

BIOLOGY

BOOKS - DINESH PUBLICATION

ENGLISH

PRINCIPLES AND APPLICATIONS OF BIOTECHNOLOGY

Mcqs

1. The technique in which a foreign DNA precipitated on the surface of tungsten or gold particles and shot into the target cells is known as

A. Microinjection

B. Electroporation

C. Particle gun

D. Chemical mediated gene transfer.

Answer: C



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2. Molecular scissors, which cut DNA at specific site is

- A. DNA ligase
- B. Restriction endonuclease
- C. DNA polymerase
- D. Reverse transcriptase

Answer: B



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3. Flavr Savr is genetically modified

A. Cotton

B. Rice

C. Tomato

D. Potato

Answer: C



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4. Increased flavourful shelf life of Tomato has been achieved by

A. Developing better storage technique

B. Reducing activity of enzyme
polygalactourinase

C. Promoting activity of enzyme
polygalactourinase

D. Enhancing epidermal growth factor.

Answer: B



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5. Bt cotton is

A. Transgenic plant

B. Mutated plant

C. Cloned plant

D. Hybrid plant

Answer: A



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6. Bt cotton is preferred over other varieties of cotton because of its

A. High yield

B. Quick growth

C. Weedicidal property

D. Resistance to bollworm

Answer: D



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7. Transgenic pigs with genes for human antigens will be useful for

- (a) Providing best human foods
- (b) Resistance to common human disease
- (c) Having all important blood factors
- (d) Organ transplantation

A. Providing best human foods

B. Resistance to common human disease

C. Having all important blood factors

D. Organ transplantation

Answer: D



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8. Bioremediation is

A. Genetically engineered organisms

capable of producing pharmaceuticals

B. Biological control

C. Biopurification of environment

D. Both B and C

Answer: C



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9. Pseudomonas putida cleans

A. Oils spills

B. Sewage

C. Hides

D. None of the above

Answer: A



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10. Frost resistance is obtained from genetically engineered

- A. *Escherichia coli*
- B. *Pseudomonas putida*
- C. *Pseudomonas fluorescens*
- D. *Trichoderma*

Answer: C



11. 'Bt' toxin is

- A. Exotoxin, biodegradable insecticide
- B. Exotoxin nonbiodegradable insecticide
- C. Endotoxin nonbiodegradable insecticide
- D. Endotoxin biodegradable insecticide

Answer: D



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12. Escherichia coli is

- A. Gut bacterium
- B. Soil bacterium
- C. Thermal bacterium
- D. Both A and B

Answer: A



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13. Fungal disease of plants can be overcome by employing genetically modified

A. *Klebsiella*

B. *Rhizobium meliloti*

C. *Trichoderma*

D. *Trametes*

Answer: C



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14. T_i plasmids used in genetic engineering is obtained from

- A. Adding tumour forming genes
- B. Deleting tumour forming genes
- C. Adding genes for endonucleases
- D. Deleting genes for endonucleases

Answer: B



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15. Gene gun can introduced genes into cells with the help of

- (a) Plasmids
- (b) Cosmids
- (c) Microscopic pellets
- (d) Phagemids

A. Plasmids

B. Cosmids

C. Microscopic pellets

D. Phagemids

Answer: C



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16. Which can be used as vector for transfer of genes?

(a) BAC

(b) YAC

(c) Plasmid

(d) All the above

A. BAC

B. YAC

C. Plasmid

D. All the above

Answer: D



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17. Blunt ends of passenger and vehicle DNAs are joined by

A. DNA polymerase I

B. RNA polymerase

C. DNA ligase

D. DNA polymerase III

Answer: C



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18. DNA fragments with sticky ends are not allowed to undergo self ligation by

(a) Unwindase

(b) Single strand binding proteins

(c) Gyrase

(d) Alkaline phosphatase

A. Unwindase

B. Single strand binding proteins

C. Gyrase

D. Alkaline phosphatase

Answer: D



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19. Which one is being produced by genetically altered genes

A. Calcitonin

B. Platelet derived growth factor

C. Erythropoietin

D. All the above

Answer: D



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20. Enzyme adenosine deaminase is deficient in genetic disorder

- A. Alzheimer's disease
- B. Muscular dystrophy
- C. SCID
- D. Colour blindness

Answer: C



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21. Endonucleases break DNA at specific sites called

A. Palindromic sequences

B. Restriction sites

C. Conserved sites

D. Both A and B

Answer: D



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22. Arber, Smith and Nathans are famous for discovery of

- A. Gene therapy
- B. Restriction enzyme
- C. Humulin
- D. Second generation vacciness

Answer: B



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23. Humulin is

A. Carbohydrate

B. Fat

C. Hybridomas

D. Protein

Answer: D



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24. Recombinant DNA technology is also called

- A. Biotechnology
- B. Modern biotechnology
- C. Genetic engineering
- D. Transgenic technology

Answer: C



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25. Recombinant DNA technology developed during

(a) 1970s

(b) 1980s

(c) 1990s

(d) 2000s

A. 1970s

B. 1980s

C. 1990s

D. 2000s

Answer: A



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26. Modern biotechnology is based on

- (a) Protoplast fusion
- (b) Tissue culture
- (c) Recombinant proteins
- (d) Genetic engineering

A. Protoplast fusion

B. Tissue culture

C. Recombinant proteins

D. Genetic engineering

Answer: D



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27. A GM crop is

- (a) Irradiated crop
- (b) Transgenic crop
- (c) Raised on green manure
- (d) A green manure

A. Irradiated crop

B. Transgenic crop

C. Raised on green manure

D. A green manure

Answer: B



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28. Hirudin gene inserted in Brassica napus was

- A. Synthesised chemically
- B. Obtained from leech
- C. Got from *Bacillus thuringiensis*
- D. *Brassica campestris*.

Answer: A



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29. Toxic component of *Bacillus thuringiensis* is

A. Alkaloid

B. Steroid

C. Amino acid

D. Protein

Answer: D



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30. Bt gene is

A. Cry

B. cry

C. Trp

D. trp

Answer: B



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31. Flavr savr variety of Tomato is improved variety developed through

A. Hybridisation between old varieties

B. Hybridisation between a modern variety
and a wild variety

C. Mutation variety

D. Incorporation of a transgene

Answer: D



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32. Flavr Savr' variety of tomato which remains
fresh for a longer period than normal tomato
variety

- A. Has little polygalacturonase
- B. Abundant polygalacturonase
- C. Has gene for antibiotic resistance
- D. Lacks amylase.

Answer: A



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33. Genetically modified food can be harmful because it can cause

A. Allergies and toxicity

B. Incorporation of antibiotic resistance in human beings

C. Disturbance in metabolism due to enzyme for antibiotic resistance

D. All the above

Answer: D



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34. Hybridomas are employed for

- (a) Production of somatic hybrids
- (b) Killing cancer cells
- (c) Synthesis of antibiotics
- (d) Synthesis of monoclonal antibodies

A. Production of somatic hybrids

B. Killing cancer cells

C. Synthesis of antibiotics

D. Synthesis of monoclonal antibodies

Answer: D



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35. Insulin has 51 amino acids arranged in

A. Single polypeptide

B. Two polypeptides of 21 and 30 amino acids

C. Two polypeptides of 25 and 26 amino acids

D. Three polypeptides having 15, 16 and 20 amino acids.

Answer: B



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36. Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because-

- A. Bacteria are resistant to the toxin
- B. Toxin is immature
- C. Toxin is inactive
- D. Bacteria enclose the toxin in special sac.

Answer: C



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Rq

1. Restriction endonuclease is employed for cutting

A. A single stranded DNA

B. Double stranded DNA

C. RNA fragment

D. mRNA

Answer: B



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2. Which enzyme is useful in genetic engineering ?

A. DNA - ase

B. Amylase

C. Lipase

D. Restriction endonuclease

Answer: D



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3. Restriction enzymes are used in genetic engineering because they

- (a) Can join DNA fragments
- (b) Cut DNA at specific base sequence
- (c) Cut DNA at variable sites

(d) Are proteolytic enzymes which degrade harmful proteins

A. Can join DNA fragments

B. Cut DNA at specific base sequence

C. Cut DNA at variable sites

D. Are proteolytic enzymes which degrade harmful proteins.

Answer: B



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4. It is now possible to breed plants and animals with desired characters through

- A. Tissue culture
- B. Genetic engineering
- C. Ikebana technique
- D. Chromosome engineering

Answer: B



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5. Genetic engineering is

- A. Plastic surgery
- B. Addition or removal of genes
- C. Study of extra nuclear genes
- D. All the above

Answer: B



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6. Advancement in genetic engineering has been possible due to

A. Oncogenes

B. Transposons

C. Restriction endonuclease

D. Exonucleases

Answer: C



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7. Genetically engineered bacteria have been used in the commercial production of

- A. Melatonin
- B. Testosterone
- C. Human insulin
- D. Thyroxine

Answer: C



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8. Transgenic plants are developed by

- A. Introducing foreign genes
- B. Introducing gene mutations
- C. Deleting certain chromosome parts
- D. Stopping spindle formation.

Answer: A



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9. Bacteria plasmid contains

(a) RNA

(b) RNA +Protein

(c) DNA

(d) Photosynthetic structures

A. RNA

B. RNA + protein

C. DNA

D. Photosynthetic structures.

Answer: C



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10. Structure involved in genetic engineering is

A. (a) Plastid

B. (b) Restriction endonuclease

C. (c) DNA polymerase I

D. (d) Prochromosome

Answer: B



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11. Plasmids are suitable vectors for gene cloning because

- A. Self replicate in bacterial cells
- B. Replicate freely outside bacterial cells
- C. Can be multiplied in culture
- D. Can be multiplied in laboratories using enzymes.

Answer: A



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12. Chemical knives of DNA are

A. Restriction endonucleases

B. Polymerases

C. Ligases

D. Transcriptases

Answer: A



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13. Two microbes found to be very useful in genetic engineering are-

- A. Rhizobium and Azotobacter
- B. Escherichia and Agrobacterium
- C. Rhizobium and Diplococcus
- D. Nitrosomonas and Klebsiella

Answer: B



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14. Advancement in genetic engineering has been possible due to

- A. Observation of DNA under electron microscope
- B. We can break DNA at specific points by DNA-ases
- C. Availability of restriction endonucleases in purified form
- D. Knowledge of transduction

Answer: C



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15. Restriction endonucleases are enzymes which

A. Used in genetic engineering for uniting
two DNA molecules

B. Used for in vitro DNA synthesis

C. Present in mammalian cells for

degeneration of DNA of dead cells

D. Synthesised by bacteria for their defence

Answer: D



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16. Cloning is a means to

A. Replace original genotype

B. Preserve genotype

C. Production of HGH gene in Escherichia coli

D. None of the above

Answer: B



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17. The technique involving insertion of a desired gene into the DNA of plasmid vector is known as

A. Gene splicing

B. Gene dressing

C. Gene cloning

D. Gene drafting

Answer: A



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18. Which of the following most used in genetic engineering?

A. RNA polymerase

B. DNA polymerase

C. Restriction endonuclease

D. Nuclease

Answer: C



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19. Plasmids are used in genetic engineering because they are

A. Easily available

B. Able to replicate

C. Able to integrate with host chromosome

D. Inert

Answer: B



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20. A bacterium commonly used in plant genetic engineering is :

A. Agrobacterium

B. Corynebacterium

C. Bacillus subtilis

D. Salmonella typhii

Answer: A



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21. Giant mouse has been produced through

A. Tissue culture

B. Gene differentiation

C. Gene manipulation

D. All the above

Answer: C



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22. Which of the following organelles is related to genetic engineering? (A) Plastids (B) Plasmids (C) Mutations (D) Hybrid vigour

- A. Plastid
- B. Plasmid
- C. Heterosis
- D. Mutation

Answer: B



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23. A plasmid

- A. Lives together with chromosomes

B. Shows dependent assortment

C. Can replicate independently

D. Cannot replicate

Answer: C



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24. Restriction endonuclease is used in

A. Tissue culture

B. Genetic engineering

C. Cell fractionation

D. Regeneration of tissues

Answer: B



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25. Which of the following is required to perform polymerase chain reaction ?

