, which can be used as vector in gene cloning is called

- a) Transposon b) Intron c) Exon d) Plasmid

93. The protein products of the following Bt toxin genes *cryI Ac* and *cryII Ab* are responsible for controlling

- a) Bollworm b) Roundworm c) Moth d) Fruit fly

94. Biopiracy is related to which of the following?

- a) Traditional knowledge b) Biomolecules and regarding bioresources
 c) Bioresources d) All of the above

95. A suitable vector for gene cloning in higher organisms is

- a) Baculovirus b) Retrovirus
 c) *Salmonella typhimurium* d) *Neurospora crassa*

96. A correct pair of characteristic of molecular probe is

- I. a single-stranded DNA or RNA tagged with a radioactive molecule

II. a double-stranded DNA tagged with a radioactive molecule

III. complementary to part of desired gene

IV. small molecule

Which of the above statements are correct?

- a) I and II b) I and III c) II and III d) III and IV

97. The crops having *cry* genes needs

- a) No insecticide b) Small amount of insecticide
c) Large amount of insecticide d) None of the above

98. In the initial stages of protoplast culture, sorbitol/mannitol is added

- a) As an additional source of carbon b) As an additional source of energy
c) To keep cells alive after the removal of cell wall d) As a osmotic stabilizer

99. Important objectives of biotechnology in agriculture section are

- a) To produce pest resistant varieties of plants b) To increase the nitrogen content
c) To decrease the seed number d) To increase the plant weight

100. Which of the following is/are considered as application (s) of biotechnology?

- I. Waste treatment
II. Energy production
III. Bioremediation
IV. Processed food
V. Genetically modified crops for agriculture
VI. Diagnostics
VII. Therapeutics

Choose the correct option

- a) I, II, III, IV and V b) III, V, VI and VII c) I, II, III, V and VII d) All of these

101. The organism, which is used for gene transfer in higher organisms is

- a) *Agrobacterium tumefaciens* b) *E. coli*
c) *Acetobacter aceti* d) *Bacillus thuringiensis*

102. Which of the following statements are false?

- I. Insulin for curing diabetes, used to be extracted from the pancreas of slaughtered pig and cattle
II. Animal insulin is slightly different from the human insulin
III. Animal insulin causes some undesirable side effects such as allergy
IV. Bacteria cannot be made to synthesise insulin from its gene because of the presence of introns

Choose the correct option

- a) I, II and III b) I, III and IV c) II, III and IV d) None of these

103. Which of the following ways are suitable for increasing food production?

- I. Agrochemical based agriculture
II. Organic agriculture
III. Genetically engineered crop-based agriculture

Choose the correct option

- a) I and II b) I and III c) II and III d) I, II and III

104. Green revolution is related to the increase in production of

- a) Better irrigation, fertilizers and pesticides facilities
b) Exploitation of high yielding varieties
c) Intensive cultivation
d) All of the above

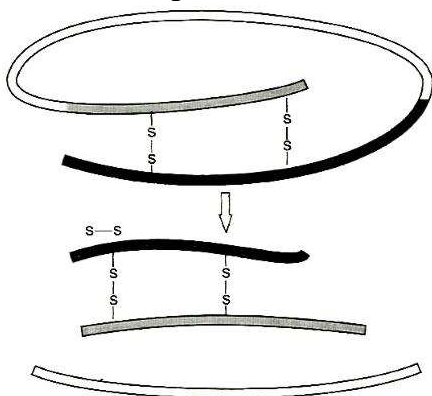
105. Tobacco plant resistant to a nematode have been developed by the introduction of DNA that produces (in the host cells)

- a) An antifeedant b) Both sense and antisense RNA
c) A particular hormone d) Toxic protein

106. Which one of the following pairs of term/names means one and the same thing?
 a) Gene pool – Genome b) Codon – Gene
 c) Cistron – Triplet d) DNA fingerprinting – DNA profiling
107. At what temperature milk gets pasteurized?
 a) 58°C b) 60°C c) 62°C d) 68°C
108. Continuous addition of sugars in 'fed batch' fermentation is done to
 a) Obtain antibiotics b) Purify enzymes c) Degrade sewage d) Produce methane
109. Genetic engineering has been successfully used for producing
 a) Transgenic mice for testing safety of polio vaccine before use in humans
 b) Transgenic models for studying new treatments for certain cardiac diseases
 c) Transgenic cow-Rosie, which produces high fat milk for making ghee
 d) Animals like bulls for farm work as they have super power
110. Who discovered recombinant DNA (rDNA) technology?
 a) Har Gobind Khurana b) James D Watson
 c) Stanley Cohen and Herbert Boyer d) Walter Sutton and Avery
111. In which of the following method, a probe is allowed to hybridise to its complementary DNA in the clone of cells?
 a) Gene therapy b) Recombinant DNA technology
 c) Polymerase chain reaction d) Enzyme Linked Immuno-Sorbent Assay (ELISA)
112. Which of the following is/are correct about Adenosine Deaminase (ADA) deficiency?
 I. In the absence of adenosine deaminase enzyme, purine metabolism is disturbed and T-lymphocytes fails to function
 II. ADA deficiency is caused by the deletion of the gene for ADA
 III. In some cases, it can be cured by bone marrow transplantation and enzyme replacement therapy. But in both approaches, the patients are not completely cured
 IV. For permanent cure, genes isolated from the bone marrow cells producing ADA at early embryonic stages can be a possible cure
 Which of the above statements are correct?
 a) I, II and III b) II, III and IV c) I, III and IV d) I, II, III and IV
113. Which variety of rice was patented by a US company even through the highest number of varieties of this rice is found in India?
 a) Basmati b) Parmal c) Lerma Roja d) CO-668
114. DNA fingerprinting technique was first developed by
 a) Jeffreys, Wilson and Thien b) Boysen and Jensen
 c) Schleiden and Schwann d) Edward and Steptoe
115. Both in callus and suspension cultures commonly used auxin is
 a) Napthalene acetic acid b) Indole-3 butyric acid
 c) 2, 4, 5- trichlorophenoxy acetic acid d) Dichlorophenoxy acetic acid (2, 4,-D)
116. A drug obtained through genetic engineering and useful for treating infertility is
 a) Calcitonin b) Chorionic gonadotropin
 c) Interleukin d) Tissue plasminogen activator
117. According to NCERT text which Indian plants have either been patented or attempts have been made to patent them by Western nations for their commercial use?
 I. Basmati rice II. Neem
 III. Turmic IV. Tulsi
 a) I and II b) I and III c) I, II and III d) I, II, III and IV
118. Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called
 a) Genetically modified organisms b) Hybrid organisms
 c) Pest resistant organisms d) Insect resistant organisms

