



BIOLOGY

BOOKS - GR BATHLA & SONS BIOLOGY (HINGLISH)

BIOTECHNOLOGY : PRINCIPLES AND PROCESSES

Multiple Choice Questions

1. Utilisation of biological knowledge for the production of materials useful to society is called:

- A. Biotechnology
- B. bioengineering
- C. Applied Biology
- D. Molecular Biology

Answer: A



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2. The technique which involves addition or deletion of genes is :

- A. gene therapy
- B. gene splicing
- C. genetic engineering
- D. artificial synthesis

Answer: C



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3. Introduction of foreign genes for improving genotype is

Or

Insertion or deletion of one or more new genes which are absent in an organism by artificial method (not by reproduction) is called as

- A. tissue culture
- B. vernalization
- C. biotechnolgy
- D. genetic engineering

Answer: D



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4. Genetic engineering means:

- A. manipulation of genes
- B. experiments on tissue culture
- C. manipulation of chromosomes
- D. producing completely new types of genes

Answer: A



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5. Genetic engineering is :

A. making artificial genes

B. production of alcohol by using
microorganisms

C. hybridization of DNA of one organism to
that of others

D. making artificial limbs, diagnostic
instruments such as ECG,EEG,etc.

Answer: C



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6. In genetic engineering recombinant DNA means :

- A. DNA with a piece of RNA
- B. DNA with a piece of foreign DNA
- C. DNA which takes part in recombination
- D. DNA not associated with recombination

Answer: B



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7. Genetic engineering :

A. can be used to make copies DNA sequence, a gene, or a gene's protein product

B. can be used to alter the performance of the genetically modified organism

C. raises ethical questions and poses risks to society

D. all of the above

Answer: D



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8. Transfer of any gene into a completely different organism can be done through :

A. genetic engineering

B. transformation

C. tissue culture

D. none of these

Answer: A



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

A. gene therapy

B. tissue culture

C. genetic engineering

D. hybridoma technology

Answer: C



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10. First protoplast fusion was done by :

A. Jacob and Monod

B. Watson and Crick

C. Harris and Watkins

D. Kornberg and Khorana

Answer: C



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11. Protoplasts of two different species are fused
in:

A. micropropagation

B. somatic hybridization

C. clona propagation

D. organography

Answer: B



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12. Who discovered recombinant DNA(r-DNA) technology ?

A. James D. Watson

B. Har Gobind Khorana

C. Walter Sutton and Oswald Avery

D. Stanley Cohen and Herbert Boyer

Answer: D



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13. 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 (A) and (R) are true and (R) is the correct explanation of the (A)

B. Both (A) and (R) are true but the (R) is not the correct explanation of (A)

C. (A) is true statement but (R) is false

D. (A) and (R) are false

Answer: A



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14. Gene recombinant technology is used for :

A. Vectorless gene transfer into target cell

B. direct transfer of DNA protein complex

C. vector based gene transfer in to target
cell

D. liposome base direct gene transfer into
target cell

Answer: C



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15. Which one of the following techniques made it possible to genetically engineer living organisms ?

A. Hybridization

B. X-ray diffraction

C. Heavier isotope labelling

D. Recombinant DNA techniques

Answer: D



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16. Which of the following is not required in the preparation of a recombinant DNA molecule ?

A. E. coli

B. DNA ligase

C. DNA fragments

D. Restriction endonuclease

Answer: A



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17. Which one of the following technique is not used for early molecular diagnosis ?

- A. Polymerase chain reaction
- B. Recombinant DNA technology
- C. Polyacrylamide gel electrophoresis
- D. Enzyme linked immunosorbent assay

Answer: B



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18. Which is used in molecular genetic engineering ?

A. Carrot

B. Tomato

C. Tobacco

D. Arabidopsis

Answer: D



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19. Pentadiplandra brazzeana produces a protein called brazzein which is about 2,000 times as sweet as sugar. This plant belongs to :

A. Canada

B. Australia

C. West Africa

D. South America

Answer: C



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20. Advancement in genetic engineering has been possible due to :

A. oncogenes

B. transposons

C. exonucleases

D. endonucleases

Answer: D



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21. Restriction endonucleases

- A. tissue culture
- B. genetic engineering
- C. cell fractionation
- D. regeneration of tissue

Answer: B



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22. Genetic engineering is possible because

A. primase

B. DNA ligase

C. transcriptase

D. restriction endonuclease

Answer: D



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23. The function of restriction enzyme is :

A. cleavages of fat

B. cleavages of DNA

C. cleavages of starch

D. cleavages of protein

Answer: B



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24. Restriction' in restriction enzyme refers to

A. prevention of the multiplication of bacteriophage in bacteria

B. Cleaving of phosphodiester bond in DNA

by the enzyme

C. Cutting of DNA at specific position only

D. all of the above

Answer: A



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25. Which of the endonuclease is mostly used in Genetic Engineering

A. Type I

B. Type II

C. Type III

D. (a) and (C)

Answer: B



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26. Genetic engineering is possible because

A. the phenomenon of transduction in bacteria is well understood

B. restriction endonuclease purified from bacteria can be used in vitro

C. we can see DNA specific sites by endonucleases like Dnase

D. we can see DNA by electron microscope

Answer: B



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27. Which of the following pairs is correctly matched ?

A. Central dogma - Codon

B. Okazaki fragments - Splicing

C. RNA polymerase - RNA primer

D. Restriction enzymes - Genetic engineering

Answer: D



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28. The enzymes commonly used in genetic engineering are :

- A. Restriction endonuclease and polymerase
- B. Restriction endonuclease and ligase
- C. Endonuclease and ligase
- D. Ligase and polymerase

Answer: B



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29. The enzyme used to cut the DNA molecule is

:

A. DNA ligases

B. β – galactosidase

C. DNA polymerases

D. Restriction endonuclease

Answer: D



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30. Which one of the following hydrolyses internal phosphodiester, bonds in a polynucleotide chain

A. Lipase

B. Protease

C. Exonuclease

D. Endonuclease

Answer: D



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31. Restriction enzyme was discovered by

A. Milstein and Kohler

B. Temin and Baltimore

C. Arber, Nathans and Smith

D. Holley, Khorana and Nirenberg

Answer: C



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32. Which enzyme acts as biological scissors in genetic engineering

A. Ligases

B. Nucleases

C. Polymerases

D. Restriction endonucleases

Answer: D



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33. Restriction endonucleases are useful in :

A. breaking DNA at specific sites

B. producing sticky DNA ends

C. both (a) and (b)

D. crossing over

Answer: C



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34. Which of the following statements does not hold true for restriction enzyme ?