A. RNA polymerase

B. Ribonuclease

C. Taq polymerase

D. Endonuclease

Answer: C



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26. Genetic engineering is

A. *Agrobacterium tumefaciens*

B. *Bacillus thuringiensis*

C. *Bacillus amyloliquefaciens*

D. *Salmonella typhimurium*

Answer: A



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27. Restriction enzyme EcoR I cleavages DNA at the sequence

A. AAGCTT

B. AAGTTC

C. GTATATC

D. GAATTC

Answer: D



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28. Thermal cycler is used in

A. Radioactivation

B. Chemical reaction

C. Polymerase chain reaction

D. Enzyme catalysed reactions

Answer: C



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29. Advancement in genetic engineering has been possible due to

- A. Transposons
- B. Endonucleases
- C. Exonucleases
- D. Oncogenes

Answer: B



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30. What is true of plasmids?

- A. Found in viruses
- B. Contains genes for vital activities
- C. Part of nuclear chromosome
- D. Widely used in gene transfer

Answer: D



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31. The enzyme capable of cutting DNA molecule at specific sites is

A. Nuclease

B. Restriction endonuclease

C. Lipase

D. Ligase

Answer: B



32. With the help of DNA ligase donor DNA fragment is joined. It is called

- A. Molecular cloning
- B. Tissue culture
- C. Protoplasmic fusion
- D. Splicing

Answer: A



33. An abnormal gene is replaced by normal gene. It is called

- A. Gene therapy
- B. Cloning
- C. Mutation
- D. None of the above

Answer: A



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34. Endonuclease is employed in

- A. Transcription
- B. Translation
- C. Genetic engineering
- D. DNA replication

Answer: C



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35. Nucleic acid is fragmented by enzyme

A. Ligases

B. Proteases

C. Nucleases

D. Polymerases

Answer: C



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36. Bt cotton has been produced by

A. In situ hybridisation of Bt gene

B. Northern blotting of Bt gene

C. Cloning of Bt gene

D. Southern blotting of Bt gene

Answer: C



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37. Introduction of genetically modified food is not desirable because

- A. It will affect economy of developing countries
- B. The products are less tasty
- C. They are costly
- D. There is danger of entry of toxins and virus in food

Answer: D





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38. In genetic engineering which is used for transfer of genes from one cell to another

A. Vector

B. Probe

C. Plasmid

D. Virus

Answer: A



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39. Transgenic plants are plants having

- A. No gene
- B. Genes in transposition
- C. Genes have no function to perform
- D. Genes of an other organism

Answer: D



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40. Construction of a recombinant, DNA involves (A) cleaving of a recombinant DNA involves with 'endonuclease' alone (B) cleaving DNA segments with 'endonuclease' and rejoining them with 'ligase' (C) cleaving DNA segments with 'ligase' and rejoining them with 'endonuclease' (D) cleaving and rejoining DNA segments with 'ligase' alone

A. Cleaving and rejoining of DNA segments
with endonuclease

B. Cleaving DNA segments with endonuclease and rejoining DNA segments with ligase

C. Cleaving and rejoining DNA segments with ligase

D. Cleaving DNA segments with ligase and rejoining with endonuclease

Answer: B



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41. Identify the vector suitable for cloning long DNA fragments

- A. Phage vector
- B. Bacterial plasmid
- C. Yeast plasmid
- D. Cosmids

Answer: D



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42. Introduction of foreign genes for improving genotype is

- A. Tissue culture
- B. Genetic engineering
- C. Biotechnology
- D. Vernalisation

Answer: B



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43. Removal and insertion of genes is

A. Genetic engineering

B. Biotechnology

C. Gene therapy

D. Cytogenetics

Answer: A



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44. The enzymes commonly used in genetic engineering are :

- A. (a) Restriction endonuclease and polymerase
- B. (b) Endonuclease and ligase
- C. (c) Restriction endonuclease and ligase
- D. (d) Ligase and polymerase.

Answer: C



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45. Genetic engineering is

A. Making artificial genes

B. Hybridisation of DNA

C. Making artificial limbs and diagnostic instruments

D. Production of alcohol by using microorganisms

Answer: B



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46. T_i plasmid transforms cell of

A. Animal

B. Plants

C. Bacteria

D. Fungi

Answer: B



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47. cDNA is

- A. Circular DNA
- B. Coiled DNA
- C. Cytoplasmic DNA
- D. Complementary DNA

Answer: D



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48. DNA segment cleaved by EcoRI is

A. ATTCGA

TAAGCT

B. GAATTC

CTTAAG

C. GCTTAA

CGAATT

D. GTTCAA

CAAGTT

Answer: B



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49. Extrachromosomal DNA used as vector in gene cloning is

A. Transposon

B. Intron

C. Exon

D. Plasmid

Answer: D



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50. Restriction endonucleases are useful in

- A. Breaking DNA at specific sites
- B. Creating sticky ends
- C. Both A and B
- D. Crossing over.

Answer: C



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51. DNA formed from RNA is

A. ADNA

B. BDNA

C. cDNA

D. ZDNA

Answer: C



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52. In transgenics, expression of transgene in target tissue is determined by

- A. Enhancer
- B. Transgene
- C. Promoter
- D. Reporter

Answer: D



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53. Natural genetic engineer is: *Bacillus subtilis* *Pseudomonas* sp. *Escherichia coli*
Agrobacterium tumefaciens

A. *Pseudomonas putida*

B. *Agrobacterium tumefaciens*

C. *Escherichia coli*

D. *Bacillus subtilis*

Answer: B



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54. The Ti plasmid, is often used for making transgenic plants. The plasmid is found in

- A. Azotobacter
- B. Agrobacterium
- C. Rhizobium in leguminous root
- D. Yeast

Answer: B



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55. Bt in popular Bt-Cotton/Brinjal stands for

- A. Biotechnology
- B. *Bacillus tomentosa*
- C. *Bacillus thuringiensis*
- D. Best type

Answer: C



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56. Identify the plasmid

A. EcoRI

B. pbR 322

C. BamH I

D. Hind III

Answer: B



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57. Polymerase chain reaction is most useful in

- A. DNA synthesis
- B. DNA amplification
- C. Protein synthesis
- D. Amino acid synthesis

Answer: B



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58. The most common bacterium used in genetic engineering is

A. Bacillus

B. Clostridium

C. Escherichia

D. Salmonella

Answer: C



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59. Fragments of DNA formed after treatment with endonucleases are separated by the technique

A. Polymerase chain reaction

B. Southern blotting

C. Colony hybridisation

D. Electrophoresis

Answer: D



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60. Each of the following questions/statements has four suggested answers. Rewrite the correct answer in each case:

DNA is methylated at

A. A-base

B. G-base

C. T-base

D. C-base

Answer: D

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61. In genetic engineering, DNA fragments are joined through

- A. Ligases
- B. Polymerase
- C. Helicase
- D. Gyrase

Answer: A



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62. Introduction of transgenes will result in

- A. Formation of a new species
- B. Formation of a new protein
- C. Alter a biosynthetic pathway
- D. Both B and C

Answer: D



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63. Flavr Savr variety of Tomato is

A. High yielding hybrid variety

B. High yielding new variety

C. Transgenic

D. Polyploid

Answer: C



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64. Production of a human protein in bacteria by genetic engineering is possible because

- A. Human chromosome replicate in bacterial cell
- B. Mechanism of gene regulation is identical in human and bacteria
- C. Bacterial cell can undertake RNA splicing
- D. Genetic code is universal

Answer: D



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65. A tumour inducing plasmid widely used in the production of transgenic plants is that of

- A. *Escherichia coli*
- B. *Bacillus thuringiensis*
- C. *Agrobacterium tumefaciens*
- D. *Staphylococcus aureus*

Answer: C



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66. Electroporation is a technique that can be used for genetic engineering . This technique enables gene manipulation by

A. Making transient pores in cell membranes to introduce gene constructs

B. Fast passage of nutrients through phloem sieve pores by electric stimulation

C. Opening of stomata by artificial light during night

D. Purification of saline water with the help of membrane system

Answer: A



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67. Assertion: *Agrobacterium tumefaciens* is popular in genetic engineering because this bacterium is associated with roots of all

cereals and pulse crops.

Reason: A gene is incorporated in the bacterial chromosomal genome gets automatically transferred to the crop with which the bacterium is associated.

A. both are true with reason being correct explanation

B. both true but reason is not correct explanation

C. assertion is true but reason is wrong

D. both are wrong

Answer: D



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68. Assertion: In recombinant DNA technology, human genes are often transferred into bacteria (prokaryotes) or yeast (eukaryote)

Reason : Both bacteria and yeast multiply very fast to form huge population, which express the desired gene

A. both are true with reason being correct
explanation

B. both true but reason is not correct
explanation

C. assertion is true but reason is wrong

D. both are wrong

Answer: A



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69. Which type of restriction enzymes are used in recombinant DNA technology ?

A. Ligases

B. Polymerase

C. Restriction endonuclease

D. Helicases

Answer: C



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70. Golden Rice will help in

- A. Producing petrol-like fuel
- B. Pest resistance
- C. Herbicide tolerance
- D. Alleviation of vitamin A deficiency

Answer: D



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71. Restriction endonucleases used widely in RDT are obtained from

- A. Plasmids
- B. Bacterial cells
- C. Bacteriophages
- D. All prokaryotic cells

Answer: B



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72. SCID is caused by defective gene coding for enzyme

- A. Adenosine deaminase
- B. Adensoine transaminase
- C. Adenosine transferase
- D. Guanosine transaminase

Answer: A



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73. Herbicide resistant gene in plants is

A. Ct

B. Mt

C. Bt

D. GST

Answer: D



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74. Vitamin A rich transgenic plant is

A. Flavr Savr Tomato

B. Golden Rice

C. Bt Cotton

D. Vaccinated Potato

Answer: B



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75. Restriction endonucleases are called so as they

- A. Synthesize DNA
- B. Restrict nuclear activity
- C. Cleave DNA into fragments
- D. Break DNA at random.

Answer: C



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76. A plant expressing a gene from another organism is

- A. Transgenic
- B. Clone
- C. Somaclonal variant
- D. Transformed

Answer: A



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77. Bt gene is got from

- A. Brassica napus
- B. Bacillus thuringiensis
- C. Azolla
- D. Rhizobium

Answer: B



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78. Recombinant DNA technology is also called

- A. Khorana
- B. Bateson and de Vries
- C. Sutton and Avery
- D. Cohen and Boyer

Answer: D



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79. Which one is a wrong statement ?

A. Transposons were visualised by Barbara

Mc-Clintock

B. DNA ligases are used to cleave DNA

molecules

C. Udder cell was used to produce cloned

sheep

D. In pedigree analysis, a person

immediately affected is called propositus

Answer: B



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80. Genomic DNA library means

A. Packing of donor DNA in a collection of
vectors

B. A collection of gene vectors

C. Collection of organisms for extracting
DNA

D. A collection of literature about DNA

Answer: A



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81. A technique which involves deliberate manipulation of genes within or between species is called:

A. Gene therapy

B. Tissue culture

C. Hybridoma technology

D. Genetic engineering

Answer: D



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82. Plasmids are used in genetic engineering because they are

A. Resistance to antibiotics

B. Resistance to restriction enzymes

C. Ability to carry foreign genes

D. Ability to cause infection in host

Answer: C



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83. A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of

A. Trichoderma

B. Xanthomonas

C. Bacillus

D. Pseudomonas

Answer: D



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84. Which of the following is produced by genetically engineered bacteria:

(a) Adrenaline

(b) Thyroxine

(c) Insulin

(d) Testosterone

A. Insulin

B. Thyroxine

C. Testosterone

D. Adrenaline

Answer: A



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85. Plasmids are suitable vectors for gene cloning because

- A. Small circular DNA molecules with their own origin of replication site
- B. Small circular DNA molecules which can integrate with host chromosomal DNA
- C. Having antibiotic genes
- D. Able to shuttle between prokaryotic and eukaryotic cells

Answer: A



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86. Match the column and find the correct combination

- | I | II |
|-----------------------------------|-------------------------------------|
| (a) <i>Bacillus thuringiensis</i> | 1. Production of chitinases |
| (b) <i>Rhizobium meliloti</i> | 2. Scavenging of oil spills |
| (c) <i>Escherichia coli</i> | 3. Incorporation of <i>nif</i> gene |
| (d) <i>Pseudomonas putida</i> | 4. Production of Bt toxin |
| (e) <i>Trichoderma</i> | 5. Production of human insulin |

A. a-2, b-4, c-1, d-5, e-3

B. a-2, b-4, c-5, d-1, e-3

C. a-4, b-3, c-5, d-2, e-1

D. a-4, b-2, c-5, d-3, e-1

Answer: C



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

A. *Salmonella typhimurium*

B. *Escherichia coli*

C. *Bacillus thuringiensis*

D. Yeast

Answer: B



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88. Select DNA sequence which would act as a restriction site

A.
$$\frac{AACCGG}{TTGGCC}$$

B. $\frac{GGTTGG}{CCAACC}$

C. $\frac{AAGGCT}{TTCCGA}$

D. $\frac{CTGCAG}{GACGTC}$

Answer: D



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89. In gel electrophoresis , the differential mobility of DNA depends on

A. Helical nature of DNA

B. Double stranded nature DNA

C. Charge and size of DNA

D. Hydrogen bonding between bases

Answer: C



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90. Which one is cloning plasmid, not an expression plasmid

A. pBAD - 18 - Cam

B. pBCSK

C. pUC 19

D. pET

Answer: C



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91. Bacteria protect themselves from viral attack by producing

A. Endonuclease

B. Exonuclease

C. Gyrase

D. Ligase

Answer: A



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92. The technique of production of monoclonal antibodies was developed by

A. Watson and Crick

B. Milstein and Kohler

C. Bentham and Hooker

D. Miescher

Answer: B



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93. In plant biotechnology, root tumours are induced by

A. Rhizobium

B. *Agrobacterium tumefaciens*

C. *Agrobacterium rhizogenes*

D. *Agrobacterium basillis*

Answer: C



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94. A transgenic plant having higher storage protein is

A. Rice

B. Maize

C. Tomato

D. Potato

Answer: D



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95. What is the first step in the southern Blot technique?