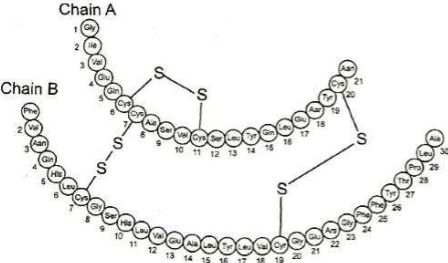
119. *Bt* toxin gene have been expressed in plant in order to provide resistance against
- I. tobacco budworm and armyworm
 - II. beetles
 - III. flies and mosquitoes
- Choose the correct option
- a) I and II
 - b) I and III
 - c) II and III
 - d) I, II and III
120. Somaclonal variation is seen in
- a) Tissue culture grown plants
 - b) Apomicts
 - c) Polyploids
 - d) Vegetatively propagated plants
121. 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' – CGTTTCG – 3'
3' – ATCGTA – 5'
 - b) 5' – GATATG – 3'
3' – CTAATA – 5'
 - c) 5' – GAATTC – 3'
3' – CTTAAG – 5'
 - d) 5' – CACGTA – 3'
3' – CTCAGT – 5'
122. Crop plants grown in monoculture are
- a) Low in yield
 - b) Free from intraspecific competition
 - c) Characterized by poor root system
 - d) Highly prone to pests
123. Agrochemical based agriculture includes
- a) Fertilisers and pesticides
 - b) Genetically modified crops
 - c) RNA interference
 - d) DNA interference
124. An improved variety of transgenic basmati rice
- a) Does not require chemical fertilizers and growth hormones
 - b) Gives high yield and is rich in vitamin-A
 - c) Is completely resistant to all insect pests and diseases of paddy
 - d) Gives high yield but has no characteristic aroma
125. Plants are more rapidly manipulated by genetic engineering than animals due to
- a) Single somatic cell, which can regenerate a whole plant body
 - b) A group of somatic cells, which can regenerate a whole plant body
 - c) May be (a) or (b)
 - d) None of the above
126. Test tube baby means, a baby born when
- a) The ovum is fertilized externally and thereafter implanted in the uterus
 - b) It develops from a non-fertilized egg
 - c) It is developed in a test-tube
 - d) It is developed through tissue culture method
127. 'Silencing of *mRNA* molecule' in order to control the production of a harmful protein has been used in the protection of plants from
- a) Beetles
 - b) Armyworm
 - c) Budworm
 - d) Nematodes
128. *Bt* corn the been made resistant from corn borer disease by the introduction of the gene
- a) *CryI Ac*
 - b) *CryII Ab*
 - c) *CryI Ab*
 - d) *CryII Ac*
129. Genetically engineered bovine (bSI), sometimes called rbST (recombinant bovine somatotropin) or rbGH (recombinant bovine growth hormone) are used in the
- a) Therapeutic drugs
 - b) Agriculture
 - c) Dairy industry
 - d) DNA fingerprinting
130. Which one of the following is a correct statement?
- a) '*Bt* in '*Bt* cotton' indicates that it is a genetically modified organism produced through biotechnology
 - b) Somatic hybridization involves fusion of two complete plant cells carrying desired genes
 - c) The anticoagulant hirudin is being produced from transgenic *Brassica napus* seeds
 - d) '*Flavr savr*' variety of tomato has enhanced the production of ethylene, which improves its taste
131. Biopatents means
- a) Right to use an invention
 - b) Right to use biological resources

- c) Right to use applications
d) Right to use processes
132. A USA patent was taken for
a) Basmati rice b) Lerma Roja c) CO-668 d) Sharbati Sonara
133. Find the incorrect statement.
a) Gene therapy is a genetic engineering technique used to treat disease at molecular level by replacing defective genes with normal genes
b) Calcitonin is a medically useful recombinant product in the treatment of infertility
c) Bt toxin is biodegradable insecticide obtained from *bacillus*
d) *Trichoderma* sp. Is a biocontrol agent for fungal diseases of plants
134. Some of the characteristics of *Bt* cotton are
a) Long fibre and resistance to aphids
b) Medium yield, long fibre and resistance to beetle pests
c) High yield and production of toxic protein crystals which kill dipteran pests
d) High yield and resistance to bollworms
135. The below diagram shows



- a) Maturation of pro-insulin into insulin b) Method of pro-insulin formation
c) Gene therapy d) Enzyme replacement therapy
136. Solution of polyethylene glycol (PEG) or a very brief high voltage electric current is used in fusion of
a) Protoplasts b) Protoplasts c) Somatic cells d) Germinal cells
137. Transgenic animals are developed by
a) Introducing foreign genes b) Introducing gene mutations
c) Deleting certain chromosomes parts d) Stopping spindle formation
138. Correct chronological order of the steps occurring during gene therapy are
I. Lymphocytes are obtained from the patients
II. Lymphocytes are transferred to the culture dishes
III. Lymphocytes are transfected with the normal ADA genes
IV. The transfected cell are returned to the patients
The chronological order should be
a) I, II, III and IV b) II, I, III and IV c) I, III, II and IV d) III, II, IV and I
139. Maximum application of animal cell culture technology today is in the production of
a) Vaccines b) Edible proteins c) Insulin d) Interferons
140. Manipulation of DNA in genetic engineering become easy due to invention of
a) Polymerase chain reaction b) Dot blot
c) Enzyme linked immune sorbent assay d) Eastern blotting
141. *Cry II Ab* and *cry I Ab* produce toxins that control
a) Cotton bollworms and corn borer respectively
b) Corn borer and cotton bollworms respectively
c) Tobacco budworms and nematodes respectively