A. It is an endonuclease

B. It is isolated from viruses

C. it recognises a palindromic nucleotide sequence

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

Answer: B



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35. Restriction endonucleases are most widely used in recombinant DNA technology. They are obtained from :

- A. plasmids
- B. bacterial cells
- C. bacteriophages
- D. all prokaryotic cells

Answer: B



36. Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with :

A. ligase

B. gyrase

C. exonuclease

D. endonuclease

Answer: D



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37. In nature, the function of restriction enzymes is to :

A. to cut plasmids

B. destroy phage DNA

C. splice DNA in a cell

D. destroy foreign DNA in animal cells

Answer: B



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38. Which of the following cut DNA at specific sites ?

A. Ligase

B. Exonuclease

C. Alkaline phosphatase

D. Restriction endonuclease

Answer: D



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39. The chemical knives of DNA are

Or Enzyme that cleaves nucleic acids within the polynucleotide chain is known as

A. ligases

B. polymerases

C. endonucleases

D. transcriptases

Answer: C



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40. The term 'molecular scissors' refers to

A. ligase

B. cellulase

C. pectinase

D. restriction endonuclease

Answer: D



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41. Read the given statements and select the correct option,

Statement 1 : Restriction endonuclease enzymes recognise a specific palindromic nucleotide sequence in the DNA

Statement 2: Restriction endonuclease enzymes are called as molecular scissors or biological scissors.

A. the cellular DNA does not have the specific sites

B. the susceptible specific sites are marked
by proteins

C. the restriction enzyme susceptible sites
are modified by cellular enzymes

D. the restriction enzymes and DNA occupy
used in genetic engineering is employed
for:

Answer: C



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42. Restriction endonuclease, an enzyme used in genetic engineering is employed for :

- A. cutting double stranded DNA
- B. cutting single stranded DNA
- C. copying DNA strands
- D. join strands of DNA

Answer: A



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43. RESTRICTION ENZYMES

A. cut or join DNA fragments

B. are required in vectorless direct gene transfer

C. are endonucleases which cleave DNA at specific sites

D. make DNA complementary of an existing DNA or RNA

Answer: C





44. Restriction endonuclease are utilized in genetic engineering as :

A. molecular build up at nucleotides

B. molecular degradation to DNA break up

C. molecular scalpels for cutting DNA at specific sites

D. molecular cement for combining DNA bits into long chains

Answer: C



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45. TYPES OF RESTRICTION ENDONUCLEASES

- A. are carbohydrates
- B. destroy host cell DNA
- C. are transposable elements
- D. recognize and cut specific DNA sequences

Answer: D



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46. In recombinant DNA experiments _____ is used to cut pieces of DNA and _____ joins these segments to form recombinant DNA:

- A. a plasmid DNA ligase
- B. a transposon..... a plasmid
- C. DNA ligase..... a restriction enzyme
- D. a restriction DNA ligase

Answer: D





47. When a typical restriction enzyme cuts a DNA molecule, the cuts are uneven so that the DNA fragments have single-stranded ends . These ends are useful in recombinant DNA work because :

A. they serve as starting points for DNA replication

B. only single stranded DNA segments can code for proteins

C. they enable researchers to use the fragments as molecular probes

D. the fragments will bond to other fragments with complementary ends.

Answer: D



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48. EcoRI is :

A. a plasmid

B. a restriction enzyme

C. used to join two DNA fragments

D. the abbreviation for bacterium *Escherichia coli*

Answer: B



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49. This is a restriction endonuclease called EcoRI. What does "co" part in it stand for

A. coli

B. colon

C. coelom

D. co-enzyme

Answer: A



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50. A restriction enzyme Eco RI from E. coli is expected to cleave DNA at following sequence:

A. GAATTC

B. AAGTTC

C. AAGCTT

D. GTATATC

Answer: A



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51. Which specific DNA sequence where Eco R1 cuts is

Or Which of the following palindromic sequence
is recongized by EcoRI

A. ATTCGA

TAAGCT

B. GAATTC

CTTAAG

C. GCTTAA

CGAATT

D. GTTCAA

CAAGTT

Answer: B



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52. Sticky ends are produced by following restriction enzymes except :

A. Sma I

B. Pst I

C. Hae II

D. Bam HI

Answer: A



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53. Which of the following restriction enzymes produce blunt ends ?

A. Sma I

B. Hae III

C. Alu I

D. All of these

Answer: D



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54. Which of the following forms chemical scissors ?

A. Eco RI

B. Hind III

C. Bam H II

D. All of these

Answer: D



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55. Which of the following could be a restriction enzyme recognition site ?

A. ATGCAT

B. ATCATC

C. AAAGGG

D. ATCCTA

Answer: A



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56. Which one of the following can give a complementary and palindromic sequence?

A. 5' ATATCC 3'

B. 5'CCGAAT 3'

C. 5'GAATTC 3'

D. 5'AGGTTC 3'

Answer: C



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57. Which of the following produce DNA fragments with sticky ends ?

- A. DNA ligase
- B. Restriction enzymes
- C. DNA polymerase
- D. All of these

Answer: B



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58. The end of fragments of DNA molecule are sticky due to :

- A. free methylation
- B. endonuclease
- C. unpaired bases
- D. calcium ions

Answer: C



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59. 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' _____ CGT TCG _____ 3'

3' _____ ATGGTA _____ 5'

B. 5' _____ GATATG _____ 3'

3' _____ CTAATA _____ 5'

C. 5' _____ GA AT TC _____ 3

3' _____ CT TA AG _____ 5'

D. 5' _____ CACGTA _____ 3

3' _____ CTCAGT _____ 5'

Answer: C



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60. Which of the following DNA sequence qualifies to be designated as a palindrome ?