A. Digestion of DNA by restriction enzyme

B. Production of a group of genetically identical cells

C. Denaturation of DNA on the gel for hybridisation with specific probe

D. Denaturation of DNA from a nucleated cell as from the scene of crime

Answer: A



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96. Which is obtained from genetic engineering

A. Glucose

B. Haemoglobin

C. Golden Rice

D. None of the above

Answer: C



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97. Which one of used in the production of insulin by genetic engineering ?

- A. Rhizobium
- B. Saccharomyces
- C. Mycobacterium
- D. Escherichia

Answer: D



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98. Which one is not a biofertilizer

A. Azotobacter

B. Azolla

C. Bacillus thuringiensis

D. Clostridium

Answer: C



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99. Which is correctly matched

- A. Central dogma - codon
- B. RNA polymerase - RNA primer
- C. Okazaki fragments - splicing
- D. Restriction enzyme - genetic engineering

Answer: D



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100. 'Golden rice' is a rice variety rich in

A. β -Carotene and ferritin

B. Lysine

C. Vitamin C

D. Biotin

Answer: A



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101. What are correctly matched :

1. Ligase - Joins short segments of DNA together
2. DNA polymerase - cuts DNA at specific site
3. Helicase - breaks hydrogen bond between complementary pairs during DNA replication

A. 1,2,3 correct

B. 1,2 correct

C. 2,3 correct

D. 1, 3 correct

Answer: D



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102. Main objective of production/use of herbicide resistant GM crops is to

A. Encourage ecofriendly herbicides

B. Reduce herbicide accumulation in food articles for health safety

C. Eliminate weeds from fields without the use of manual labour

D. Eliminate weeds from fields without the use of herbicides.

Answer: C



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103. Which of the following has not been synthesized by DNA technology ?

A. Insulin

B. Haemoglobin

C. Somatostatin

D. Interferon

Answer: B



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104. Disorder in which B-lymphocytes and T-lymphocytes are not formed in:

A. AIDS

B. SCID

C. Cystic fibrosis

D. Muscular dystrophy

Answer: B



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105. Transgenic hirudin is obtained from:

A. *Ocimum sanctum*

B. Brassica napus

C. Potato

D. Tomato

Answer: B



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106. In cloning experiments cDNA molecules can be obtained from an mRNA copy by

A. Polymerase chain reaction

B. Reverse transcriptase

C. Ribozyme

D. DNA-RNA hybridisation.

Answer: B



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107. Which is employed for synthesis monoclonal antibody by hybridisation technique

A. RBC

B. Liver cells

C. Tumour cells

D. Nerve cells

Answer: C



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108. Restriction enzymes are also called

A. Molecular markers

B. Vectors

C. Carriers

D. Molecular scissors

Answer: D



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109. Isolation of Bt gene from bacterium *Bacillus thuringiensis* was undertaken in year

A. 1977

B. 1980

C. 1997

D. 1990

Answer: B



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110. Which of these is used as vector in gene therapy for SCID?

A. Retrovirus

B. Enterovirus

C. Arbovirus

D. Rotavirus

Answer: A



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111. Product of biotechnology is

A. Transgenic crop

B. Biofertilizer

C. Humulin

D. All the above

Answer: D



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112. Which is used in recombinant DNA technology ?

A. Virus

B. Capsid of virus

C. Cell wall of virus

D. Gene which produces capsid of virus

Answer: B



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113. 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. a, b

B. b, c

C. c, d

D. d, a

Answer: C



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114. The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as

- A. Source of industrial enzyme
- B. Insecticide
- C. Indicator of water pollution
- D. Agent for production of dairy products.

Answer: B



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115. Transgenic plants are the ones

A. Grown on artificial medium after hybridisation in the field

B. Produced after protoplast fusion in artificial medium

C. Produced by somatic embryo on artificial medium

D. Generated by introducing foreign DNA into a cell and regenerating plant from that cell.

Answer: D



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116. What is true of Bt toxin ?

- A. The concentrated 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 sterilize it and this prevents its multiplication.

Answer: B



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117. The genetic defect-Adenosine Deaminase deficiency may be cured permanently by

- A. Introducing bone marrow cells producing (ADA) into cells at an early embryonic stages
- B. Administering adenosine deaminase activators
- C. Periodic infusion of genetically engineered lymphocytes having functional ADA cDNA
- D. Enzyme replacement therapy.

Answer: A



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118. Polymerase chain reaction employs

- A. Primers and DNA ligase
- B. DNA ligase only
- C. DNA polymerase only
- D. Primers and DNA polymerase

Answer: D



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119. 'Bt' toxin is

- A. Protein
- B. Carbohydrate
- C. Lipid
- D. Enzyme

Answer: A



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120. Biopiracy is

A. Exploitation of bioresources

B. Patenting bioresources of others

C. Use of bioresources without
authorisation

D. Both B and C

Answer: D



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121. Genetic engineering has helped in production of

A. Thyroxine

B. Insulin

C. Parathormone

D. Epinephrine

Answer: B



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122. Some of the steps involved in the production of humulin are given below. Arrange them in the correct sequence and select the correct option

(i) Synthesis of gene (DNA) for human insulin artificially

(ii) Culturing recombinant E.coli in bioreactors

(iii) Purification of humulin

(iv) Insertion of human insulin gene into plasmid

(vi) Extraction of recombinant gene product from E.coli.

A. ii, i, iv, iii, v, vi

B. i, iv, v, ii, vi, iii

C. i, iii, v, vi, ii, iv

D. iii, v, ii, i, vi, iv

Answer: B



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123. 'Golden rice' is a rice variety rich in

A. Vitamin A

B. Vitamin B

C. Vitamin C

D. Vitamin D

Answer: A



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124. Bt-cotton genes repel:

A. Bacterial pathogens

B. Fungal pathogens

C. Nematode parasites

D. Insect pests

Answer: D



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125. Restriction enzyme was discovered by

A. Alexander Fleming

B. Smith and Nathans

C. Berg

D. Waksman

Answer: B



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126. Vaccines produced through recombinant DNA technology are

- A. First generation vaccines
- B. Second generation vaccines
- C. Third generation vaccines

D. None of the above

Answer: C



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127. Salt tolerant transgenic has been developed for

A. Brinjal

B. Potato

C. Tomato

D. Grape

Answer: C



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128. Insect tolerant gene from *Bacillus thuringiensis* is introduced using Ti plasmid of

A. *Escherichia coli*

B. *Agrobacterium tumefaciens*

C. *Haemophilus influenzae*

D. *Arabidopsis thaliana*

Answer: B



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129. Which of the following is a transgenic plant?

A. Flavr Savr

B. *Ashbya gossypii*

C. *Meloidogyne incognita*

D. *Gluconobacter oxidans*

Answer: A



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130. GAATTC is the recognition site for the restriction endonuclease

A. Hind III

B. Eco RI

C. BamH I

D. Hae III

Answer: B



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131. In recombinant DNA technology, the term vector refers to

A. Plasmids that can transfer foreign DNA
into a living cell

B. Cosmids that can cut DNA at specific
base sequence

C. Plasmids that can join different DNA
fragments

D. Cosmids that can degrade harmful
proteins

Answer: A



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132. First genetically modified plant commercially released in India is

- A. Golden Rice
- B. Bt Brinjal
- C. Slow ripening Tomato
- D. Bt cotton

Answer: D



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133. cryIIAb and cryIAb produce a toxin that controls

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

Answer: A



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134. The vector for T-DNA is

- A. *Salmonella typhimurium*
- B. *Thermus aquaticus*
- C. *Agrobacterium tumefaciens*
- D. *Escherichia coli*

Answer: C



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135. PCR technique was invented by:

A. Boyer

B. Karry Mullis

C. Cohen

D. Sanger

Answer: B



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136. Autonomously replicating circular extrachromosomal DNA of a prokaryotic cell is called:

A. Chromatin

B. Plasmid

C. Palindromic nucleotide sequence

D. Nucleoid

Answer: B



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137. Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because-

- A. Bacteria are resistant to the toxin
- B. Toxin is inactive
- C. Toxin is immature
- D. Bacteria enclose toxin in a special sac.

Answer: B



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138. Transgenic animals have been used:

- A. For testing safety of vaccines
- B. For testing toxicity of drugs
- C. To produce useful biological products
- D. All the above

Answer: D



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139. Maturation of proinsulin into insulin takes place after

- A. Joining of c-peptide
- B. Removal of c-peptide
- C. Removal of disulphide bridge
- D. Addition of disulphide bridge

Answer: B



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140. Which is true

- A. Centromere is found in animal cells which produces aster during cell division
- B. Insulin gene is present in every body cell
- C. Nucleosome is formed of nucleotides
- D. DNA has a core of eight histones

Answer: B



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141. Which of the following are used in gene cloning ?

A. Lysosomes

B. Mesosomes

C. Plasmids

D. Nucleotides

Answer: C



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142. In genetic engineering, a DNA segment (gene) of interest, is transferred to the host cell through a vector. Consider the following four agents (i-iv)) in this regard and select the correct option about which one or more of these can be used as a vector / vectors

(i) Bacterium

(ii) P

(iii) Plasmodium

(iv) Bacteriophage

A. a, b and d

B. a only

C. a and c

D. b and d

Answer: D



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143. The genetically-modified (GM) brinjal in India has been developed for

A. Enhancing shelf life

B. Enhancing mineral content

C. Drought resistance

D. Insect resistance

Answer: D



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144. Some of the characteristics of Bt cotton are

- A. Medium yield, long fibre and resistance to beetle pests
- B. High yield and production of toxic protein crystals which kill dipteran pests
- C. High yield and resistance to bollworms
- D. Long fibre and resistance to aphids

Answer: B



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145. An improved variety of transgenic basmati rice

- A. Gives high yield and is rich in vitamin A
- B. Is completely resistant to all insect pests and disease of paddy
- C. Gives high yield but has no characteristic aroma
- D. Does not require chemical fertilizers and growth hormones.