- d) Nematodes and tobacco budworms respectively
142. Genetically engineered bacteria are being employed for production of
 a) Thyroxine b) Human insulin c) Cortisol d) Epinephrine
143. Micropropagation is a technique for production of
 a) True type plants b) Haploid plants c) Somatic hybrids d) Somaclonal plants
144. Which of the following radioisotope is not suitable for DNA labeling based studies?
 a) H³ b) P³² c) N¹⁵ d) S³⁵
145. Gene therapy in humans was first practiced by Blease and Andresco to cure
 a) Cystic fibrosis
 b) Haemophilia
 c) Thalassaemia
 d) Severe Combined Immuno Deficiency Disease
146. For production of haploids, we culture
 a) Shoot tip b) Anther c) Root tip d) None of these
147. Differentiation of organs and tissues in a developing organism, is associated with
 a) Developmental mutations b) Differential expression of genes
 c) Lethal mutations d) Deletion of genes
148. How many varieties of rice has been estimated to be present in India?
 a) 2200 b) 20000 c) 200000 d) 2000000
149. Who discovered that restriction enzymes have the capability of cutting DNA strands in a particular fashion, which left what has become known as 'sticky ends' on the strads?
 a) Ramdeo Mishra b) Stanley Cohen c) Herbert Boyer d) James D Watson
150. A cybrid is hybrid carrying
 a) Genomes and cytoplasms of two different plants
 b) Cytoplasms of two different plants
 c) Cytoplasms of two different plants but genome of one plant
 d) Genomes of two different plants
151. Which of the following is correctly matched?
 a) *Agrobacterium tumefaciens* – Tumour b) *Thermos aquaticus* – *Bt-gene*
 c) pBR322 – Enzyme d) Ligase – Molecular scissors
152. Which of the following shows correct chronological order of the events occurring during callus culture?
 a) Callus → Cell division → Explant → Addition of cytokinin → Cells acquire meristematic property
 b) Explant → Callus → Cell division → Addition of cytokinin → Cells acquire meristematic property
 c) Explants → Cell division → Callus → Addition of cytokinin → Cells acquire meristematic property
 d) Callus → Explant → Cell division → Addition of cytokinin → Cells acquire meristematic property
153. *Bt* toxin is
 a) Intracellular crystalline protein b) Extracellular crystalline protein
 c) Intracellular monosaccharide d) Extracellular polysaccharide
154. A major use of embryo culture is in
 a) Production of alkaloids b) Clonal propagation
 c) Induction of somaclonal variations d) Overcoming hybridization barriers
155. Which one of the following hydrolyses internal phosphodiester bonds in a polynucleotide chain?
 a) Lipase b) Exonuclease c) Endonuclease d) Protease
156. White revolution is related to the increase in production
 a) Egg b) Milk c) Meat d) Wool
157. What is true about *Bt* toxin?
 a) The inactive protoxin gets converted into active form in the insect gut
 b) *Bt* protein exists as active toxin in the *Bacillus*
 c) The activated toxin enters the ovaries of the pest to sterilize it and thus, prevent its multiplication

- d) The concerned Bacillus has antitoxins
158. In recombinant DNA technique, the term vector refers to
- Donor DNA, is identified and picked up through electrophoresis
 - Plasmid, transfers DNA into living cell
 - Collection of entire genome in form of plasmid
 - Enzyme, cuts the DNA at specific sites
159. A plant species which has been exploited for the production of hirudin is
- Brassica napus*
 - Zea mays*
 - Solanun nigrum*
 - Oryza sativa*
160. The aims and objectives of Genetic Engineering Approval Committee are
- To permit the use of genetically modified organisms and their product for commercial applications
 - To adopt the procedures for restriction, production and application of GM organisms
 - approval to conduct large scale field trails and release of transgenic crops in the environment
- Which of the statements are given above are correct?
- I and II
 - I and III
 - II and III
 - I, II and III
161. Identify the figure given below
- 
- Glyphosphatase
 - Insulin
 - TPA
 - Erythropoietin
162. *Bt* cotton is not
- a GM plant
 - Insect resistant
 - A bacterial gene expressing system
 - Resistant to all pesticides
163. Which of the following is/are true?
- Biowar is the use of biological weapons against humans and/or their crops and animals.
 - Bioethics is the unauthorized use of bioresources and traditional knowledge related to bioresources for commercial benefits.
 - Biopatent is exploitation of bioresources of other nations without proper authorization.
- II only
 - I only
 - I and II
 - I and III
164. Alec Jeffreys developed the DNA fingerprinting technique. The probe he used was
- Ribozyme
 - Sex chromosomes
 - SNP
 - VNTR
165. ADA is an enzyme, which is found lacking in a genetic disorder SCID. What is the full form of ADA?
- Adenosine Deoxyaminase
 - Adenosine Deaminase
 - Aspartate Deaminase
 - Arginine Deaminase
166. Cellular totipotency is demonstrated by
- All eukaryotic cells
 - Only bacterial cells
 - Only gymnosperm cells
 - All plant cells
167. The problem of blindness in poor countries can be taken care of by using which of the following?
- Golden rice
 - Transgenic tomato
 - Transgenic maize
 - Bt* brinjal
168. Consider the following statements about the responsibility of GEAC (set-up by the Indian Government)
- GEAC make decisions regarding the validity of the GM research
 - It checks the safety of introducing GM organisms for the public services for their large scale use
- Which of the statements given above is/are correct?
- Only I
 - Only II
 - I and II
 - None of these
169. All are the biotechnological application in order to increase food production, except
- Pisciculture
 - Agro-chemical based agriculture

- c) Organic-agriculture
 d) Genetically engineered crop-based agriculture
170. Which of the following is false for Bt transgenic plant?
 a) Disease resistance
 b) Prepared by *Bacillus thuringiensis*
 c) It is recombinant type
 d) No such plant is known
171. DNA fingerprinting technique was discovered by
 a) Wilmut
 b) A Jeffreys
 c) Ethoven
 d) Kary Mullis
172. C-peptide of human insulin is
 a) A part of mature insulin molecule
 b) Responsible for the formation of disulphide bridges
 c) Removed during the maturation of pro-insulin to insulin
 d) Responsible for its biological activity
173. Consider the following statements about therapeutic drugs
 I. The recombinant DNA technology is used for production of therapeutic drugs which are safe and effective
 II. It avoid unwanted immunological responses, commonly observed with similar products isolated from non-human sources
 III. About thirty recombinant therapeutics have been approved for human use in the world including India
 Which of the statements given above are correct?
 a) I and II
 b) I and III
 c) II and III
 d) I, II and III
174. Choose a correct option for the uses of PCR technique in diagnosis
 I. It is used to detect HIV in suspected AIDS patients
 II. It is used to detect mutations in the genes in suspected cancer patients
 III. It is used to detect swine flu in human beings
 IV. It is used to detect different common diseases in pigs, sheep and cow
 V. It is a good technique to identify many other genetic disorders
 Which of the above statements are correct?
 a) I and II
 b) III and IV
 c) I, II and V
 d) II, III and IV
175. What might be an advantage of beginning gene therapy prior to birth?
 a) This would give the body plenty of time
 b) The body would not reject it as it has not yet recognised 'self'
 c) The cells being extremely young are more receptive of gene therapy
 d) There probably is not any advantage
176. Which of the following transgenic animals are used in testing safety of polio vaccine before they are used on human?
 a) Transgenic cow
 b) Transgenic monkey
 c) Transgenic mice
 d) Transgenic sheep
177. Which Indian plants have either been patented or attempts have been made to patent them by Western nations for their use?
 a) Basmati rice
 b) Turmeric
 c) Neem
 d) All of these
178. The T_i – plasmid, is often used for making transgenic plants. This plasmid is found in
 a) *Azotobacter*
 b) *Rhizobium* of the roots of leguminous plants
 c) *Agrobacterium*
 d) Yeast as a 2 µm plasmid
179. Which step was proved to be the main challenge in the production of human insulin by recombinant DNA technology?
 a) Splitting A and B-peptide chain
 b) Addition of C-peptide to proinsulin
 c) Getting insulin assembled into mature form
 d) Removal of C-peptide from active insulin
180. A nutritionally wild type organism, which does not required any additional growth supplement is known as
 a) Phenotype
 b) Holotype
 c) Auxotroph
 d) Prototroph
181. PCR is used to