A. 5'-GACCAG-3' in one strand

B. 3'-GACCAG-5' in one strand

C. 5'-GACCAG-3'

3'-CTGGTC-5'

D. 5'-AGCGCT -3'

3'-TCGCGA-5'

Answer: D



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

A. Protease

B. Lysozyme

C. Ribonuclease

D. Deoxyribonuclease

Answer: D



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62. An enzyme catalysing the removal of nucleotides from the ends of DNA is

A. Hind II

B. DNA ligase

C. exonuclease

D. endonuclease

Answer: C



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63. Enzyme that cleaves nucleic acids within polynucleotide chain is known as :

- A. endonuclease
- B. exonuclease
- C. arlsulfatase
- D. phosphotriesterase

Answer: A



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64. GAATTC is the recognition site for which of the following restriction endonuclease

A. Hind III

B. Eco RI

C. Bam I

D. Hae III

Answer: B



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

A. *Escherichia coli*

B. *Bacillus amylo*

C. *Haemophilus influenzae*

D. *Agrabacterium tumefaciens*

Answer: D



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66. Construction of a recombinant DNA involves:

A. Cleaving and rejoining DNA segments with endonuclease' alone

B. Cleaving DNA segments with endonuclease and rejoining them with ligases

C. Cleaving DNA segments with 'ligase and rejoining them with endonuclease

D. Cleaving and rejoining DNA segments with ligase alone

Answer: B



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67. The enzyme used to join the DNA fragments

is :

- A. DNA ligase
- B. Topoisomerase
- C. DNA polymerase
- D. Reverse transcriptase

Answer: A



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68. The linking of antibiotic resistance gene with the plasmid vector became possible with :

- A. Exonucleases
- B. DNA ligase
- C. Endonuclease
- D. DNA polymerase

Answer: B



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69. DNA ligase was discovered by :

A. Mullis

B. Venter

C. Gellert

D. Lipman

Answer: C



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

- A. Formation of phosphodiester bond between two DNA fragments
- B. Formation of hydrogen bonds between sticky ends of DNA fragments
- C. Ligation of all purine and pyrimidine bases
- D. None of the these

Answer: A



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71. Find out the wrong statement

- A. Udder cell, a somatic cell is used to produce the cloned sheep by unclear transplantation method
- B. In pedigree analysis, a person immediately affected by an action is called propositus

C. Mobile genetic elements transposons

were visualized by Barbara McClintock

D. DNA ligases are used to cleave a DNA

molecule

Answer: D



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72. Which of the following techniques is used to separate proteins?

A. Gel electrophoresis

B. Isoelectric focusing

C. Polymerase chain reaction

D. Ion- exchange chromatography

Answer: A



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73. In agarose gel electrophoresis, DNA molecules are separated on the basis of their

A. size only

B. charge only

C. charge to size ratio

D. all of these

Answer: A



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

A. DNA can be seen in visible light

B. DNA can be seen without staining in visible light

C. Ethidium bromide stained DNA can be seen in visible light

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

Answer: D



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75. A mixture containing DNA fragments a, b, c and d with molecular weights of $a + b = c$, $a > b$ and $d > c$, was subjected to agarose gel electrophoresis. The positions of these fragments from cathode to anode sides of the gel would be

A. B,A,C,D

B. A,B,C,D

C. C,B,A,D

D. B,A,D,C

Answer: A



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76. Agarose extracted from sea weeds finds use in

- A. Tissue culture
- B. PCR
- C. Gel electrophoresis
- D. Spectrophotometry

Answer: C



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77. Which one is used as vector in genetic engineering ?

A. Plasmid

B. Bacterium

C. Cyanophage

D. None of these

Answer: A



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78. In genetic engineering the term vector is applied for :

A. Virus

B. Plasmid

C. sources of DNA

D. cell which receives

Answer: B



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79. The autonomously independent self replicating extranuclear DNA imparting certain factors to some bacterium is called:

- A. cosmid
- B. plastid
- C. plasmid
- D. phagemid

Answer: C



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80. An extrachromosomal DNA which can be used as vector in gene cloning is called :

A. axon

B. intron

C. plasmid

D. transposon

Answer: C



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81. So far the genetic engineering of plants has not resulted in significant increases in food production because :

A. genetically engineering plants are very expensive

B. the vectors used do not work with many food plants

C. agricultural scientists have not pursued it seriously

D. new plant diseases have evolved faster than expected

Answer: B



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82. A part from DNA in the bacterial nucleoid there is a circular extrachromosomal DNA called:

A. plasmid

B. mesosome

C. chromosome

D. none of these

Answer: A



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83. Plasmid :

A. is a component of cell wall of bacteria

B. is a structure which help in respiration

C. consists of genes found inside the nucleus

D. is the genetic part in addition to DNA in
microorganisms

Answer: D



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84. Plasmid :

A. c-DNA

B. viral RNA

C. mitochondrial DNA

D. circular extrachromosomal DNA in bacteria

Answer: D



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

- A. it is resistant to antibiotics
- B. its ability to carry a foreign gene
- C. it is resistant to restriction enzymes

D. its ability to cause infection in the host

Answer: B



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86. Plasmids are suitable vectors for gene cloning because :

A. these are small circular DNA molecules which can integrate with host chromosomal DNA

- B. these are small circular DNA molecules with their own replication origin site
- C. these can shuttle between prokaryotic and eukaryotic cells
- D. these often carry antibiotic resistance genes

Answer: B



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87. Plasmids are extrachromosomal circular DNA

Molecules :

A. Which have their own point of replication
and can replicate independently

B. Which have their own point of replicant
but cannot replicate independently

C. which do not have their own point of
replication and cannot replicate
independent of bacterial chromosomal
DNA

D. none of the above

Answer: A



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88. A plasmid is a :

A. Bacteriophage

B. DNA molecule present in mitochondria

C. DNA molecule incorporated in the
bacterial chromosome

D. DNA molecular DNA molecule capable of self-replication and that can carry genes into host organism

Answer: D



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89. Plasmids are ideal vectors for gene cloning as they :

A. can be multiplied by culturing

B. replicate freely outside the bacterial cells

C. are self-replicating within the bacterial cell

D. can be multiplied in a laboratory using
enzyme

Answer: C



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90. Plasmid is a :

A. double stranded circular DNA

B. extrachromosomal linear DNA

C. single stranded DNA

D. none of the above

Answer: A



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91. Assertion : Plasmids are extrachromosomal DNA.

Plasmids are found in bacteria and are useful in genetic engineering

A. outgrowth of mitochondria

B. outgrowth of cell membrane

C. extrachromosomal circular material

D.

Answer: D



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92. A plasmid is

A. cannot replicate

B. can replicate independently

C. shows independent assortment

D. lives together with chromosomes

Answer: B



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93. What are true of Plasmids

A. They are found in viruses

B. They are main parts of chromosomes

C. They are widely used in gene transfer

D. They contain gene for vital activities

Answer: C



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94. Plasmids are extra chromosomal genetic material of

A. bacteria

B. viruses

C. chloroplasts

D. chromosomes

Answer: A



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95. Generally, plasmids carry which type of genetic material ?