Answer: A



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

A. *Salmonella typhimurium*

B. *Rhizopus nigricans*

C. Retrovirus

D. Baculovirus

Answer: C



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147. Stirred - tank bioreactors have been designed for

A. Purification of the product

B. Ensuring anaerobic conditions in the culture vessel

C. Availability of oxygen throughout the process

D. Addition of preservatives to the product.

Answer: C



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148. Satellite DNA is useful tool in ;

A. Sex determination

B. Forensic science

C. Genetic engineering

D. Organ transplantation

Answer: B



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149. 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'.....GATATG.....3'

3'.....CTACTA.....5'

B. 5'.....GAATTC.....3'

3'.....CTTAAG.....5'

C. 5'.....CACGTA.....3'

3'.....CTCAGT.....5'

D. 5'.....CGTTCG.....3'.....ATGGTA.....5'

Answer: B



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150. Genetic engineering has been successfully used for producing

A. Transgenic models for studying new treatments for certain cardiac diseases

B. Transgenic cow, Rosie, which produces high fat milk for making ghee

C. Animals like bulls for farm work as they have super power

D. Transgenic mice for testing safety of polio vaccine before use in humans.

Answer: D



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

A. Probe

B. Clone

C. Plasmid

D. Vector

Answer: A



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152. Which is correct about genetically modified sugar by America

A. (a) Obtained patent of bacterial germplasm

B. (b) Brazzein obtained from *Gymnema sylvestre* is used in Maize

C. (c) Protein obtained from Lantana plant of Africa is used in Maize

D. (d) Brazzein protein obtained from African plant is used in Maize.

Answer: D



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153. Illegal and unlawful development of biomaterials without payment to inhabitants of their region is called:

A. Biopatent

B. Biotechnology

C. Biowar

D. Biopiracy

Answer: D



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154. Main aim of human genome project is to

A. Introduce new genes into human beings

B. Identify and sequence all the genes present in human DNA

C. Develop better techniques to compare two human DNAs

D. Remove disease causing genes from human DNA

Answer: B



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155. Source of Taq polymerase used in PCR is a

- A. Thermophilic fungus
- B. Mesophilic fungus
- C. Thermophilic bacterium
- D. Halophilic bacterium

Answer: C



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156. The complementary, synthetic and random DNA are used as :

- A. Cloning vectors
- B. Recombinant DNA
- C. Transposons
- D. Passenger DNA

Answer: D



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157. The transgenic animals are those which have

- A. Foreign DNA in some of its cells
- B. Foreign DNA in all its cells
- C. Foreign RNA in all its cells
- D. DNA and RNA both in the cells

Answer: B



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158. Bollworms attacks

A. Bt cotton

B. Tomato

C. Cotton

D. *Bacillus thuringiensis*

Answer: C



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159. Golden colour of Rice is due to occurrence of

A. Vitamin A

B. Vitamin C

C. Vitamin K

D. Vitamin B_6

Answer: A



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160. Flavr Savr Tomato has increased

- A. Productivity
- B. Vigour
- C. Shelf life
- D. Flowering period

Answer: C



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161. Hybridoma is connected with:

- A. (a) Growth of cancer
- B. (b) Monoclonal antibody formation
- C. (c) Antibody-antigen interaction
- D. (d) Activity of NK cells

Answer: B



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162. Biolistic technique is used in :

- A. Tissue culture process

B. Hybridisation process

C. Germplasm conservation process

D. Gene transfer process

Answer: D



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163. The ends of DNA fragments are sticky due to

A. Unpaired bases

B. Free methylation

C. Endonuclease

D. Calcium ions

Answer: A



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164. Which transgenic animal has been given human genes for organ transplantation into humans without risk of rejection ?

A. (a) Cow

B. (b) Sheep

C. (c) Goat

D. (d) Pig

Answer: D



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165. In hybridoma technology

A. B-cells are fused with myeloma cells

B. T-cells are fused with myeloma cells

C. T-cells are fused with B-cells

D. None of the above

Answer: A



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166. Recombinant DNA bearing ampicillin resistance gene is passed in E. coli. The latter are spread on agar plates containing ampicillin. Then

A. Both transformed and untransformed cells die

B. Both transformed and untransformed cells grow

C. Transformed recipient cells grow and untransformed cells die

D. Transformed recipient cells die and untransformed cells grow.

Answer: C



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167. The thermostable enzymes, 'Taq' and 'Pfu', isolated from thermophilic bacteria are

- A. DNA polymerase
- B. DNA ligases
- C. Restriction endonuclease
- D. RNA polymerases

Answer: A



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168. The Bt toxin is not toxic to human beings because

- A. The toxin recognises only insect specific targets
- B. Bt toxin activation requires temperature above human body temperature
- C. Bt toxin formation from pro-Bt state requires pH lower than one present in human stomach

D. Conversion of pro-Bt to Bt state takes place only in highly alkaline conditions

Answer: D



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169. Which of the following technique is not used for early diagnosis of disease?

A. Polymerase chain reaction

B. Polyacrylamide gel electrophoresis

C. Recombinant DNA technology

D. Enzyme linked immunosorbent assay

Answer: C



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170. GMO technology is useful for

A. Making crops more tolerant to abiotic stresses

B. Helping to reduce post-harvest losses

C. Enhancing nutritional value of food

D. All the above

Answer: D



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171. DNA polymerase or taq enzyme used in PCR is isolated from

A. *Thermus aquaticus*

B. *E. coli*

C. *Salmonella typhimurium*

D. None of the above

Answer: A



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172. Cyanogen bromide is employed in

A. Genetic finger printing

B. Tissue culture

C. Synthesis of humulin

D. Hybridoma technology

Answer: C



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173. The term "Southern Blotting" refers to

A. Transfer of DNA fragments from in vitro
cellulose membrane to electrophoretic
gel

B. Attachment of probes to DNA fragments

C. Transfer of DNA fragments from electrophoretic gel to nitrocellulose sheet

D. Comparison of DNA fragments from two sources.

Answer: B



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174. "World Intellectual Property Day" is observed on

A. February 29th

B. April 26th

C. June 30th

D. September 5th

Answer: B



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175. The protein $\alpha - 1$ antitrypsin is used to treat the disease

- A. Cancer
- B. Rheumatoid arthritis
- C. Alzheimer's disease
- D. Emphysema

Answer: D



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176. Which is correctly matched

A. *Agrobacterium tumefaciens* - Tumour

B. pBR 322-Enzyme

C. *Thermus aquaticus*-Bt gene

D. Ligase - Molecular scissors

Answer: A



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177. Gene amplification using primers can be done by :

A. Microinjection

B. ELISA

C. Polymerase chain reaction

D. Gene gun

Answer: C



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178. PCR proceeds in three distinct steps governed by temperature, they are in order of

- A. Denaturation, synthesis, annealing
- B. Annealing, synthesis, denaturation
- C. Synthesis, annealing, denaturation
- D. Denaturation, annealing, synthesis

Answer: A



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179. ELISA

- A. Uses complement mediated cell lysis
- B. Uses radiolabelled second antibody
- C. Involves addition of substrate which is converted into coloured end product
- D. Requires RBCs

Answer: C



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180. A regulatory body working under MoEF for the release of transgenic crops is:

A. NBPGR

B. NSC

C. NIPGR

D. GEAC

Answer: D



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181. The problem of blindness in poor countries can be taken care of by using which of the following?

- A. Golden Rice
- B. Transgenic Maize
- C. Transgenic Tomato
- D. Bt Brinjal

Answer: A



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182. Toxins produced by genes cryIIAb and cryIAb control:

(a) Corn borer and cotton bollworm respectively

(b) Tobacco bud worms and Cotton bollworm respectively

(c) Cotton bollworms and corn borer respectively

(d) Cotton bollworm and tobacco bud worms respectively

A. Roundworm

B. Moth

C. Bollworm

D. Fruitfly

Answer: C



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183. There is a restriction endonuclease called Eco RI. What does 'co' part in it stand for ?

A. Coenzyme

B. coli

C. Colon

D. Coelom

Answer: B



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184. The process of RNA interference has been used in the development of plants resistant to

A. Viruses

B. Insects

C. Fungi

D. Nematodes

Answer: D



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185. Maximum number of existing transgenic animals is of

A. Cow

B. Pig

C. Mice

D. Fish

Answer: C



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186. Agarose extracted from sea weeds finds use in

A. PCR

B. Gel electrophoresis

C. Spectrophotometry

D. Tissue culture

Answer: B



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187. Read the following four statements (A-D)

A. The first transgenic buffalo, Roise produced milk which was human alpha-lactalbumin enriched

B. Restriction enzymes are used in isolation of DNA from other macromolecules

C. Downstream processing is one of the step of rDNA technology

D. Disarmed pathogen vectors are also used in transfer of rDNA into the host

which of the two statements have mistakes ?

(a) B and C

(b) C and D

(c) A and C

(d) A and B

A. b and c

B. c and d

C. a and c

D. a and b

Answer: D



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188. Which one of the following technique made it possible to genetically engineer living organisms

A. Recombinant DNA techniques

B. Heavy isotope labelling

C. X-ray diffraction

D. Hybridisation

Answer: A



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189. *Bacillus thuringiensis* forms protein crystals which contain insecticidal protein This protein

- A. Binds with epithelial cells of mid gut of the insect pest ultimately killing it
- B. Is coded by several genes including the gene cry
- C. Is activated by acid pH of the foregut of the insect pest
- D. Does not kill the carrier bacterium which is itself resistant to the toxin.

Answer: A



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190. What is the source of EcoRI

- A. Escherichia coli RI
- B. Escherichia coli RI 13
- C. Escherichia coli RX 13
- D. Escherichia coli RY 13

Answer: D



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191. Which is correct match the phenomenon and its explanation

A. Central dogma-RNA \rightarrow RNA DNA \rightarrow

Protein \rightarrow RNA`

B. Reverse transcription - PCR - Many copies of DNA sequence

C. Transcription - Formation of RNA proteins

D. RNA silencing - Use of dsRNA

Answer: B



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192. The first clinical gene therapy was given for treating

- A. Adenosine deficiency
- B. Adenine deficiency
- C. Growth deficiency
- D. Adenosine deaminase deficiency

Answer: D



193. Assertion: A gene from bacillus thuringiensis is incorporated in plant genome to increases yield.

Reason : it is Bt toxin producing gene which kills larvae of insects.

A. both are true with reason being correct explanation

B. both are true but reason is not correct explanation

C. assertion is true but reason is wrong

D. both are wrong

Answer: A



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194. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the ones categorized as

A. Archaeobacteria

B. Cyanobacteria

C. Heterotrophic bacteria

D. Chemoautotrophs

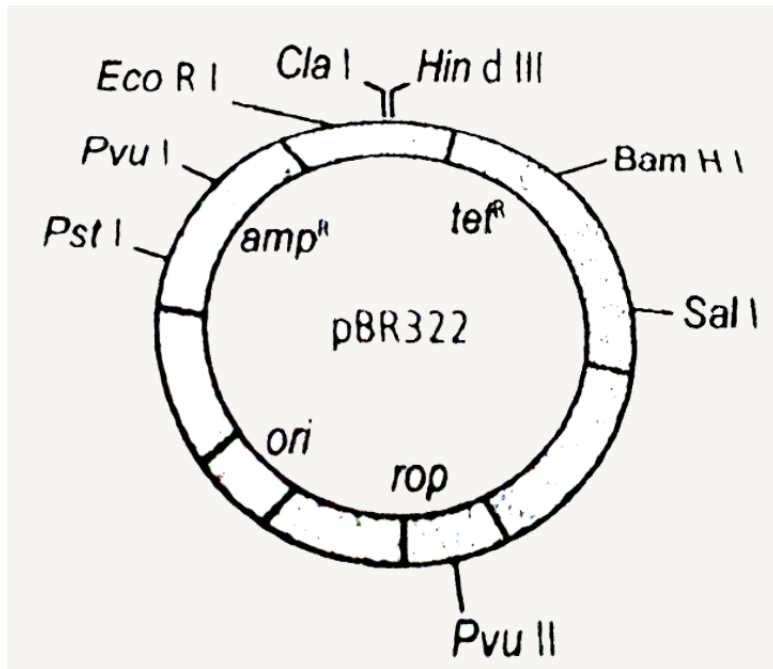
Answer: C



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195. The given figure is the diagrammatic representation of the E. coli vector pBR 322. Which one of the given options correctly

identifies its certain component (s)?