- a) Detect HIV in suspended AIDS patients
 b) Detect mutations in the genes in suspended cancer patients
 c) Diagnose many genetic disorders
 d) All of the above
182. The technique that was employed to produce haploids of *Datura* was
 a) Meristem culture b) Anther culture c) Embryo culture d) Protoplast culture
183. Find out the wrong statement.
 a) Mobile genetic elements, transposons were visualized by Barbara McClintock
 b) Udder cell, a somatic cell is used to produce the cloned sheep by nuclear transplantation method
 c) In pedigree analysis, a person immediately affected by an action is called propositus
 d) DNA ligases are used to cleave a DNA molecule
184. Phytotron is
 a) A controlled condition chamber for tissue culture
 b) Leaf culture process
 c) Special culture of plants
 d) Root culture process
185. Which of the following bio-engineered bacteria is utilized for cleaning of marine oil slicks?
 a) *Escherichia coli* b) *Pseudomonas syringae*
 c) *Pseudomonas putida* d) *Rhizoctonia solani*
186. The RNAi stands for
 a) RNA interference b) RNA interferon c) RNA inactivation d) RNA initiation
187. Which of the following peptide chain is removed during the maturation of proinsulin into insulin?
 a) A-chain (21 amino acid) b) B-chain (30 amino acid)
 c) C-chain (33 amino acid) d) A and B chain
188. Which of the following is obtained from genetic engineering?
 a) Haemoglobin b) Glucose c) Golden rice d) None of these
189. The enzyme employed for amplification of DNA during PCR is commercially obtained from
 a) *Streptococcus pyogenes* b) *Bacillus licheniformis*
 c) *Trichoderma reesi* d) *Thermos aquaticus*
190. A genetically engineered microorganism used successfully in bioremediation of oil spills, is a species of
 a) *Pseudomonas* b) *Trichoderma* c) *Xanthomonas* d) *Bacillus*
191. The vector for T-DNA is
 a) *Thermos aquaticus* b) *Salmonella typhimurium*
 c) *Agrobacterium tumefaciens* d) *Escherichia coli*
192. What is true for plasmid?
 a) Found in viruses b) Contains genes for vital activities
 c) Part of nuclear chromosome d) Widely used in gene transfer
193. β -carotene is a principal source of
 a) Vitamin-A b) Vitamin-B c) Vitamin-C d) Vitamin-D
194. Consider the following statements
 I. Earlier, insulin was extracted from pancreas of slaughtered cattle and pigs which was more efficient than the genetically engineered insulin
 II. PCR technique is being used for the detection of HIV in suspected AIDS patients and genetic mutations in suspected cancer patients
 III. Cystic fibrosis, haemophilia, cancer, Parkinson's etc., are treated by gene therapy
 Which of the statements given above are correct?
 a) I and II b) I and III c) II and III d) I, II and III
195. A single strand of nucleic acid tagged with a radioactive molecule is called
 a) Plasmid b) Vector c) Probe d) Selectable marker

196. Product of biotechnology is
a) Transgenic crops (GM crops) b) Humulin
c) Biofertilizer d) All of the above
197. Cultivation of *Bt* cotton has been much in the news. The prefix *Bt* means
a) Barium-treated cotton seeds
b) Bigger thread variety of cotton with better tensile strength
c) Produced by biotechnology using restriction enzymes and ligases
d) Carrying an endotoxin gene from *Bacillus thuringiensis*
198. Enzyme that is used in PCR technology is
a) *Taq polymerase* b) Polymerase c) Helicase d) Reverse transcriptase
199. Transgenic animals are those which have foreign
a) DNA in some of its cells b) DNA in all its cells
c) RNA in all of its cells d) RNA in some of its cells
200. The application of biotechnology includes all except
a) Waste treatment
b) Energy production
c) Genetically modified crops
d) Conventional hybridization
201. A strain of golden rice contains high contents of
a) Vitamin-A b) Vitamin-K c) Vitamin-E d) Vitamin-C
202. 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
203. Which one of the following is the most suitable, medium for culture of *Drosophila melanogaster*?
a) Moist bread b) Agar agar c) Ripe banana d) Cow dung
204. Technique used to detect the DNA in a clone is called
a) Gel electrophoresis b) Polymerase chain reaction
c) Gene therapy d) Autoradiography
205. Genetic engineering is related with
a) Eugenics b) Euphenics c) Euthenics d) All of these
206. In 1983, Eli Lilly an American company, first prepared two DNA sequences corresponding to A and B-chains of the human insulin and introduced them in the plasmids of *Escherchia coli* to produce insulin chains. Chains A and B were prepared separately, extracted and combined by creating
a) Hydrogen bond b) Disulphide bond c) Covalent bond d) Peptide bond
207. The nucellar embryos were first produced by tissue culture technique in
a) *Citrus mexima* b) *Citrus reticulate* c) *Citrus microcarpa* d) Citrus limon
208. Restriction endonucleases are
a) Present in mammalian cells for degradation of DNA when the cell dies
b) Used in genetic engineering for ligating two DNA molecules
c) Used for in *vitro* DNA synthesis
d) Synthesized by bacteria as part of their defence mechanism
209. The method of growing micro-organisms as a thin layer on nutrient medium is known as
a) Suspended growth system b) Support growth system
c) Thin layer growth system d) All of the above
210. Kohler and Milstein developed a method in biotechnology for the production of
a) Myelomas b) Steroid conversion
c) Monoclonal antibodies d) immobilised enzymes