A. Essential genes

B. Useless genes

C. Nonessential genes

D. Metabolic genes

Answer: C



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96. Plasmids are extrachromosomal circular DNA

Molecules :

A. extrachromosomal DNA which can self replicate

B. DNA carrying genetic sequence without expressing it

C. integrated with host DNA without replication ability

D. none of the above

Answer: A



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97. Which of the following is not correct statement about the plasmids

- A. It is the extrachromosomal DNA in bacteria
- B. It is not an integral part of inert genetic material
- C. Host chromosome can be integrated with the Plasmid
- D. Transfer of Plasmid can be done from cell to cell without killing the host

Answer: B



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98. Plasmids that carry genes to provide resistance to antibiotics are called :

A. R-plasmids

B. C-plasmids

C. A-plasmids

D. Ti-plasmids

Answer: A



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99. In plasmid R-gene is responsible for :

- A. exchange of genetic material between two partners
- B. drug resistance
- C. locomotion
- D. all of the above

Answer: B



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100. R-plasmids are important because they :

A. control bacterial reproduction

B. protect bacteria against mutation

C. make bacteria resistant to antibiotics

D. can be used to produce transgenic
animals

Answer: C



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101. The first plasmid used successfully to clone a vertebrate gene by Cohen and Boyer was:

A. pUC19

B. YEp24

C. pSC101

D. pBR322

Answer: C



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102. Identify the plasmid :

A. AIU I

B. Hind III

C. Eco RI

D. pBR322

Answer: D



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103. The plasmid pBR322 used in biotechnology is :

A. Yeast

B. M_{32} phage

C. Parasite

D. Cloning vehicle

Answer: D



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

A. E. coli

B. Salmonella typhimurium

C. B. thuringiensis

D. Yeast

Answer: B



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105. Which of these are correct in view of genetic engineering ?

A. It uses resistant plasmid pBR322

B. DNA molecules are broken down by
topoisomerase

C. The recombined DNA or r-DNA is called
chimeric DNA

D. Both (a) and (C)

Answer: D



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106. A plasmid that have been cleaved with Eco RI can hybridize with another plasmid that has been :

- A. digested with Eco RI
- B. in a Southern blot
- C. digested with Hind III
- D. cleaved with Bam HI

Answer: A



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107. During "gene cloning" which is called as "gene taxi"?

A. vaccine

B. Plasmid

C. bacterium

D. protozoa

Answer: B



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108. An ideal vector must possess:

- A. a multiple cloning site
- B. an origin of replication
- C. a gene encoding a restriction enzyme
- D. a gene encoding resistance to an antibiotic

Answer: B



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109. What is the function of a vector ?

A. Helps to amplify the DNA

B. Allows cells to take up foreign DNA

C. Destroys cells that do not contain cloned
DNA

D. Carries cloned DNA enabling it to replicate
in host cells

Answer: D



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

A. Retrovirus

B. Baculovirus

C. *Rhizopus nigricans*

D. *Salmonella typhimurium*

Answer: A



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

A. nucleoids

B. lomasomes

C. mesosomes

D. plasmids

Answer: D



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112. In recombinant DNA technique, 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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113. The vector for T-DNA is :

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

Answer: C



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114. Insect tolerant gene *Bacillus thuringiensis* is introduced using Ti-plasmid of :

- A. *Escherichia coli*
- B. *Arabidopsis thaliana*
- C. *Haemophilus influenzae*
- D. *Agrobacterium tumefaciens*

Answer: D



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115. Polyethylene glycol method is used for

- A. Energy production from sewage
- B. Gene transfer without sewage
- C. Seedless fruit production
- D. Biodiesel production

Answer: B



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

- A. *Penicillium expansum*
- B. *Trichoderma harzianum*
- C. *Meloidogyne incognita*
- D. *Agrobacterium tumefaciens*

Answer: D



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117. The tumour inducing capacity of *Agrobacterium tumefaciens* is located in large extrachromosomal plasmids called :

- A. pBR322
- B. Ri-plasmid
- C. Ti-plasmid
- D. Lambda phage

Answer: C



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118. Ti-plasmids used in genetic engineering is obtained from :

- A. *Agrobacterium rhizogenes*
- B. *Agrobacterium tumefaciens*
- C. *Bacillus thuringiensis*
- D. *Pseudomonas syringae*

Answer: B



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

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

Answer: D



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120. Crown gall disease in plants is caused by :

A. Ti-plasmid

B. Pi-plasmid

C. bacteria

D. virus

Answer: A



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121. The most important feature in a plasmid to be used as a vector is

A. its size

B. origin of replication (ori)

C. presence of a selectable marker

D. presence of sites for restriction endonuclease

Answer: B



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

- A. Competent cells
- B. Transformed cells
- C. Recombinant cells
- D. None of these

Answer: B



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123. A direct procedure to copy the gene sequence of interest is called :

A. TPA

B. PCR

C. BCG

D. None of these

Answer: B



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124. Which of the following is a recent application of genetic engineering in diagnostic technique ?

A. PCR

B. ELISA test

C. Gravidex test

D. ABC blood groups

Answer: A



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125. PCR stands for :

A. polymerase chain reaction

B. politically correct research

C. polygraphed criminal rating

D. polyploid chromosome restrictions

Answer: A



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126. Manipulation of DNA in genetic engineering become easy due to the invention of :

- A. Do blot
- B. Eastern blotting
- C. Polymerase chain reaction
- D. Enzyme-linked immunosorbent assay

Answer: C



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127. Thermal cycler is used in this reaction:

- A. Radioactivity
- B. Chemical reactions
- C. Polymerase chain reaction
- D. Enzyme catalysed reactions

Answer: C



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128. PCR technique was invented by:

A. Boyer

B. Cohn

C. Sanger

D. Kary Mullis

Answer: D



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129. Who among the following was awarded the Nobel Prize for the development of PCR technique ?

A. kary Mullis

B. Herbert Boyer

C. Arthur Kornberg

D. Hargovind Khurana

Answer: A



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130. Polymerase chain reaction is concerned with :

A. DNA amplification

B. DNA repairing

C. DNA proof reading

D. DNA replication

Answer: A



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131. The polymerase chain reaction is a technique that is used for :

A. in vivo replication of DNA

B. in vivo synthesis of m-RNA

C. in vitro synthesis of m-RNA

D. in vitro replication of specific DNA
sequence using thermostable DNA
polymerase

Answer: D



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132. Palaeontologists unearthed a human skull during excavation. A small fragment of the scalp tissue was still attached to it . Only little DNA could be extracted from it . It the genes of the ancient man need to be analysed the best way of getting sufficient amount of DNA from this extract is :

A. hybridising the DNA with a DNA probe

B. subjecting the DNA to gel electrophoresis

C. Subjecting the DNA to polymerase chain reaction

D. treating the DNA with restriction endonucleases

Answer: C



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133. Forensic scientists have to work often with extremely small samples of DNA obtained from the hair or other sources of suspected criminals. However, it is possible to produce DNA finger print from these small samples by using :

A. gene 'gun'

B. gene cloning

C. polymerase chain reaction

D. genetically engineering microorganisms

Answer: C



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134. What is the utility of the bacterium, *Thermus aquaticus*?