A. *rop*-reduced osmotic pressure

B. *Hind* III, *Eco*RI - selectable markers

C. *amp^R*, *tet^R* - antibiotic resistance genes

D. *ori* - original restruction enzyme

Answer: C



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196. *monascus purpureus* is a yeast used commercially in the production of

A. Ethanol

B. Citric acid

C. Streptokinase for removing clots in
blood vessels

D. Blood cholesterol lowering statins

Answer: D



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197. A patient brought to a hospital with myocardial infarction is normally immediately given

A. Streptokinase

B. Cyclosporin -A

C. Statins

D. Penicillin

Answer: A



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198. Which is wrongly matched

A. Somatic hybridisation - Fusion of two
diverse cells

B. Vector DNA-Site for tRNA synthesis

C. Micropropagation-In vitro production of plants in large number

D. Callus-Unorganised mass of produced in tissue culture.

Answer: B



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199. What is true about DNA polymerase used in PCR

- A. It is used to ligate introduced DNA in recipient cells
- B. It serves as selectable marker
- C. It is isolated from a virus
- D. It is active at high temperature

Answer: D



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

- (a) silver or platinum
- (b) platinum or zinc
- (c) silicon or platinum
- (d) gold or tungsten

A. Silver or platinum

B. Platinum or zinc

C. Silicon or platinum

D. Gold or tungsten

Answer: D



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201. Basic principle of developing transgenic plants and animals is to introduce the gene of interest into the nucleus of

A. Body cell

B. Vegetative cell

C. Germ cell

D. Somatic cell

Answer: C



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202. Melting of DNA at $70^{\circ}C$ is due to breakdown of

A. Phosphodiester bonds

B. Hydrogen bonds

C. Glycosidic bonds

D. Disulphide bonds

Answer: B



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203. Biolistics (gene-gun) is suitable for

A. Transformation of plant cells

B. Disarming pathogen vectors

C. DNA finger printing

D. Constructing recombinant DNA

Answer: A



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204. In genetic engineering, the antibiotics are used

- A. For keeping cultures free of infection
- B. To select healthy vectors
- C. As selectable markers

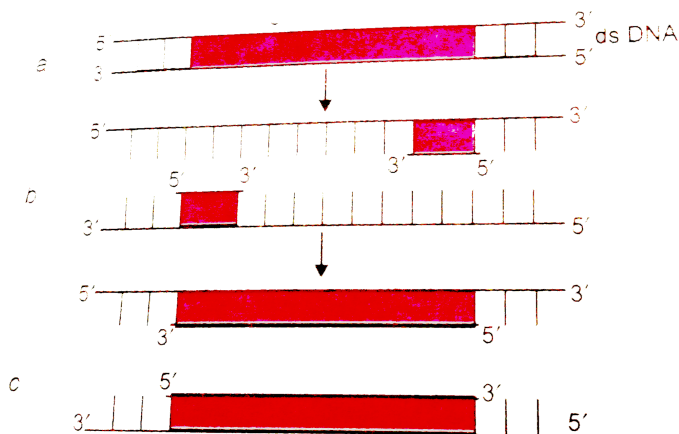
D. As sequenes where replication starts

Answer: C



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205. In the three steps (a,b,c) of polymerase chain reaction, select the correct step



A. c- extension in presence of heat stable

DNA polymerase

B. a - annealing with two sets of primers

C. b - denaturation at high temperature

D. a - denaturation at 50°C

Answer: D



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206. The restriction enzyme(s) used in recombinant DNA technology that make staggered cuts in DNA leaving sticky ends is /are

A. EcoRI

B. Hind III

C. Bam HI

D. All the above

Answer: D



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207. Cohen and Boyer isolated an antibiotic resistance gene, by cutting out a piece of DNA from a plasmid which was responsible for conferring antibiotic resistance, in the year

A. 1962

B. 1965

C. 1972

D. 1982

Answer: C



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208. Amplification of gene of interest by using DNA polymerase may go upto

- A. 0.1 million
- B. 1.0 million
- C. 1.0 billion
- D. 1.0 trillion

Answer: C



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209. The 'clot buster' produced by Streptococcus and modified by genetic engineering is

A. Streptokinase

B. Penicillin

C. Cyclosporin A

D. Statins

Answer: A



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210. Recombinant DNA technology is also called

- A. Endonucleases and polymerases
- B. Restriction endonucleases and ligases
- C. Peptidases and ligases

D. Restriction endonucleases and topoisomerases.

Answer: B



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211. Read a and b and identify correct choice
Statement a. *Agrobacterium tumefaciens* causes crown gall in dicots
Statement b. *Agrobacterium tumefaciens* enters host through wound and injuries

- A. b is correct, a is wrong
- B. Both a and b are wrong
- C. Both a and b are correct
- D. a is correct, b is wrong

Answer: A



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212. In biochemical processes, cDNA is prepared from

A. B-DNA

B. hnRNA

C. Z-DNA

D. mRNA

Answer: D



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213. Human proteins can be produced in the milk or semen of farm animals true or false?

A. 1

B. False, proteins cannot be produced in
semen

C. False, proteins cannot be produced in
milk

D. False, animals are not used for protein
production.

Answer: A



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214. In genetic engineering , restriction enzymes are used for cutting

- A. Bacterial DNA only
- B. Eukaryotic DNA
- C. Viral DNA
- D. Any DNA fragment

Answer: D



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215. Which of the following is used to select genes of interest from a genomic library

- A. Cloning vectors
- B. DNA probes
- C. Gene targets
- D. Restriction enzymes

Answer: B



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216. Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells)

- A. Both sense and antisense RNA
- B. An antifeedent
- C. A toxic protein
- D. A particular hormone

Answer: A



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217. Xenograft is a graft

- A. Between genetically identical individuals
- B. Between individuals of different species
- C. From one individual to another of same species
- D. From one area to another of same individual

Answer: B



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218. Globular protein of $\sim 6kDa$ consisting of 51 amino acids arranged in two polypeptide chains held by disulphide bridge is

- A. Insulin
- B. Fibrinogen
- C. Glucagon
- D. Keratin

Answer: A



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219. The first transgenic plant released for commercial use was

A. Bt Cotton

B. Tobacco

C. Golden rice

D. Solan gola

Answer: B



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220. The gene that encodes for BT protein, specific to cotton boll worm is

A. cry II Ac

B. cry II Ab

C. cry IAc

D. cry II Abc

Answer: C



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221. Which is not a pharmaceutical product obtained through biotechnology

- A. Human insulin
- B. Clotting factor
- C. Cholecystokinin
- D. Human growth hormone

Answer: C



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222. This is not a GMO

A. Golden Rice

B. Tracy

C. Bt Brinjal

D. Dolly

Answer: D



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223. A genetic disorder can be cured through

- A. Gene therapy
- B. rDNA technology
- C. Embryo transfer
- D. Hybridisation technology

Answer: A



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224. RNA interference involves

- A. Micropropagation

B. Cell defence

C. Cell proliferation

D. Cell differentiation

Answer: B



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225. Cells obtained from cancerous tumours are known as

A. Hybridoma

B. Lymphocyte

C. Monoclonal cells

D. Myeloma

Answer: D



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226. What are plasmids, often used in genetic engineering

A. Extrachromosomal DNA

B. Nuclear DNA

C. Membrane bound organelle

D. DNA attached to mitochondria

Answer: A



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227. Match the lists and find the correct option

I

II

- | | |
|-------------------------------|---|
| (a) Colony hybridisation | 1. Transfer of recombinant DNA into host cell |
| (b) Gel electrophoresis | 2. Selection of cells containing the desired gene |
| (c) Gradient centrifugation | 3. Separation of DNA fragments |
| (d) Polymerase chain reaction | 4. Purification of DNA |
| | 5. Gene cloning in thermocycler |

A. a-4, b-5, c-2, d-3

B. a-1, b-2, c-3, d-4

C. a-2, b-3, c-4, d-5

D. a-3, b-4, c-5, d-2

Answer: C



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228. Match the lists and find the correct option

I

II

- | | |
|-------------------------------------|-------------------------------------|
| (a) Transgenic potato | 1. Resistant to <i>Phytophthora</i> |
| (b) Transgenic golden rice 'Taepei' | 2. Bruise resistant |
| (c) Transgenic tomato 'flavr Savr' | 3. Resistant to insects |
| (d) Transgenic papaya | 4. Rich in vitamin A |
| | 5. Resistant to ring spot virus |

A. a-1, b-4, c-2, d-5

B. a-1, b-4, c-3, d-2

C. a-1, b-4, c-2, d-3

D. a-5, b-4, c-2, d-3

Answer: A



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229. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-re-combinant bacteria because of

A. Inactivation of glycosidase enzyme in recombinant bacteria

B. Nonrecombinant bacteria contain beta galactosidase

C. Insertional inactivation of alpha-galactosidase in nonrecombinant bacteria

D. Insertional inactivation of alpha-galactosidase in recombinant bacteria.

Answer: D



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230. Which is not correctly matched organisms and its cell wall degrading enzyme

- A. Fungi - chitinase
- B. Bacteria - lysozyme
- C. Plant cells - cellulase
- D. Algae - methylase

Answer: D



231. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by

- A. Restriction mapping
- B. Centrifugation
- C. Polymerase chain reaction
- D. Agarose gel electrophoresis

Answer: D





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232. During the process of isolation of DNA, chilled ethanol is added to

- A. Break open the cell to release DNA
- B. Facilitate action of restriction enzymes
- C. Remove proteins such as histones
- D. Precipitate DNA

Answer: D



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233. Which one of the following vectors is used to replace the defective gene in gene therapy ?

A. Cosmid

B. Ri plasmid

C. Ti plasmid

D. Adenovirus

Answer: D



234. RNA interference involves

- A. Silencing of specific mRNA due to complementary RNA
- B. Interference of RNA in synthesis of DNA
- C. Synthesis of mRNA from DNA
- D. Synthesis of cDNA from RNA using reverse transcriptase

Answer: A



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235. Which cleaves DNA at specific sites producing sticky ends

- A. Clearing enzyme
- B. Proteases
- C. Lyases
- D. Restriction endonuclease

Answer: D



236. The technique used to make numerous copies of a specific segment of DNA quickly and accurately is

- A. Ligase chain reaction
- B. Transcription
- C. Polymerase chain reaction
- D. Translation

Answer: C





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237. In PCR, Taq polymerase is used between

- A. Extraction and denaturation
- B. Denaturation and annealing
- C. Annealing and extension
- D. Extension and amplification

Answer: C



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238. YAC is

- A. Yeast artificial colony
- B. Yeast artificial chromosome
- C. Yeast artificial cell
- D. None of the above

Answer: B



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239. Recent techniques used for separating fragments of DNA is

- A. Eastern blotting
- B. Western blotting
- C. Northern blotting
- D. Southern blotting

Answer: D



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240. At which temperature a DNA molecule is denatured by heat in PCR

A. $70^{\circ} - 80^{\circ} C$

B. $90^{\circ} - 95^{\circ} C$

C. $42^{\circ} C$

D. $50^{\circ} - 65^{\circ} C$

Answer: B



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241. Which statement is suitable for tet^R gene

- A. It has Pst - I recognition site
- B. It has Bam HI and Sal-I recognition sites
- C. It has tet III recognition sites
- D. None of the above

Answer: B



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242. E. coli having plasmids for production of human insulin is cultured in medium containing

A. Glucose

B. Maltose

C. Lactose

D. Sucrose

Answer: C



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243. EcoRI cleaves DNA strands to produce

- A. Blunt ends
- B. Sticky ends
- C. Satellite cells
- D. ori replication end

Answer: B



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244. Match the column and find the correct answer

I		II	
(a) Restriction endonucleases	(p)	Kohler and Milstein	
(b) Polymerase chain reaction	(q)	Alec Jeffreys	
(c) DNA finger printing	(r)	Arber	
(d) Monoclonal antibodies	(s)	Karry Mullis	

A. a-r, b-s, c-q, d-p

B. a-r, b-q, c-s, d-p

C. a-q, b-r, c-s, d-p

D. a-q, b-s, c-r, d-q

Answer: A



245. In the technique of recombinant insulin production, the genes for α - and β -polypeptides were inserted into the plasmid by the side of

- A. Antibiotic resistance gene
- B. Lac Z promoter gene
- C. β -galactosidase gene
- D. Ori

Answer: C



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246. Which of the following not a vector quantity ?