211. Maximum utilization of biotechnological techniques has been made in the field of
 a) Industries b) Medicines c) Agriculture d) Biogas production
212. The haploid content of human DNA is
 a) 3.3×10^6 bp b) 3.3×10^9 bp c) 4.6×10^6 bp d) 6.6×10^9 bp
213. A novel strategy was adopted to prevent *Meloidegyne incognitia* infection in tobacco plants that was based on the process of
 a) DNA interference b) RNA interference c) RNA initiation d) DNA initiation
214. The term "Test Tube Baby" implies that
 a) Fertilization of ovum takes place in the uterus but develops in the test-tube
 b) Fertilization of ovum takes place in the test-tube but it develops in test-tube itself
 c) Fertilization of ovum takes place in the test-tube but it develops in the uterus
 d) Fertilization of ovum takes place in the uterus and embryo develops I the uterus
215. Human insulin is being commercially produced from a transgenic species of
 a) *Escherichia coli* b) *Mycobacterium* c) *Rhizobium* d) *saccharomyces*
216. The process of RNA interference has been used in the development of plants resistance to
 a) Armyworm b) *Meloidegyne incognitia*
 c) *Enterobius* d) Beetles
217. *Bacillus thuringiensis* (*Bt*) strains have been used for designing novel
 a) Biofertilisers b) Bio-metallurgical techniques
 c) Bio-mineralisation processes d) Bio-insecticidal plants
218. *Bacillus thuringiensis* is a bacterium of
 a) Dirty water b) Skin of cat c) Soil d) Surface of midgut
219. Which one of the following techniques has helped to solve many mysteries involving murders, robberies and rapes?
 a) Gene splicing b) Computer technology
 c) DNA fingerprinting d) Gene cloning
220. Which one of the following bacterium is used for production of transgenic plants?
 a) *Escherichia coli* b) *Bacillus thuringiensis*
 c) *Staphylococcus aureus* d) *Agrobacterium tumefaciens*
221. Agarose extracted from sea weeds finds use in
 a) Tissue culture b) PCR c) Gel electrophoresis d) Spectrophotometry
222. The inherent capacity of a cell to regenerate a new whole organism is called
 a) Ontogeny b) Totipotency c) Phylogeny d) Proliferation
223. Axenic culture is
 a) Pure culture of a microbe without any nutrient b) Pure culture without any contamination
 c) Culture of tissue d) Culture of gene
224. Golden rice is a transgenic variety of rice which contains good quantities of
 a) β -carotene (pro-vitamin-A) b) α -carotene (pro-vitamin-A)
 c) γ -carotene (pro-vitamin-B) d) All of the above
225. An institution, where valuable plant material likely to become irretrievably lost in the wild or in cultivation is preserved in viable condition is known as
 a) Genome b) Gene library c) Gene bank d) Herbarium
226. Which of the following technique is based on the principle of antigen-antibody interaction?
 a) PCR
 b) ELISA
 c) Recombinant DNA technology
 d) Gene therapy
227. Basmati is unique for its aroma and flavour, whose A... varieties are cultivated in B...
 Here A and B refers to

- a) A-27; B-America b) A-30; B-America c) A-27; B-India d) A-30; B-India
228. Which one of the following bacteria has found extensive use in genetic engineering work in plants?
 a) *Bacillus coagulans* b) *Xanthomonas citri*
 c) *Clostridium septicum* d) *Agrobacterium tumefaciens*
229. Through which method more number of female plants can be produced in papaya?
 a) Spraying ethephon b) Genetic engineering c) Polyploidy breeding d) Tissue culture
230. Which one of the following gene is defective in patients suffering from Severe Combined Immunodeficiency Disease (SCID)?
 a) Adenosine deaminase b) Glutamate dehydrogenase
 c) DNAase d) Tyrosine oxidase
231. A transgenic food crop, which may help in solving the problem of night blindness in developing countries is
 a) *Flavr savr tomatoes* b) Starlink maize c) *Bt soybean* d) Golden rice
232. Blood stains are found at the site of a murder. If DNA profiling technique is to be used for identifying the criminal, which of the following is ideal for use?
 a) Serum b) Erythrocytes c) Leucocytes d) Platelets
233. A probe which is a molecule 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 ssDNA but not ssRNA
234. Which of the following pairs are correctly matched?
 a) Central dogma – Codon b) Okazaki fragments – RNA primer
 c) RNA polymerase – RNA primer d) Restriction enzyme – Genetic engineering
235. Which one of the following is commonly used in transfer of foreign DNA into crop plants?
 a) *Trichoderma harzianum* b) *Meloidogyne incognita*
 c) *Agrobacterium tumefaciens* d) *Penicillium expansum*
236. Production of value added products like nutrition supplements, pharmaceuticals, fuels, etc., using transgenic crop is called
 a) Genetic farming b) Molecular farming c) Biotech farming d) All of these
237. Multicellular organisms that carries a specific genetic change in each cell because of an intervention at the fertilized egg stage is a
 a) Transversion b) Transition c) Transgenic d) Transformant
238. Polyethylene glycol method is used for
 a) Gene transfer without a vector b) Biodiesel production
 c) Seedless fruit production d) Energy production from sewage
239. The site of the production of ADA in the body is
 a) Bone marrow b) Lymphocytes c) Blood plasma d) Monocytes
240. First genetically modified plants commercially released in India is
 a) Golden rice b) Slow ripening tomato
 c) *Bt* brinjal d) *Bt* cotton
241. Which one of the following molecular diagnostic technique is used to detect the presence of a pathogen in its early stage of infection?
 a) Angiography b) Radiography
 c) Enzyme replacement technique d) Polymerase Chain Reaction (PCR)
242. First hormone prepared by genetic engineering is
 a) Oxytocin b) Somatotropin c) Adrenaline d) Insulin
243. First hormone produced artificially by culture bacteria, is