- A. It is used in RFLP mapping
- B. It is used to create recombinant plasmids
- C. It is used in automated DNA sequencing
- D. It facilitates the polymerase chain reaction

Answer: D



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135. The enzyme employed for amplification of DNA during PCR is commercially obtained from:

- A. *Trichoderma reesi*
- B. *Thermus aquaticus*
- C. *Bacillus licheniformis*
- D. *Streptococcus pyohenes*

Answer: B



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136. In PCR technology the DNA segment is replicated over a billion times. This repeated replication is catalysed by the enzyme :

A. DNA dependent RNA polymerase

B. DNA polymerase

C. Taq polymerase

D. Primase

Answer: C



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137. Which of the following enzymes is used in polymerase chain reaction (PCR) ?

- A. Taq polymerase
- B. Vent polymerase
- C. Both of these
- D. None of these

Answer: C



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138. The polymerase chain reaction uses Taq polymerase rather than a DNA polymerase from *E. coli*, because Taq polymerase :

A. is heat -stable

B. is easier to obtain

C. can denature a double stranded DNA
template

D. can initiate DNA synthesis at a wider
variety of sequences

Answer: A



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139. The polymerase chain reaction generated a fragment of a distinct size even when an intact chromosome is used as template . What determines the boundaries of the amplified fragment ?

A. the sites to which the primer anneal

B. the duration of the elongation step in each cycle

C. the temperature of the elongation step in each cycle

D. the concentration of one particular deoxynucleotide in the reaction

Answer: A



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140. The application of polymerase Chain Reaction is to:

A. demonstrate DNA as genetic material

B. to replicate specific DNA sequence at high temperature

C. determine minerals in biological tissues

D. replicate RNA sequences at low temperature

Answer: B



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141. The 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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142. PCR proceeds in three distinct steps governed by temperature they are in order of :

A. Synthesis ,Annealing , Denaturation

B. Annealing, Synthesis, Denaturation

C. Denaturation, Synthesis, Annealing

D. Denaturation, Annealing, Synthesis

Answer: D



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143. Which of the following steps are catalysed by Taq polymerase in a PCR reaction ?

A. Extension of primer end on the template

DNA

B. Annealing of primers to template DNA

C. Denaturation of template DNA

D. all of the above

Answer: A



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144. Which of the following has popularised the PCR (polymerase chain reactions)?

A. A vailability of synthetic primers

B. Easy avilabiliy of DNA template

C. A vailability of cheap deoxyribonucleotides

D. A vailability of Thermostable DNA
polymerase

Answer: D



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145. Gene amplification using primers can be done by :

A. ELISA

B. Gene gun

C. Microinjection

D. Polymerase chain reaction

Answer: D



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146. The thermostable enzyme , "Taq" and "Pfu",
is isolated from thermophilic bacteria are :

A. DNA ligases

B. RNA polymerases

C. DNA polymerases

D. Restriction endonucleases

Answer: C



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147. Match List I (Scientists) with List II (Achievements) and select the correct answer

using the codes given below:

	List I (Scientists)	List II (Achievements)
A	Arber and Smith	1 Development of transgenic plants with <i>Agrobacterium</i> T-DNA
B	Feldman	2 Discovered endonuclease
C	Mullis	3 Discovered reverse transcriptase
D	Temin and Baltimore	4 Discovered PCR

A. A=2,B=1,C=4,D=3

B. A=1,B=2,C=4,D=3

C. A=2,B=1,C=3,D=4

D. A=1,B=2,C=3,D=4

Answer: A



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148. The offspring produced through which of the following processes are not exactly similar to their parents?

- A. Dizygotic twins
- B. Parthenogenesis
- C. Sexual reproduction
- D. Asexual reproduction

Answer: C



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149. Cloning gene is process where:

A. gene is cloned in an animal

B. fragments of DNA are transferred from one organism to another usually carried on a DNA vector

C. fragment of DNA cloned in the same organism using carrier

D. DNA is cloned in plants

Answer: B



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150. Which one of the following processes results in the formation of clone of bacteria ?

- A. Binary fission
- B. Conjugation
- C. Transformation
- D. Transduction

Answer: A



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151. Genetically similar individuals of species are

:

A. chorot

B. clones

C. colony

D. community

Answer: B



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152. Plants having similar genotypes produced by plant breeding are called

- A. clones
- B. genomes
- C. haploids
- D. autopoloids

Answer: A



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153. A new method of harvesting stem cells is known as :

A. cloning

B. sporogony

C. entrapping

D. schizogony

Answer: A



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154. Clonal cell lines can be obtained by :

- A. tissue system
- B. tissue culture
- C. tissue fractionation
- D. tissue homogenization

Answer: B



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155. The following can be described as clones:

- A. A colony of bacteria derived from a single cell by asexual reproduction
- B. The mother of the sheep Dolly and Dolly
- C. Identical twins arising out a single egge
- D. all of the above

Answer: D



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156. Cloning is meant to :

- A. preserve the genotype of the organism
- B. produce hGH gene in E. coli
- C. replace the original one
- D. all of the above

Answer: A



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157. A clone is a group of individuals obtained through :

A. hybridization

B. self pollination

C. cross pollination

D. vegetative propagation

Answer: D



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158. Recently cloned species is :

- A. Dolly - goat
- B. Molly - sheep
- C. Dolly - sheep
- D. None of these

Answer: C



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159. The first mammalian clone "Dolly" was created by :

A. Ian Wilmut

B. T.H. Morgan

C. Thomas King

D. Robert Briggs

Answer: A



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160. The sheep "Dolly" was cloned by using the somatic cells from the donor's

A. skin

B. udder

C. tongue

D. ear lobe

Answer: B



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161. Choose the correct statement with reference to "Dolly"

A. She was created by taking nucleus from unfertilized eggs and cytoplasm from unfertilized eggs.

B. She was created by taking cytoplasm from udder cell and nucleus from unfertilized egg.

C. She was created by taking nucleus from udder cells and cytoplasm from

unfertilized eggs.