- A. Amp^r and Tet^r loci
- B. Ori minus pBR 322
- C. DNA of *Salmonella typhimurium*
- D. Ti plasmid

Answer: D



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247. Genetically modified crops can be produced by

- A. Recombinant DNA technology
- B. Somatic hybridisation
- C. Cross breeding
- D. Micropropagation

Answer: A



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248. Which of the following restriction endonuclease was discovered first

A. Hind II

B. EcoRI

C. Bam HI

D. EcoR II

Answer: A



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249. Find out the wrong statement

A. Human protein used to treat

emphysema is α -1-antitrypsin

B. Human insulin is being commercially

produced from a transgenic species of

Agrobacterium tumefaciens

C. Rosie, the first transgenic cow produced human protein enriched milk

D. Cry Ab endotoxin obtained from *Bacillus thuringiensis* is effective against corn borers

Answer: B



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250. Select the matched one

A. Biolistics - bioreactor

B. *Thermus aquaticus* - T-DNA

C. Plasmid DNA - vector

D. EcoRI - restriction exonuclease

Answer: C



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251. Restriction endonuclease Hind II always cuts DNA molecule at a particular point by recognising a specific sequence of

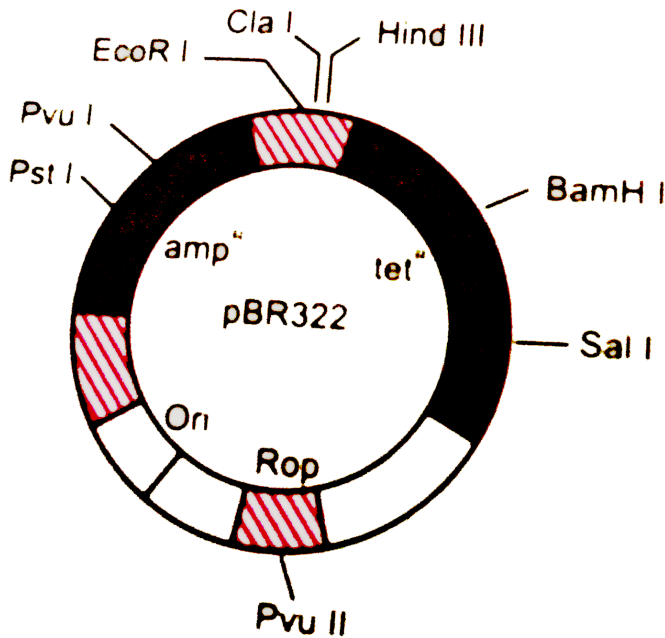
- A. Six base pairs
- B. Five base pairs
- C. Four base pairs
- D. Seven base pairs

Answer: A



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252. Identify and tick the correct one



A. Gel electrophoresis showing DNA fragments

B. E. coli cloning vector pBR 322 showing restriction sites

C. Polymerase chain reaction

D. None of the above

Answer: B



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253. Cosmid is

A. Extra DNA in bacteria

B. Circular DNA in bacteria

C. Extragenetic material in mycoplasma

D. Plasmid with phage cos sites and having

inserted DNA for forming

copies/products.

Answer: D



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254. In order to induce the bacterial uptake of plasmids, the bacteria are made competent by treating them with

- A. Sodium chloride
- B. Potassium chloride
- C. Magnesium chloride
- D. Calcium chloride

Answer: D



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255. Products of restriction enzyme digestion are separated by

A. Agarose gel electrophoresis

B. Centrifugation

C. Polyacrylamide gel electrophoresis

D. PCR

Answer: A



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256. Sticky ends of two DNA strands are joined
by the action of enzyme

A. DNA ligase

B. Endonuclease

C. Exonuclease

D. DNA polymerase

Answer: A



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257. *Bacillus thuringiensis* (Bt) strains have been used for designing novel

- A. Biofertilizers
- B. Bioinsecticidal plants
- C. Biomineralization process
- D. Biometallurgical techniques

Answer: B



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258. Recombinant therapeutics developed for curing human diseases are

A. 12

B. 24

C. 30

D. 56

Answer: C



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259. Strategy used to prevent nematode infection of tobacco roots is

A. Use of agrochemicals

B. Bt toxin gene

C. Gene mutation

D. RNA interference

Answer: D



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260. Gene therapy is treatment done on

A. Adults only

B. Child or embryo only

C. Pregnant mothers only

D. Persons of any age and conditon

Answer: D



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261. The enzyme used to join the DNA fragments is

A. DNA ligase

B. Restriction endonuclease

C. Alkaline phosphatase

D. Exonuclease

Answer: A



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262. Insect pest resistant Bt Cotton was developed by

A. Somaclonal variation

B. Micropropagation

C. Transgenic technology

D. Somatic hybridisation

Answer: C



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263. During gene cloning which is called 'gene taxi'

A. Vaccine

B. Plasmid

C. Bacterium

D. Protozoa

Answer: B



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264. Some foreign DNA fragment is attached to Cla I site of pBR 322. This recombinant vector is used to transform Escherichia coli. The cells subjected to transformation are

plated on two different media, one containing ampicillin and the other containing tetracycline. The transformed cells containing the recombinant vector will

A. Grow on both, tetracycline and ampicillin containing media

B. Not grow on either tetracycline containing or ampicillin containing media

C. Grow on tetracycline but not on ampicillin containing medium

D. Grow on ampicillin but not on tetracycline containing medium

Answer: A



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265. Study the lists and find the correct match

I

RNAi
ELISA
PCR
cry I Ab

II

- (i) Cotton bollworms
- (ii) Early detection of HIV
- (iii) *Meloidogyne* resistance
- (iv) Antigen-antibody interaction
- (v) **Corn borer**

A. a-iii, b-iv, c-ii, d-v

B. a-iv, b-iii, c-i, d-v

C. a-ii, b-iii, c-v, d-iv

D. a-v, b-i, c-iii, d-ii

Answer: A



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266. Identify the desirable characteristics for a plasmid used in rDNA technology from the following

- (a) Ability to multiply and express outside the host in a bioreactor
- (b) A highly active promoter
- (c) A site at which replication can be initiated
- (d) One or more identifiable marker genes
- (e) One or more unique restriction sites

A. a, c and e only

B. b, c and e only

C. a, c,d and e only

D. b,c,d and e only

Answer: D



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267. EcoRI is.....

- A. A restriction enzyme
- B. A plasmid
- C. Used to join two DNA fragments
- D. The abbreviation for bacterium *Escherichia coli*.

Answer: A



268. RNA interference which is employed in making tobacco plant resistant to *Meloidogyne incognita* is essentially involved in preventing the process of:

- A. Transcription
- B. Replication of DNA
- C. Translation of mRNA
- D. Splicing of hnRNA

Answer: C



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269. ADA deficiency results in

- A. Increased risk of infertility
- B. Inability of immune system to function normally
- C. Chromosomal disorders
- D. Decreases in yield of crop plants

Answer: B



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270. Taq polymerase is isolated from a

- A. (a) Virus
- B. (b) Bacterium
- C. (c) Fungus
- D. (d) Protozoan

Answer: B



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271. In pBR 322, the gene sequence that codes for the proteins involved in replication of the plasmid is

A. Pvu II

B. Cla I

C. rop

D. pst I

Answer: C



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272. Selective markers in plasmids are used to

- A. Identify cancer cells
- B. Identify antibiotics
- C. Identify recombinants from non-recombinants
- D. None of these

Answer: C



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273. Cry ' gene is obtained from:

- A. *Agrobacterium tumefaciens*
- B. *Bacillus thuringiensis*
- C. *Rhizopus leguminosarum*
- D. *Rhizobium phaseoli*

Answer: B



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274. Which of the following is used to promote growth of new blood vessels, thus helping in wound healing?

A. (a) Humulin

B. (b) TPA

C. (c) TGF- β

D. (d) α - 1 antitrypsin

Answer: C



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275. Which is correct regarding genetically engineered insulin using E.coli ?

A. Difficult to purify

B. Obtained in large unlimited quantities

C. Possibility of transmission of animal diseases

D. Insulin obtained varies in chemical structure.

Answer: B



276. The first recombinant DNA was constructed by linking an antibiotic resistant gene with the native plasmid of

- A. *Escherichia coli*
- B. *Salmonella typhimurium*
- C. *Clostridium butylicum*
- D. *Acetobacter aceti*

Answer: B



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277. Polymerase chain reaction (PCR) is used for

- A. In vivo replication of specific DNA sequence using thermostable DNA polymerase
- B. In vitro synthesis of mRNA
- C. In vivo synthesis of mRNA

D. Separation of DNA fragments according to their size.

Answer: D



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278. Bioreactors have

- A. Separation and purification of a product
- B. Microinjection
- C. Processing of large volumes of culture

D. Isolation of genetic material

Answer: C



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279. How are transformants selected from nontransformants

A. Presence of more than one recognition site in vector DNA

B. Presence of alein DNA into vector DNA
results into insertional inactivation of
selectable marker

C. Antibiotic resistance gene gets
inactivated due to insertion of alein DNA

D. Both B and C

Answer: D



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

A. It is the first artificial cloning vector constructed in 1977 by Boliver and Rodriguez

B. It is 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 sal I

Answer: D



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281. Assertion : GM crops can affect human health by causing allergic reactions

Reason : Transgenes in commercial crops endanger native species. For example, Bt toxin gene expressed in pollen might endanger pollinators like Honey bees.

- A. if both are true with reason being correct explanation
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. assertion true but reason is wrong
- D. both are wrong

Answer: B



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282. Assertion : GM foods are facing widespread resistance by the people

Reason : GM foods hve mutated genes which cause infections and alleriges

A. if both are true with reason being correct explanation

B. assertion true but correct explanation

C. assertion true but reason is wrong

D. both are wrong

Answer: A



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283. Assertion : Secondary metabolites are produced in small quantities and their extraction from the plant is difficult and expensive.

Reason : Secondary metabolites can be commercially produced by using tissue culture technique.

A. if both are true with reason being correct explanation

B. assertion true but correct explanation

C. assertion true but reason is wrong

D. both are wrong

Answer: B



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284. Assertion: In recombinant DNA technology, human genes are often transferred into bacteria (prokaryotes) or yeast (eukaryote)

Reason : Both bacteria and yeast multiply very fast to form huge population, which express the desired gene

A. if both are true with reason being correct explanation

B. assertion true but correct explanation

C. assertion true but reason is wrong

D. both are wrong

Answer: A



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285. Plasmid vector in DNA recombinant technology means

- A. A virus that transfers gene to bacteria
- B. Extrachromosomal autonomously
replicating circular DNA
- C. Sticky end of DNA
- D. Any fragment of DNA carrying desirable
gene.

Answer: B



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286. An example of gene therapy is

- A. Production of injectable hepatitis B vaccine
- B. Production of vaccine in food crops like potatoes which can eaten

C. Introduction of gene for adenosine deaminase in persons suffering from severe combined immuno-deficiency

D. Production of test babies by artificial insemination and implantation of fertilized eggs.

Answer: C



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287. Which vector can clone only a small fragment of DNA ?

A. Yeast artificial chromosome

B. Plasmid

C. Cosmid

D. Bacterial artificial chromosome

Answer: B



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288. DNA polymerase is isolated from bacteria

A. *E. coli*

B. *Bacillus thuringiensis*

C. *Thermus aquaticus*

D. *Agrobacterium*

Answer: C



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289. Assertion (A) : Restriction endonucleases recognise short pallindromic sequence and cut at specific sites

Reason (R) : When a restriction endonuclease acts on a pallindrome, it cleaves both the strands of DNA molecule.

A. A and R both correct and R is explanation of A

B. A is correct and R is wrong

C. A and R are both correct but R is not correct explanation of A

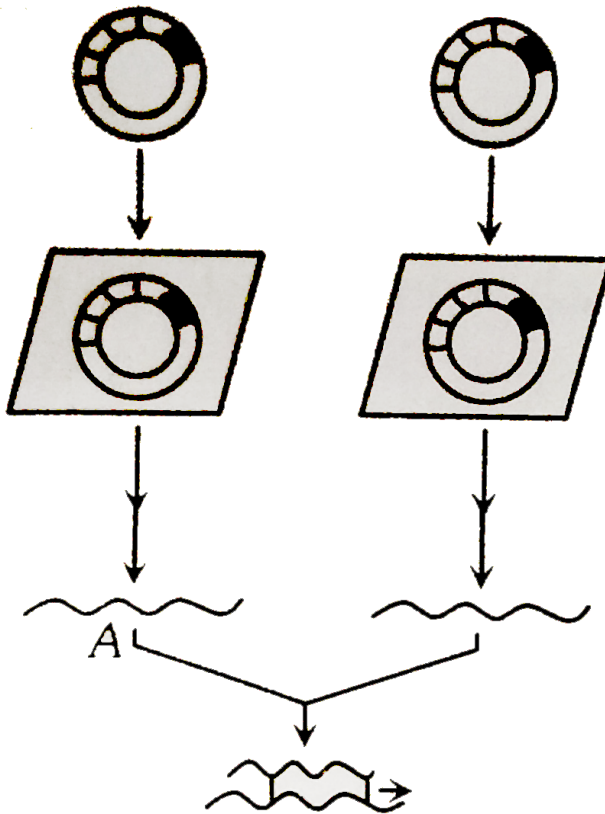
D. A is wrong and R is correct.