- a) Insulin b) Thyroxine c) Testosterone d) Adrenaline
244. In transgenics, expression of transgene in target tissue is determined by
a) Enhancer b) Transgene c) Promoter d) Reporter
245. Genomic DNA library means
a) A collection of literature about DNA b) A collection of organisms for extracting DNA
c) Packing of donor DNA in a collection of vectors d) A collection of gene vectors
246. The characteristics of a molecular probe are
I. Very long molecule
II. Double-stranded
III. DNA or RNA
IV. Complementary to a part of desired gene
The correct pair is
a) I and II b) II and III c) III and IV d) IV and I
247. A monopoly granted to a person who has either invented a new and useful article, made improvement in an existing article or invented a new process of making an article is called
a) Bioethics b) Patent
c) Biopiracy d) Genetic recombination
248. Choose the correct option about agrochemicals
a) These are expensive for farmers in developing countries
b) Also have harmful effects on environment
c) Genetically modified crops are less expensive than agrochemicals
d) All of the above
249. Some organisations and multinational companies patent biological resources of other nations without proper authorization from the countries concerned, this is called
a) Bioweapon b) Biopiracy c) Bioethics d) Bio patient
250. Which one of the following is a 'man made cereal' not found in nature?
a) *Triticale* b) Hybrid maize c) Dwarf wheat d) Soyabean
251. What is the demerit of using bovine insulin (from cow) and porcine insulin (from pig) in diabetic patients?
a) It leads to hypercalcemia
b) It is expensive
c) It may cause allergic reactions
d) It may lead to mutations in human genome
252. The tumour inducing capacity of *Agrobacterium tumefaciens* is located in large extra chromosomal plasmids called
a) R_i – plasmid b) Lambda phage c) pBR 322 d) T_i – plasmid
253. Choose the correct options about Basmati rice
I. In 1997, an American company got patent rights for Basmati rice through the US Patent and Trademark office and was allowed to sell a 'new variety' in US and abroad
II. This new variety of Basmati was derived from Chinese farmer's varieties
III. Indian Basmati was crossed with semidwarf varieties and claimed as an invention or a novelty
Which of the above statements are correct?
a) I and II b) I and III c) II and III d) I, II and III
254. Genetically engineered human insulin, humulin was launched by American drug company on
a) 5th July 1998 b) 5th July 1993 c) 5th July 1973 d) 5th July 1983
255. Which of the following is not a restriction endonuclease?
a) *Eco* RI b) *Hind* III c) *Pst* I d) DNAse I
256. The totipotency of a cell refers to the
a) Flowering in a culture medium
b) Development of fruit from a flower in a culture medium

- c) Development of an organ from a cell in culture medium
 d) Development of all tissues of all kinds from a cell in a culture medium
257. The anticoagulant hirudin is obtained from
 a) Ti plasmid of *Agrobacterium*
 b) Bt toxin produced by cry gene
 c) Seeds of *Brassica napus*
 d) None of the above
258. Restriction enzymes are used to cut
 a) Single stranded RNA
 b) Double stranded DNA
 c) Single stranded DNA
 d) Double stranded RNA
259. When a person with defective Adenosine Deaminase (ADA) was treated, which of the following steps were performing for gene therapy?
 I. Lymphocytes were extracted from the bone marrow of the patient
 II. Lymphocytes were grown in a culture out side the body
 III. Lymphocytes were transfected with the normal ADA genes
 IV. The transfected cells were returned to the patients
 a) I, II and III
 b) I, III and IV
 c) II, III and IV
 d) I, II, III and IV
260. DNA or RNA segment tagged with a radioactive molecule is called
 a) Vector
 b) Probe
 c) Clone
 d) Plasmid
261. Consider the following statements
 I. *Bt* toxin gene has been cloned from the bacteria
 II. Genetic engineering works only on animals and has not yet been successfully used on plants
 III. Strains of *Bacillus thuringiensis* are used in producing bioinsecticidal plants
 Which of the statements given above are correct?
 a) I and II
 b) I and III
 c) II and III
 d) I, II and III
262. There is a restriction endonuclease called Eco RI. What does 'co' part in it stand for?
 a) Coelom
 b) Coenzyme
 c) *Coli*
 d) Colon
263. Animals whose DNA is manipulated to possess and express an extra (foreign) gene are known as
 a) Transgenic animal
 b) Hybrid animal
 c) Transversion animal
 d) All of these
264. Which of the following terms is used to describe the component isolated from a plant, for in vitro culturing in the specific medium?
 a) Callus
 b) Embryoid
 c) Synthetic seeds
 d) Explant
265. Which of the following is a transgenic plant?
 a) Hirudin
 b) *Flavr savr*
 c) *Triticale*
 d) All of these
266. *Bt* cotton is resistant to
 a) Herbicides
 b) Drought
 c) Cold
 d) Insects
267. A doctor, while operating on an HIV⁺ patient accidentally cut himself with a scalpel. He comes to you, suspecting himself to have contacted the virus. Which test will you advise him to rule out/confirm his suspicion?
 a) PCR
 b) Routine urine examination
 c) TLC
 d) DLC
268. Golden rice is a promising transgenic crop. When released for cultivation, it will help in
 a) Producing a petrol like fuel from rice
 b) Alleviation of vitamin-A deficiency
 c) Pest resistance
 d) Herbicide tolerance
269. Natural genetic engineer is
 a) *Bacillus subtilis*
 b) *Pseudomonas sp*
 c) *Escherichia coli*
 d) *Agrobacterium tumefaciens*
270. Consider the following statements about 'Rosie'
 I. Rosie is a first transgenic cow

II. Rosie produced human protein enriched milk

III. The milk contained the human α -lactalbumin and scientist behind the research believes that the milk from the cow could provide an alternative to human breast milk

Which of the statements given above are correct?

- a) I and II b) I and III c) II and III d) I, II and III

271. An example of gene therapy is

- a) Production of injectible hepatitis-A vaccine b) Introduction of the genes for adenosine deaminase in a person suffering from SCID
c) Production of test-tube babies by artificial insemination d) All of the above

272. The process, in which mature differentiated cells reverse to meristematic activity to form callus is called

- a) De-differentiation b) Differentiation c) Cyto-differentiation d) Re-differentiation

273. The first human drug made by using genetic engineering technique was

- a) Insulin b) Paracetamol c) Streptomycin d) None of these

274. In tissue culture, roots can be induced by

- a) Lower concentration of cytokinin and higher concentration of auxins
b) Only cytokinin and no auxins
c) No cytokinin and only auxins
d) Higher concentration of cytokinin and lower concentration of auxins

275. Consider the following statements about insulin

I. Human insulin is made-up of 51 amino acids arranged in two polypeptide chains

II. The two polypeptide chains are interconnected by two disulphide bridges

III. In mammals including humans, insulin is synthesized as a pro-hormone, which contains an extra stretch called the C-peptide

IV. C-peptide is not present in the mature insulin

Which of the statements given above are correct?