D. She was created by taking cytoplasm from udder cell and nucleus from fertilized egg.

Answer: C



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162. The technique by which "Dolly" the sheep obtained is termed as :

A. cloning by gene transfer

B. cloning by nuclear transfer

C. cloning without the help of gametes

D. cloning by tissue culture of somatic cells

Answer: B



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163. Which of the following statements is true?

A. In the historic cloning experiment of Dr.

Wilmut the transplanted nucleus was

taken from an udder cell

B. Mammalian characters appeared first in dinosaurs

C. Heart of mammals is incapable of beating in vitro

D. Pyramid of biomass is upright in pond ecosystem

Answer: A



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164. What is ANDI ?

A. Cat

B. Bull

C. Man

D. Monkey

Answer: D



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165. The first simian cloning was carried out by :

A. T.J. King

B. Don Wolf

C. Ian Wilmut

D. Robert Briggs

Answer: B



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166. In genetic engineering antibiotic resistance is often cloned into a vector to :

A. kill bacteria

B. select for cells that cannot grow

C. enhance in the survival of cloned cell

D. make direct selection of a clone possible

Answer: D



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167. The following steps are used to make a recombinant cell. What is the fourth step?

- A. Isolate gene of interest
- B. Insert gene of interest
- C. Vector is taken up by cell
- D. Clone cell containing vector

Answer: D



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168. The following steps are necessary to clone eukaryotic genes in bacteria . What is the third step ?

A. Transcription

B. Remove the introns

C. Splice exons together

D. Reverse transcription of m-RNA

Answer: C



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169. Foreign DNA that was inserted into a plasmid and then replicated many times in a population of bacteria is a :

A. Gene map

B. DNA clone

C. Gene library

D. DNA probe

Answer: B



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

A. Binding of DNA to the cell wall

B. Expression of antibiotic resistance gene

C. Uptake of DNA through membrane
transport proteins

D. Uptake of DNA through transient pores in
the bacterial cell wall

Answer: D



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171. When a cow is crossed to a bull and the female progeny is yielding more milk than its mother. From this it is inferred :

A. More number of genes for high yielding milk are inherited, only from the female parent

B. More number of genes for high yielding milk are inherited only the male parent

C. More number of genes for high yielding milk are inherited from both the parents

D. The progeny through mutation achieved more number of genes for high yielding milk

Answer: C



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172. Widely used tool in genetic engineering of crop plant involves :

A. Microinjection

B. Protoplast fusion

C. Transposon mediation

D. Agrobacterium mediation

Answer: D



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173. The organism which is used for gene transfer in higher organism is :

A. E. coli

B. Acetobacter

C. Bacillus thuringiensis

D. Agrobacterium tumefaciens

Answer: D



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174. A good vector in genetic engineering is :

A. Bacillus thuringiensis

B. Salmonella typhimurium

C. *Bacillus amyloliquefaciens*

D. *Agrobacterium tumefaciens*

Answer: D



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175. In genetic engineering , *Agrobacterium* is used to :

A. transform plant cells

B. transform bacterial cells

C. identify recombinant clones

D. genetically engineer bacteria

Answer: A



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176. The Ti-plasmid of *Agrobacterium tumefaciens* is used to genetically engineering which of the following cell types ?

A. Yeast

B. Plants

C. Animals

D. Bacteria

Answer: B



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177. Tumor inducing (Ti) plasmid transforms :

A. plants

B. fungi

C. bacteria

D. animals

Answer: A



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

A. Translation

B. Conjugation

C. Transduction

D. Transformation

Answer: C



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179. Electroporation procedure involves:

A. fast passage of food through sieve pores
in phloem elements with the help of
electric stimulation

- B. opening of stomatal pores during night by artificial light
- C. making transient pores in the cell membrane to introduce gene constructs
- D. purification of saline water with the help of a membrane system

Answer: C



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180. Biolistic technique is used in :

- A. Tissue culture process
- B. Gene transfer process
- C. Hybridization process
- D. Germplasm conservation process

Answer: B



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181. Two microbes found to be very useful in genetic engineering are :

A. Diplococcus sp. And Pseudomonas sp.

B. vibrio cholerae and a tailed bacteriophage

C. Crown gall bacterium and Caenorhabditis elegans

D. Escherichia coli and Agrobacterium tumefaciens

Answer: D



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182. In plant biotechnology, root tumours are induced in plant using the bacterium :

- A. *Agrobacterium rhizogenes*
- B. *Agrobacterium tumefaciens*
- C. *Rhizobium*
- D. None of the above

Answer: A



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183. What is the source of the Ti (Tumour inducing) plasmid which is modified and used as a cloning vector to deliver the desirable genes into plant cells ?

A. *Agrobacterium tumefaciens*

B. *Thermophilus aquaticus*

C. *Pyrococcus furiosus*

D. *Aedes aegypti*

Answer: A



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184. Which of the following is correctly matched ?

A. *Agrobacterium tumefaciens* - Tumour

B. *Thermus aquaticus* - Bt-gene

C. pBR322 - Enzyme

D. Ligase - Molecular scissors

Answer: A



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185. Which one of the following is not a biofertilizer?

A. Azolla

B. Clostridium

C. Azotobacter

D. Bacillus thuringiensis

Answer: D



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186. Hirudin is

A. a protein produced by *Hordeum vulgare*,
which is rich in lysine

B. a toxic molecule isolated from *Gossypium*
hirsutum, which reduces human fertility

C. a protein produced from transgenic
Brassica napus which prevents blood
clotting

D. an antibiotic produced by a genetically
engineered bacterium, *Escherichia coli*

Answer: C



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187. Main objective of production of herbicide resistant GM crops is to

- A. encourage eco-friendly herbicides
- B. eliminate weeds from the field without the use of herbicides
- C. reduce herbicide accumulation in food articles for health safety

D. eliminate weeds from the field without the use of manual labour

Answer: D



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188. A crop scientist spliced genes for disease resistnace into Ti-plasmids and then treated tomato plants with the plasmids. Some parts of some plants resisted the disease, but most of

the plants eventually died. The researcher could increase his chances of success by :

A. using molecular probes to figure out where to put genes

B. treating single cells and cloning whole plant from the cells

C. using R-plasmids rather than Ti-plasmids to introduce the genes

D. inserting the genes into the cells of a tomato plant with a needle

Answer: B



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

A. Vector

B. Probe

C. Clone

D. Plasmids

Answer: B



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190. In genetic fingerprinting, the 'probe' refers to ...