Answer: C



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290. What indicated "A" in given figure



A. Peptide bond

B. Disulphide bond

C. Glycosidic bond

D. Hydrophobic bond

Answer: B



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291. In which field, application of biotechnology occurs

A. Biomedicine

B. Agriculture

C. Environmental field

D. All the above

Answer: D



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292. The cloning vectors M13 has genetic material

A. (a) ssRNA

B. (b) dsRNA

C. (c) ssDNA

D. (d) dsDNA

Answer: C



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293. In the nomenclature of enzyme restriction endonuclease the Roman numerical indicates

A. (a) Number of times it is used

B. (b) The order of discovery from source

C. (c) Number of cuts on DNA

D. (d) Number of recombinants formed

Answer: B



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294. A desirable change in genotype of an organism is obtained by

A. DNA replication

B. Protein synthesis

C. rDNA technology

D. mRNA formation

Answer: C



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295. More than 95% of transgenic animals are

A. Rabbits

B. Mice

C. Fish

D. Cows

Answer: B



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296. Transgenic animals are generally produced for all of the following needs except:

- A. Testing of chemical safety
- B. Testing of vaccine safety
- C. Stimulation of pathogenicity

D. Production of pharmacologically important proteins

Answer: C



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297. Clot formation can be prevented by treatment with_____in gene therapy

A. DNAase

B. Recombinant vaccine

C. TPA

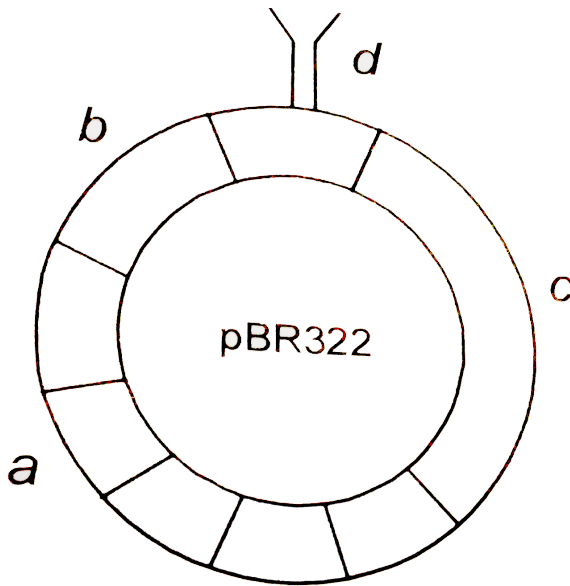
D. TGF-B

Answer: C



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298. Identify a,b,c,d in the given diagram



- A. a-ori, b- amp^R , c- tet^R , d- Hind III
- B. a- Hind III, b - tet^R , c - amp^R , d-ori
- C. a - amp^R , b - tet^R , c - Hind III, d - ori
- D. a - tet^R , b - Hind III, c - ori, d - amp^R

Answer: A



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299. Which one of these is not a tool of recombinant DNA technology

A. Restriction enzyme

B. Vector

C. Polymerase enzyme

D. Introns

Answer: D



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300. One of the methods of which DNA cannot be transferred to the host cell is by

- A. Microinjection
- B. Gene gun
- C. Disarmed pathogen vectors
- D. PCR

Answer: D



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301. What is the advantage of clinical use of humulin over use of conventional ox of pig insulin

- A. It does not cause immunological problems
- B. It is cheaper for the patient
- C. It is produced by E. coli in our intestine

D. There is no advantage

Answer: A



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302. One of the advantages of developing transgenic mice is that it is very useful:

- A. To study vaccine safety
- B. In producing new varieties of mice
- C. In developing a show piece example

D. In gene targeting

Answer: A



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303. Study the following lists and find the correct match

- | | |
|----------------------------|---|
| (a) Vector | (i) Resistant to cotton bollworm |
| (b) Down stream processing | (ii) Mobile genetic elements |
| (c) <i>Cry II Ab</i> | (iii) Controls corn borer |
| (d) Transposons | (iv) T ₁ plasmid |
| | (v) Purifying protein in biopharmaceuticals |

A. a-iv, b-v, c-ii, d-iii

B. a-iii, b-v, c-iv, d-ii

C. a-iv, b-ii, c-i, d-v

D. a-iv, b-v, c-i, d-ii

Answer: D



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304. Select the wrong statement

(a) Presence of chromogenic substrate gives blue color colonies if the plasmid in the

bacteria does not have an insert

(b) Retroviruses in animals have the ability to transform normal cells into cancerous cells

(c) In microinjection, cells are bombarded with high velocity microparticles of gold or tungsten coated with DNA

(d) Since DNA is a hydrophilic molecule it cannot pass through cell membranes

A. Presence of chromogenic substrate gives blue colour colonies if the plasmid in the bacteria does not have an insert

B. Retroviruses in animals have the ability to transform normal cells into cancerous cells

C. In microinjection, cells are bombarded with high velocity microparticles of gold or tungsten coated with DNA

D. Since DNA is a hydrophilic molecule it cannot pass through cell membranes

Answer: C



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305. Select the wrong statement

A. (a) Human insulin is being commercially produced from a transgenic species of *Escherichia coli*

B. (b) Genetically modified *Bacillus thuringiensis* is used as biopesticide on commercial scale

C.(c) Human protein, α -1-antitrypsin, is used to treat emphysema

D.(d) Bt toxin genes cry IAc control corn borer

Answer: D



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306. Restriction endonucleases are

- A. Synthesized by bacteria as part of their defence mechanism
- B. Used in vitro DNA synthesis
- C. Present in mammalian cells to degrade DNA when the cells die
- D. Used in genetic engineering for ligation of two DNA molecules.

Answer: A



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307. In insertional inactivation of β -galactosidase gene, the bacteria in white colonies have

- A. (a) Nonrecombinant plasmid
- B. (b) Recombinant plasmid
- C. (c) No plasmid
- D. (d) Linear foreign DNA

Answer: B



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308. Match the improved varieties with related

- | | |
|-------------------|--------------------------------|
| (a) Golden Rice | (i) Cross breed hybrid |
| (b) IR-8 Rice | (ii) Somatic hybrid |
| (c) Himgiri Wheat | (iii) Semi-dwarf variety |
| (d) Pomato | (iv) Genetically modified crop |

A. a-iv, b-i, c-ii, d-iii

B. a-iv, b-iii, c-i, d-ii

C. a-ii, b-iv, c-i, d-iii

D. a-i, b-iii, c-iv, d-ii

Answer: B



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309. With respect to DNA fragmentation

Statement A: Gel electrophoresis and elution are two important processes

Statement B : After staining with ethidium bromide, it has to be exposed to UV light

A. Only A is correct and B is not correct

B. Only B is correct

C. Both A and B are correct statements

D. Only A is correct

Answer: C



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310. The cutting of DNA at specific locations be- came possible with the discovery of

A. Restriction enzymes

B. Probes

C. Selectable markers

D. Ligases

Answer: A



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311. The introduction of t-DNA into plants involves

A. Infection of the plant by *Agrobacterium tumefaciens*

B. Altering the pH of the soil, then heat shocking the plants

C. Exposing the plants to cold for a brief period

D. Allowing the plant roots to stand in water.

Answer: A



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312. The DNA molecule to which the gene of interest is integrated for cloning is called

A. Transformer

B. Vector

C. Template

D. Carrier

Answer: B



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313. Gel electrophoresis is used for

A. Cutting DNA

B. Isolation of DNA

C. Construction of recombinant DNA

D. Separation of DNA fragments according to their size.

Answer: D



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314. Restriction endonucleases are enzymes that

A. Restrict the action of other enzymes

B. Break phosphodiester bond between
specific nucleotides of DNA

C. Break nucleus into pieces

D. Break H-bond between two strands of
DNA

Answer: B



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315. Extrachromosomal self replicating double stranded circular DNA in bacterial cell is called

A. Plasmids

B. Phages

C. Virus

D. Chloroplasts

Answer: A



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316. A dicotyledonous plant forms crown gall when

A. *Agrobacterium tumefaciens* comes in contact with the plant

B. *Agrobacterium rhizogenes* comes in contact with the plant

C. A specific part of DNA from the Ti plasmid gets integrated with the plant chromosome

D. A specific part from the Ri plasmid gets integrated with the plant chromosome

Answer: C



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317. Which one is wrong in relation to transgenic Bt cotton plant

A. Crop yield loss due to attack by *Bacillus thuringiensis* bacterium is reduced

- B. Crop yield loss due to attack by lepidopteran insect pest is reduced
- C. Use of chemical insecticides in the cotton field is minimised
- D. Better quality cotton is produced

Answer: A



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318. Antibodies produced by a group of identical B-cells against a single epitope of an antigen is called

- A. Polyclonal antibodies
- B. Monoclonal antibodies
- C. Antihapten antibodies
- D. Somaclonal antibodies

Answer: B



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319. Gene therapy has been successful in curing genetic diseases in laboratory animals through

A. Exposure to X-ray to rectify the defective gene

B. Replacing the defective gene with a functional gene

C. Oral delivery of genes

D. Use of therapeutic medicines to rectify the defective genes

Answer: B



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320. Bacteria protect themselves from viral attack by producing

- A. Methylase
- B. Endonucleases
- C. Ligases
- D. Exonucleases

Answer: B



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321. Genetic engineered male sterile crop plants may be produced by inserting

A. Bt toxin gene

B. Barnase gene

C. Lectin gene

D. Chitinase gene

Answer: B



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322. Polymerase chain reaction

- A. Is a method of synthesising human protein from human DNA
- B. Uses restriction enzymes
- C. Can produce billions of copies of a DNA fragment

D. Takes place naturally in bacteria

Answer: C



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323. Genes can be inserted into human cells by

A. PCR

B. Xenotransplantation

C. Modified viruses

D. Modified microarrays

Answer: C



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324. The hepatitis B vaccine is

- A. Combined vaccine
- B. Recombinant antigen vaccine
- C. Polysaccharide vaccine
- D. DNA vaccine

Answer: B



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325. Human insulin is being commercially produced from a transgenic species of

- A. *E. coli*
- B. *Brassica napus*
- C. *Bacillus thuringiensis*
- D. *Agrobacterium*

Answer: A



326. Isolation of DNA from a fungal cell involves the use of enzyme

A. Chitinase

B. Lysozyme

C. Eco RI

D. Hind II

Answer: A



327. The first nif genes were isolated from

- A. *Klebsiella aerogenes*
- B. *Klebsiella oxytoa*
- C. *Klebsiella pneumonia*
- D. *Klebsiella granulonatis*

Answer: C



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328. The plasmid used by Cohen and Boyer for the first transformation experiment was

A. pSC 101

B. PUC 19

C. pBR 322

D. pBR 400

Answer: A



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329. Which of the following has revolutionised the discipline of biotechnology

- A. Restriction endonucleases
- B. Discovery of DNA structure
- C. Recombinant DNA
- D. All the these

Answer: D



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330. In an experiment the gene of bioluminescence from firefly has been successfully transferred into a plant as a result of which it started to glow. In the terminology of the molecular genetics, the plant is called

- A. Firefly plant
- B. Hybrid plant
- C. Transgenic plant
- D. Bioluminescent plant

Answer: C





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331. The genetically modified crops (GM) may contain the gene of interest from

- A. Closely related species
- B. Distantly related species
- C. Bacteria or animals
- D. All the above

Answer: D



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332. Which statement is correct about Bt cotton

A. Contains a gene from jelly fish which makes it to glow in dark

B. It contains a gene from Bacillus bacteria which is not useful to plants

C. It contains a gene from Bacillus bacteria which kill the pests

D. It contains a gene from *Bacillus* bacteria
which kill other plants

Answer: C



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333. Assertion (A) : Acidic pH of insect converts
inactive Bt toxin into active form

Reason (R) : Most of Bt toxins are insect group
specific.