- a) I, II and III b) I, III and IV c) II, III and IV d) I, II, III and IV

276. The basis of DNA fingerprinting is

- a) The double helix b) Errors in base sequence
c) Polymorphism in sequence d) DNA replication

277. Which of the following enzymes are used to join bits of DNA?

- a) Ligase b) Primase c) DNA polymerase d) Endonuclease

278. Consider the following statements

I. Transgenic animals are more sensitive to the toxic substance than non-transgenic animals

II. Useful biological products can be produced by introducing into transgenic animals the portion of DNA which codes for a particular product

III. Brazzein is a protein produced by a west African plant, *Pentadiplandra brazzeana* which is approximately 2000 time as sweet as sugar

Which of the statements are given above are correct?

- a) I, II and III b) I and II c) I and III d) None of these

279. The construction of the first recombinant DNA was done by using the native plasmid of

- a) *E. coli* b) *Salmonella typhimurium*
c) *Bacillus thuringiensis* d) Yeast

280. Satellite DNA is useful tool in

- a) Organ transplantation b) Sex determination
c) Forensic science d) Genetic engineering

281. *Bt* tobacco was first cultured to kill

- a) Hornworm b) Bollworm c) Stem borer d) Tobacco budworm

282. Rules of conduct that may be used to regulate our activities in relation to the biological world is called

- a) Bioethics b) Biowar c) Biopiracy d) Biopatent
283. Murashige and Skoog's medium is used for
a) Isolation of fungal strains
b) Culture of bacteria
c) Raising plants through micropropagation
d) Culture of protein rich cyanobacterium *spirulina*
284. Organic farming is the technique of raising crops by the use of
a) Manures b) Biofertilisers c) Resistant varieties d) All of these
285. In crop improvement programmes, virus-free clones can be obtained through
a) Grafting b) Hybridization c) Embryo culture d) Shoot apex culture
286. Plasmids are suitable vectors for gene cloning because
a) These are small circular DNA molecules, which can integrate with host chromosomal DNA
b) These are small circular DNA molecules with their own replication origin site
c) These can shuttle between prokaryotic and eukaryotic cells
d) These often carry antibiotic resistance genes
287. is a collection of methods that allows correction of gene defects diagnosed in a child or embryo
a) Genetic therapy b) Gene therapy c) Molecular diagnosis d) ELISA
288. *Bt* toxin protein crystals present in bacterium *Bacillus thuringiensis*, do not kill the bacteria themselves because
a) Bacteria are resistant to the toxin b) Bacteria enclose toxins in a special sac
c) Toxins occur as inactive protoxins in bacteria d) None of the above
289. Out of the following which is a genetically engineered anti-viral protein?
a) Humulin b) Interferon c) Fumagillin d) Griseofulvin
290. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin-A deficiency?
a) *Flavr savr* tomato b) Canolla c) Golden rice d) *Bt* brinjal
291. Which of the following statements are considered as the advantages of biotechnology?
I. Creation of fermented food
II. Production of pestresistant crops
III. Plants yielding more nutritious and tastier fruits
IV. Production of new types of medicine to fight dangerous disease
Choose the correct option
a) Only IV b) I and III c) I, II and III d) I, II, III and IV
292. The name of first cloned sheep is
a) Dolly b) Polly c) Molley d) Holly
293. Palaeontologists unearthed a human skull during excavation. A small fragment of the scalp tissue was still attached to it. Only little DNA could be extracted from it. If the genes of the ancient man need to be analysed, the best way of getting sufficient amount of DNA from this extract is
a) By hybridizing the DNA with a DNA probe b) By subjection the DNA to polymerase chain reaction
c) By subjecting the DNA to gel electrophoresis d) By treating the DNA with restriction endonucleases
294. Applications, like bioremediation, processed food, therapeutics and diagnostics are related with
a) Biochemistry b) Microbiology c) Biotechnology d) Medical science
295. *Cry I* endotoxins obtained from *Bacillus thuringiensis* are effective against
a) Flies b) Mosquitoes c) Worms d) Nematodes
296. The critical research areas of biotechnology are
I. providing best catalyst as improved organism, usually a microbes or pure enzyme
II. creating optimal conditions by engineering for a catalyst to act

III. down stream processing technologies

IV. Multiple Ovulation Transfer Technology (MOET)

Which of the statements given above the correct?

- a) I and II b) I, II and III c) II, III and IV d) I, II, III and IV

297. *Bacillus thuringiensis* is used to control

- a) Insect pests b) Bacterial pathogen c) Fungal pathogen d) Nematodes

298. This method of finding a gene is used when researchers know very little about the gene they are trying to find. This process results in a complete gene library: a collection of copies of DNA fragments that represent the entire genome of an organism. Identify the method.

- a) Cloning b) Shotgun cloning
c) Gene synthesis cloning d) PCR

299. Part of the plant, which is cultured to obtain virus free clones, is

- a) Leaf b) Root tip c) Shoot tip d) Embryo

300. Which of the following is a plasmid?

- a) pBR322 b) *Bam* HI c) *Sal* I d) *Eco* RI

301. *Bt* toxin is produced by

- a) *Bacillus subtilis* b) *Bacillus thuringiensis*
c) *Bacillus anthracis* d) *Bacillus coccus*

302. Transgenic plants are

- a) Produced by a somatic embryo in artificial medium
b) Generated by introducing foreign DNA into a cell and regenerating a plant from that cell
c) Produced after protoplast fusion in artificial medium
d) Grown in artificial medium after hybridization in the field

303. Which of the following key factors, makes the plasmid, the vector in genetic engineering?

- a) It is resistant to antibiotics b) It is resistant to restriction enzymes
c) Its ability to carry a foreign gene d) Its ability to cause infection in the host

304. The genetic defect-Adenosine Deaminase (ADA) deficiency may be cured permanently by

- a) Periodic infusion of genetically engineered lymphocytes having functional ADA C-DNA
b) Administering adenosine deaminase activators
c) Introducing bone marrow cells producing ADA into
d) Enzyme replacement therapy

305. animals are made to carry genes which make them more sensitive to the toxic substance than other normal animals

- a) Transgenic b) Transversion c) Transition d) Transformant

306. Nucleic acid segment tagged with a radioactive molecule is called

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

307. Who discovered the super bug?

- a) H G Khurana b) Dilip sah
c) Anand Mohan Chakraborty d) Robert Hooke

308. Automated DNA sequencers, work on the principle of the method developed by

- a) Erwin Chargaff b) Maurice Wilkins c) Frederick Sanger d) Francis Crick

309. Biotechnology mainly deals with

- a) Industrial scale production of biopharmaceutical
b) Biological use of genetically modified microbes, fungi, plants and animals
c) Both (a) and (b)
d) None of the above