A. a radioactively labelled single stranded
DNA molecule

B. a radioactively labelled single stranded
RNA molecule

C. a radioactively labelled double stranded

RNA molecule

D. a radioactively labelled double stranded

DNA molecule

Answer: A



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191. Location or sites in the human DNA where single base DNA differences occurs are called:

A. repetitive DNA

B. VNTR

C. SNP

D. SSCP

Answer: C



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192. A bacterial cell was transformed with a recombinant DNA that was generated using a human gene. However, the transformed cells did

not produce the desired protein. Reason could be

- A. Human gene may have intron which bacteria cannot process
- B. Amino acid codons for humans and bacteria are different
- C. Human protein is formed but degraded by bacteria
- D. all of the above

Answer: A



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193. The complementary synthetic and random DNA are used as :

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

Answer: B



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

A. A stirred-tank bioreactor without in-lets and out-lets

B. Laboratory flask of largest capacity

C. A continuous culture system

D. Any of the above

Answer: C



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195. A bioreactor refers to :

- A. fermentation tank
- B. tank for biochemical reactions
- C. organisms reacting to a stimulus
- D. nuclear reacting for biological studies

Answer: A



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196. Stirred-tank bioreactors have been designed for

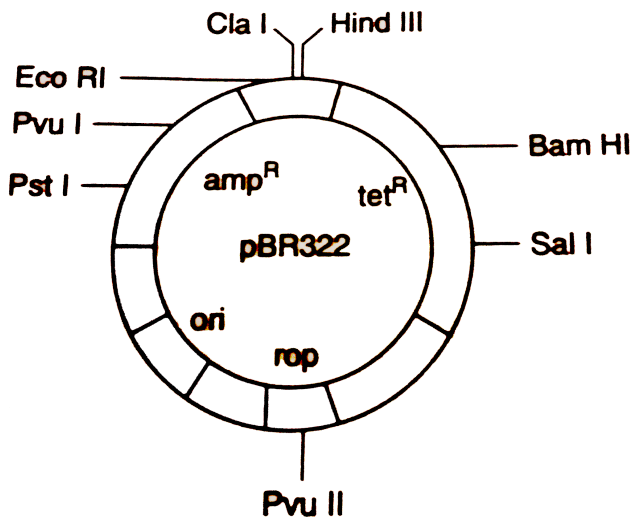
- A. Ensuring anaerobic conditions in the culture vessel
- B. A availability of oxygen throughout the process
- C. Addition of preservatives to the product
- D. Purification of the product

Answer: B



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197. The given figure is the diagrammatic representation of the E. coli vector pBR322. Which one of the given options correctly identifies its certain component (s) ?



A. ori " - " original restriction enzyme

B. rop " - "reduced osmotic pressure

C. Hind III Eco RI " - "selectable markers

D. amp^(R), tet^(R)" - "antibiotic resistance genes

Answer: D



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198. A single strand of nucleic acid tagged with a radioactive molecule is called:

A. Probe

B. vector

C. plasmid

D. selectable marker

Answer: A



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199. Which one is a true statement regarding DNA polymerase used in PCR

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

Answer: B



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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

Answer: D



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201. 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'-CGTTCG-3'

3'-CCAAGC-5'

B. 5'-GAATTC-3'

3'-CTTAAG-5'

C. 5'CTACTG-3'

3'-GTGCAA-5'

D. 5'-CACGTA-3'

3'-GCATAC-5'

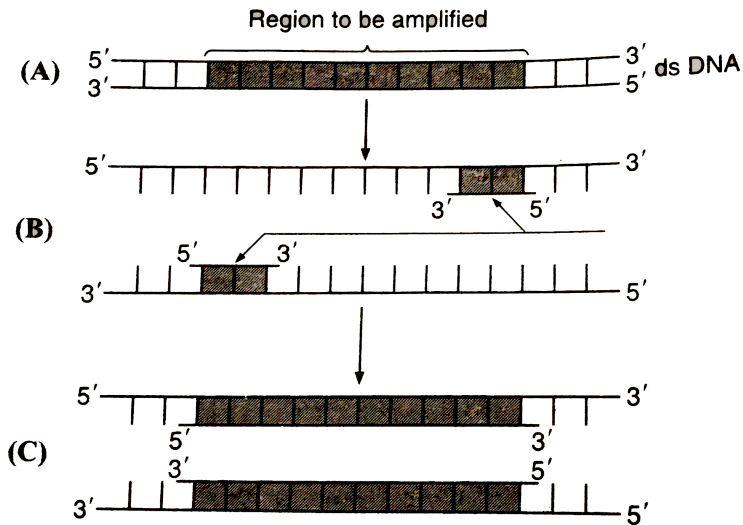
Answer: B



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202. The figures below shows three steps (A,B,C) of polymerase chain reaction (PCR). Select the option giving correct identification together

with what it represents ?



A. C-extension in the presence of heat stable

DNA polymerase

B. A-Annealing with two sets of primers

C. B-Denaturation at a temperature of about

$98^{\circ}C$ separating the two DNA strands

D. A-extension at a temperature of about

$50^{\circ}C$

Answer: A



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

A. 5'-CATTAG-3'

3'-GATAAC-5'

B. 5'-GATACC-3'

3'-CCTAAG-5'

C. 5'GAATTC-3'

3'-CTTAAG-5'

D. 5'-CCATG-3'

3'-GAATCC-5'

Answer: C



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204. Biolistics (gen gun) is suitable for :

- A. DNA finger printing
- B. Disarming pathogen vectors
- C. Transformation of plant cells
- D. Constructing recombinant DNA by joining
with vectors

Answer: C



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205. In genetic engineering , the antibiotics are used :

- A. as sequence from where replication starts
- B. to keep the cultures free of infection
- C. to select healthy vectors
- D. as selectable markers

Answer: D



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206. The enzymes which are absolutely necessary for recombinant DNA technology are :

A. restriction endonuclease and topoisomerases

B. restriction endonucleases and ligases

C. endonucleases and polymerases

D. peptidases and ligases

Answer: B



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

- A. germ cell
- B. body cell
- C. somatic cell
- D. vegetative cell

Answer: A



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208. Which of the following enzymes is a RNA dependent DNA polymerases enzyme ?

- A. DNA polymerase I
- B. RNA polymerases I
- C. Reverse transcriptase
- D. Taq polymerase

Answer: C



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209. In biotechnological processes cDNA is prepared from :

A. B-DNA

B. hn-RNA

C. Z-DNA

D. m-RNA

Answer: D



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210. Which of the following cartoon characters does not share its name with that of a gene ?