A. A and R true and R is incorrect
explanation of A

B. A and R are true and R is not the correct
explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: D



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334. Find the correct match

I	II	III
(a) PCR	(i) Specific base sequence	(p) Taq polymerase
(b) Downstream processing	(ii) Inheritable gene	(q) Ampicillin resistance
(c) Restriction endonuclease	(iii) Amplification of DNA	(r) <i>E.coli</i>
(d) Selectable marker	(iv) Transformation and non-transformation	(s) Quality control
	(v) Product separation and purification	(t) /

A. a-iii-p, b-v-s, c-ii-t, d-i-r

B. a-i-s, b-iv-p, c-ii-t, d-iii-q

C. a-iii-p, b-v-s, c-i-r, d-iv-q

D. a-iii-p, b-iv-q, c-i-r, d-ii-t

Answer: C



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335. Which one is correct answer for plasmid

(i) It can be readily isolated from cells

(ii) It possesses a single recognition site for one restriction enzyme

(iii) It should have high molecular weight

(iv) Plasmids and bacteriophages have the ability to replicate within bacteria

A. i, ii, iv

B. i, ii, iii, iv

C. ii, iii, iv

D. i, ii, iii

Answer: A



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336. Identify the wrong statements

- (a) Genetic modifications in plants helped to reduce post-harvest losses
- (b) In Tobacco, cry genes are introduced against nematodes

(c) In gene therapy, healthy genes are inserted into person's cells and tissues to treat diseases

(d) Injustice, inadequate compensation and benefit sharing are related to molecular diagnosis.

A. a,b,c

B. b,c,d

C. a,b,d

D. a,c,d

Answer: B



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337. Assertion (A) : The milk of transgenic cow Rosie was nutritionally more balanced than normal cow milk

Reason (R) : α -1 antitrypsin is a biological product produced by transgenic animals

A. Both A and R are true, R is correct explanation for A

B. Both A and R are true, R is not correct explanation for A

C. A is true but R is false

D. A is false but R is true

Answer: B



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338. Restriction sites for Pvu I and Pvu II respectively are in which genes of pBR 322

A. rop, amp^R

B. amp^R , rop

C. rop, ori

D. ori, rop

Answer: B



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339. After insertion of DNA segment within the sequence of Z-gene of bacteria, they are grown on chromogenic substrate. After the growth of

bacterial colonies, they are identified as

- (i) Recombinants if colonies are blue-coloured
- (ii) Recombinants if colonies are white coloured
- (iii) Non-recombinants if colonies are blue-coloured
- (iv) Non - recombinants if colonies are white coloured

A. iii, iv

B. i, iv

C. i, ii

D. ii, iii

Answer: D



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340. Identify the correct sequence of steps in RNA-interference (RNAi) process to develop nematode resistant plants

- (i) Silencing of specific mRNA of the nematode
- (ii) Formation of sense and antisense RNA
- (iii) dsRNA formation

(iv) Introducing nematode specific genes into plant

A. i, ii, iv, iii

B. iii, ii, i, iv

C. iv, ii, iii, i

D. iv, i, ii, iii

Answer: C



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341. Identify the wrong statement with reference to the structure of human insulin

A. Insulin is synthesised as a pre-hormone which contains an extra stretch called C-peptide

B. A and B chains are combined by disulphide bonds to form humulin

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

D. In these, chain A is made up of 30 amino acids and chain B is made up of 21 amino acids.

Answer: D



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342. Pathogenic entity which is responsible for the production of tumour in most dicot plants is

A. Retrovirus

B. Bacteriophage

C. Ti plasmid

D. Vector

Answer: C



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343. Transgenic animals means

- A. Genes of the animal are introduced into other animals
- B. All the genes are from the same animal
- C. These animals are used as vectors
- D. Introduction of exogenous DNA into the genome of an animal to create and maintain a stable heritable character.

Answer: D



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344. In which of the following cry protein is synthesised

A. Simple cotton

B. Bt cotton

C. *Bacillus thuringiensis*

D. Bt cotton and *Bacillus thuringiensis*

Answer: D



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345. Which is correct about genetically modified sugar by America

A. Brazzein

B. Basmati

C. Cane sugar

D. Zeamin

Answer: A



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346. What is the role of primer in PCR?

A. Denaturation

B. Annealing

C. Polymerisation

D. Isolation

Answer: B



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347. *Agrobacterium tumefaciens* is most widely used for gene transfer because of

A. It causes crown gall tumours

B. its ability to insert Ti plasmid into nuclear genome

C. It can grow anywhere

D. It has the ability to kill pathogenic bacteria

Answer: B



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348. In plasmid pBR 322, 'BR' stands for

- A. Baculovirus and Retrovirus
- B. Boyer and Reed
- C. Bollivar and Rodrigues
- D. Bacillus and Rhizobium

Answer: C



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349. The plasmid of which organism was used successfully for the first time as vector by Cohen and Boyer

- A. *Salmonella typhimurium*
- B. *Streptococcus pneumoniae*
- C. *Staphylococcus aureus*
- D. *Rhizobium leguminosarum*

Answer: C



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350. Cystic fibrosis can be treated by -in gene therapy

A. TGP-B

B. TPA

C. Dnase

D. BGH

Answer: C



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351. Which of the following is not produced as transgenic animals

- A. Sheep and pig
- B. Rat and Rabbit
- C. Dog and Banded Krait
- D. Cow and Fish

Answer: C



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352. Match the columns and choose the right option

I	II
(a) ELISA	(i) Antigen-antibody interaction
(b) PCR	(ii) Gene amplification
(c) Biolistics	(iii) Direct introduction of recombinant DNA
(d) Microinjection	(iv) Gold coated DNA

A. a-iii, b-iv, c-i, d-ii

B. a-ii, b-i, c-iv, d-iii

C. a-iv, b-i, c-ii, d-iii

D. a-i, b-ii, c-iv, d-iii

Answer: D



353. Match the columns and choose the right option

I		II	
(a) <i>Bacillus thuringiensis</i>	(i)	Restriction endo-nuclease	
(b) <i>Agrobacterium tumefaciens</i>	(ii)	Thermostable DNA polymerase	
(c) <i>Thermus aquaticus</i>	(iii)	Insecticidal protein	
(d) <i>Escherichia coli</i>	(iv)	Ti plasmid	

A. a-iii, b-iv, c-i, d-ii

B. a-ii, b-i, c-iv, d-iii

C. a-iv, b-i, c-ii, d-iii

D. a-iii, b-iv, c-ii, d-i

Answer: D



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354. Which of the following statements about transgenic animals is/are false

- (i) Transgenic animals are designed to study how genes are regulated
- (ii) They are specially made to serve as models for human diseases
- (iii) Transgenic cow Rosie was created to produce human protein α -1 antitrypsin

(iv) Transgenic mice are used to test the safety of vaccines

A. iii only

B. I and iii only

C. ii only

D. ii and iii only

Answer: A



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355. Most suitable method of introducing alien DNA into a plant cell is

- A. Biolistics
- B. Micro - injection
- C. Lipofection
- D. Heat shock method

Answer: A



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356. Desired genes have been introduced transgenic animals to obtain large scale production of useful biological products encoded by these genes. This approach is generally referred to as

- A. Hybridoma technology
- B. Molecular farming
- C. Gene therapy
- D. Downstream processing

Answer: B





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357. Which one of the following statements is not correct about a plasmid

- A. It is a circular DNA
- B. It has antibiotic resistant gene
- C. It has the ability of autonomous
- D. Its DNA is as long as chromosomal DNA

Answer: D



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358. Which of the following is a restriction endonucleases?

A. RNAase

B. Hind II

C. Protease

D. DNA ase I

Answer: B



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

A. Root

B. Flower

C. Leaf

D. Stem

Answer: A



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360. The two polypeptides of human insulin are linked together by

- A. Disulphide bridges
- B. Hydrogen bonds
- C. Phosphodiester bridge
- D. Covalent bond.

Answer: A



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361. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using

A. Ligase

B. Eco RI

C. Taq polymerase

D. Polymerase II

Answer: A



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362. Which of the following is not component of downstream processing?

A. Expression

B. Separation

C. Purification

D. Presentation

Answer: A



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

A. Radiation therapy

B. Gene therapy

C. Chemotherapy

D. Immunotherapy

Answer: B



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364. Match the columns of substances and enzymes required to degrade them

I	II
(a) Cell wall	(i) Proteases
(b) RNA	(ii) Pectinases
(c) Histone	(iii) Ribonucleases
(d) Pectin	(iv) Cellulase

A. a-iv, b-iii, c-i, d-ii

B. a-ii, b-i, c-iv, d-iii

C. a-i, b-ii, c-iii, d-iv

D. a-iii, b-iv, c-ii, d-i

Answer: A





365. Which one is a correct statement

- A. "Bt" in "Bt Cotton" indicates that it is a genetically modified organism produced through biotechnology
- B. Classical plant breeding involves fusion of two somatic cells carrying desired genes

- C. Anticoagulant hirudin is being produced from seeds of transgenic *Brassica napus*
- D. Golden Rice is a transgenic variety of rice rich in vitamin E

Answer: C



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366. Assertion : Flavr-Savr tomato was the first transgenic commercial crop that entered the market

Reason : Roundup variety of Soay Bean was prepared through breeding.

A. if both are true with reason being correct explanation

B. both true but reason is not correct explanation

C. assertion true but reason is wrong

D. both are wrong

Answer: C



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367. Assertion : Restriction enzymes cut the strand of DNA to produce sticky ends.

Reason : Stickiness of the ends facilitates the action of the enzyme DNA polymerase

A. if both are true with reason being correct explanation

B. both true but reason is not correct explanation

C. assertion true but reason is wrong

D. both are wrong

Answer: C



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

A. Upstream processing

B. Downstream processing

C. Bioprocessing

D. Post-production processing

Answer: B



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369. 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. Positive charged fragment moves to farther end

D. Negatively charged fragments do not move

Answer: B



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370. A gene whose expression helps to identify transformed cell is known as

A. Selectable marker

B. Vector

C. Plasmid

D. Structural gene

Answer: A



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

A. Bromophenol blue

B. Acetocarmine

C. Aniline blue

D. Ethidium bromide

Answer: D



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1. The term plasmid was coined by

A. Lederberg and Tatum

B. Hayes and Lederberg

C. Anderson

D. Stanley

Answer:



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2. Eco RI is

A. Terminal transferase

B. Restriction enzyme

C. Vector plasmid

D. Vector virus

Answer:



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3. Taq polymerase used in polymerase chain reaction is active at temperature of

A. $25^{\circ} - 30^{\circ} C$

B. $35^{\circ} - 50^{\circ} C$

C. $50^{\circ} - 70^{\circ} C$

D. $72^{\circ} - 90^{\circ} C$

Answer: D



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4. Enzyme Taq polymerase is obtained from

- A. *Thermus aquaticus*
- B. *Trichoderma aquatica*
- C. *Tremetes aquaticus*
- D. All the above

Answer: A



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5. Modified tumour free T_1 plasmid carrying a desired gene is called

A. Cosmid

B. Phagemid

C. T-DNA

D. BAC

Answer: C



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6. GMOs are

A. Transgenic microbes

B. Transgenic plants

C. Transgenic animals

D. All the above

Answer: D



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7. Restriction endonucleases are obtained from

A. Bacteria

B. All prokaryotic cells

C. Bacteriophages

D. Plasmids

Answer: A



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8. Silencing complex is produced by

A. Sense RNA

B. Antisense RNA

C. Short interference RNA

D. All the above

Answer:



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9. RISC is

- A. RNA induced silencing complex
- B. RNA interference short segment
- C. Recombinant induced short cloning
- D. None of the above

Answer:



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10. Cry protoxin is changed into toxic state in

- A. Alkaline medium

B. Acidic medium

C. Neutral medium

D. Contact with saliva

Answer: A



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Brain Teasers

1. Curative technique involving repairing or replacement of defective genes is

- A. Gene therapy
- B. Gene replacement therapy
- C. Antisense therapy
- D. Sense therapy

Answer: A



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2. Gene splicing was invented by

- A. Cohen and Boyer

B. Parsons et al

C. Ohno and Hanschka

D. Nakamura et al

Answer: A



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3. Gene shears are

A. Pieces of mRNA

B. Endonucleases

C. Exonucleases

D. Mini lasers

Answer: A



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4. Gene shear breaks

A. mRNA

B. rRNA

C. DNA

D. tRNA

Answer: A



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5. Cosmid is

A. Circular extra-nuclear DNA of bacteria

B. Extra genetic material in mycoplasma

C. Fragment of DNA inserted in bacteria for
forming its copies

D. Fragment of genetic material inserted in cells to replace defective genes.

Answer: C



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