310. Restriction enzyme was discovered by

- a) Alexander Fleming b) Waksman
c) Berg d) Smith, Nathan and Arber

311. Which of the following techniques serves the purpose of early diagnosis of AIDS, cancer, etc?
I. Polymerase chain reaction
II. Recombinant DNA technology
III. Enzyme linked immune-sorbant assay
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III
312. Adenosine Deaminase (ADA) deficiency can be cured by ...A... and ...B... but it is not fully curative. Here A and B can be
a) A-gene therapy, B-radiation therapy
b) A-bone marrow transplantation, B-enzyme replacement therapy
c) A-organ transplantation, B-hormone replacement therapy
d) A-radiation therapy, B-enzyme replacement therapy
313. Which step has been taken by Government of India to cater to the requirements of patent terms and other emergency provisions in this regards
a) Biopiracy act b) Indian patents bill c) Biowar act d) Bioethics act
314. A regulatory body working under MoEF for the release of transgenic crops is
a) NBPGR b) GEAC c) NSC d) NIPGR
315. A functional ADA cDNA can be introduced into the cells of the patients receiving gene therapy by using vector constituted by
a) *E. coli* b) Retrovirus
c) *Bacillus thuringiensis* d) *Agrobacterium*
316. Gene therapy is
a) A method aim to cure the genetic disorders
b) A method to provide correct version of the defective gene
c) A method to replace a defective gene with a healthy gene
d) All of the above
317. Which of the following could be a permanent cure for treatment of Severe Combined Immuno Deficiency (SCID)?
a) Gene therapy b) Bone marrow transplant
c) Enzyme replacement therapy d) All of the above
318. Hybridomas are result of the fusion of
a) Normal antibody producing cell with myeloma
b) Abnormal antibody producing cell with myeloma
c) Male reproductive cell with myeloma
d) Female reproductive cell with myeloma
319. The first clinical gene therapy was done for the treatment of
a) AIDS
b) Cancer
c) Cystic fibrosis
d) SCID (Servere Combined Immuno Deficiency) resulting from deficiency of ADA
320. Transfer of any gene into a completely different organism can be done through
a) Genetic engineering b) Tissue culture c) Transformation d) None of these
321. Somaclones are obtained by
a) Tissue culture b) Plant breeding c) Irradiation d) Genetic engineering
322. Restriction endonucleases are most widely used in recombinant DNA technology. They are obtained from
a) Bacteriophages b) Bacterial cells c) Plasmids d) All prokaryotic cells
323. T_i plasmids used in genetic engineering is obtained from
a) *Bacillus thuringiensis*
b) *Agrobacterium rhizogenes*

- c) *Agrobacterium tumefaciens*
d) *Pseudomonas syringae*
324. Sterilization of tissue culture medium is done by
a) Autoclaving of medium at 120° for 15 min b) Filtering the medium through fine sieve
c) Mixing the medium with antifungal agents d) Keeping the medium at –20°C
325. In cloning of cattle, a fertilized egg is taken out of the mother's womb and
a) The egg is divided into four pairs of cells, which are implanted into the womb of other cows
b) In the eight cell stage, cells are separated and cultured until small embryos are formed, which are implanted into the womb of other cows
c) In the eight cell stage, the individual cells are separated under electrical field for further development in culture media
d) From this upto eight identical twins can be produced
326. Which of these is used as vector in gene therapy for SCID?
a) Arbovirus b) Rotavirus c) Enterovirus d) Retrovirus
327. About ...A... recombinant therapeutics have been approved for human use the world over. In India, ...B... of these are presently being marketed
Here A and B can be
a) A-30, B-20 b) A-30, B-12 c) A-20, B-10 d) A-25, B-10
328. The mobile genetic element is
a) Transposon b) Mutation c) Endonuclease d) Variation
329. *Bacillus thuringiensis* forms protein crystals which contains a
a) Toxic insecticidal protein b) Non-toxic insecticidal protein
c) Simple protein d) Simple lipids
330. Hardening in tissue culture is
a) Keeping at 30 – 50°C temperature for about 30 minutes
b) Acclimatization tissue culture plants slowly before growing in the field
c) Plunging the vials into water at 37 – 40°C
d) None of the above
331. Pollen grains of a plant, whose $2n = 28$, are cultured to get callus by tissue culture method. What would be the number of chromosomes in the cells of the callus?
a) 28 b) 21 c) 14 d) 56
332. Transgenic animals are produced for which of the following purposes?
I. To study the normal physiology and development
II. To study diseases
III. To obtain useful biological products
IV. To test the vaccine safety
V. To test the chemical safety
Which of the above statements are correct?
a) I, II and III b) II, III and IV c) I, II, III and V d) I, II, III, IV and V
333. Choose the correct statement with reference to 'Dolly'
a) She was created by taking nucleus from unfertilized eggs and cytoplasm from fertilized eggs
b) She was created by taking nucleus from udder cells and cytoplasm from unfertilized egg
c) She was created by taking cytoplasm from udder cell and nucleus from unfertilized egg
d) She was created by taking cytoplasm from udder cell and nucleus from fertilized egg
334. The callus is not formed in
a) Tissue culture b) Suspension culture c) Clonal propagation d) Sexual reproduction
335. The green revolution succeeded in increasing the yield of crops mainly due to the use of
I. improved varieties of the crops
II. agro-chemicals

III. better management practices

Choose the correct option

- a) I and II b) I and III c) II and III d) I, II and III
336. ELISA is based on
- a) Antigen – antibody interaction b) Antigen – protein interaction
c) Lectin – antibody interaction d) All of the above
337. Manipulation of DNA in genetic engineering became possible due to the discovery of
- a) Restriction endonuclease b) DNA ligase
c) Transcriptase d) Primase
338. Which of the following is used in recombinant DNA technique?
- a) Cell wall of virus b) Gene which produces capsid of virus
c) Virus d) Capsid of virus
339. Which one is regarded as a molecular scissor in biotechnology?
- a) Reverse transcriptase b) Restriction endonuclease
c) *Taq* polymerase d) Topoisomerase
340. In 1997, the first transgenic cow, Rosie produced
- a) Human protein enriched milk (2.4 g/L)
b) Human protein enriched milk (2.8 g/L)
c) Human calcium enriched milk (2.4 g/L)
d) Human calcium enriched milk (2.8 g/L)