A. Tintin

B. Popeye

C. Asterix

D. Oelix

Answer: A



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211. In a genetic engineering experiment restriction enzymes can be used for :

A. bacterial DNA only

B. viral DNA only

C. any DNA fragment

D. eukaryotic DNA only

Answer: C



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

- A. Centrifugation
- B. Electrophoresis
- C. Restriction mapping
- D. Polymerase chain reaction

Answer: B



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213. Which of the following techniques is used to make numerous copies of a specific segment of DNA quickly and accurately ?

A. Translation

B. Transcription

C. Polymerases chain reaction

D. Ligase chain reaction

Answer: C



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214. Which of the following recent techniques is used for separating fragments of DNA ?

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

Answer: C



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215. Eco RI cleaves the DNA strands to produce :

A. blunt ends

B. sticky ends

C. satellite ends

D. ori replication end

Answer: B



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216. which of the following enzymes cleaves DNA at specific sites producing sticky ends ?

A. Lyases

B. Proteases

C. Restriction endonuclease

D. Cleaving enzyme

Answer: C



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217. Match the entries in column-I with those of column-II and choose the correct answer.

Column-I	Column-II
(A) Restriction endonucleases	(p) Köhler and Milstein
(B) polymerase chain reaction	(q) Alec Jeffreys
(C) DNA fingerprinting	(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



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218. During amplification of gene using PCR Taq polymerase is used between:

- A. denaturation and annealing
- B. annealing and extension
- C. extension and amplification
- D. none of the above

Answer: B



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219. Plasmids present in the bacterial cells are :

- A. linear double helical RNA molecules
- B. linear double helical DNA molecules
- C. circular double helical DNA molecules
- D. circular double helical RNA molecules

Answer: C



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220. 'YAC" refers to :

- A. yeast artifical cell
- B. yeast artifical chromosome
- C. yeast artificial colony
- D. none of the above

Answer: B



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221. An analysis of chromosomal DNA using the Southern hybridization technique does not use :

A. PCR

B. Blotting

C. Electrophoresis

D. Autoradiography

Answer: A



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222. Commonly used vectors for human genome sequencing are :

A. T-DNA

B. BAC and YAC

C. Expression vectors

D. T / A Cloning Vectors

Answer: B



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223. The first human hormone produced by recombinant DNA technology is :

A. Insulin

B. Estrogen

C. Thyroxine

D. Progesterone

Answer: A



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

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

Answer: D



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225. The polymerase chain reaction (PCR) is a technique that is used :

A. in vitro synthesis of m-RNA

B. in vivo synthesis of m-RNA

C. separation of DNA fragments according to their size.

D. in vivo replication of specific DNA sequence using thermostable DNA polymease.

Answer: D



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226. Identify the desirable characteristic for a plasmid used in r-DNA 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,D and E only

B. A,C and E only

C. B,C,D and E only

D. B,C and E only

Answer: C



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227. Identify the DNA segment which is not a palindromic sequence.

A. 5' GGATCC 3'

3' GGTACC 5'

B. 5' GAATTC 3'

3' CTTAAG 5'

C. 5' GCGGCCGC 3'

3' GGCCGGCG 5'

D. 5' CCCGGG 3'

3' GGGCCC 5'

Answer: A



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228. During gene cloning the enzyme used to join the insert DNA with the plasmid vector is :

- A. Exonuclease
- B. DNA ligase
- C. Alkaline phosphatase
- D. Restriction endonuclease

Answer: B



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229. The 'sticky ends' on each of the two strands of a DNA generated by treatment with restriction enzyme facilitate the action of enzyme :

- A. DNA ligase
- B. Endonudease
- C. Exonudease

D. DNA polymerase

Answer: A



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230. In order to induce the bacterial uptake of plasmids, the bacteria are made 'competent' by first treating with :

A. sodium chloride

B. potassium chloride

C. magnesium chloride

D. calcium chloride

Answer: D



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231. Which of the following techniques is most widely employed to check the progress of restriction enzyme digestion ?

A. PCR

B. Centrifugation

C. A garose gel electrophoresis

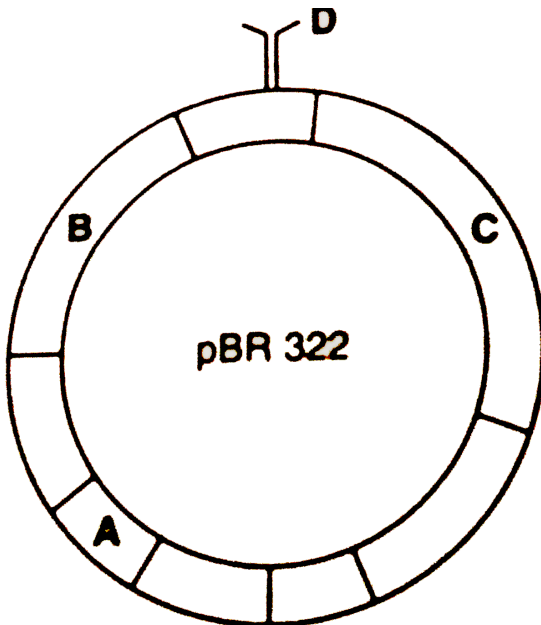
D. Polyacrylamide gel electrophoresis

Answer: C



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232. Identify A, B, C and D in the given diagram :



A.

$A - \text{ori}, B - \text{amp}^R, C - \text{tet}^R, D - \text{HindIII}$

B.

$A - \text{HindIII}, B - \text{tet}^R, C - \text{amp}^R, D - \text{ori}$

C.

$A - \text{amp}^R, B - \text{tet}^R, C - \text{HindIII}, D - \text{ori}$

D.

$A - \text{tet}^R, B - \text{HindIII}, C - \text{ori}, D - \text{amp}^R$

Answer: A



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

A. Vector

B. Introns

C. Restriction enzyme

D. Polymerase enzyme

Answer: B



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234. One of the methods by which DNA cannot be transformed to the host cell is by :

A. gene gun

B. microinjection

C. polymerase chain reaction

D. disarmed pathogen vectors

Answer: C



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235. Restriction endonucleases :

- A. are used for in vitro DNA synthesis.
- B. are synthesized by bacteria as part of defence mechanism.
- C. are used in genetic engineering for ligation of two DNA molecules.
- D. are present in mammalian cells for degradation of DNA when the cell dies.

Answer: B





236. The function of selectable marker is :

- A. elimination of non-transformants and permitting transformants
- B. eliminating transformants and permitting non-transformants
- C. to destroy recognition sites
- D. identify ori site

Answer: A



237. 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
- B. Both A and B are correct statements
- C. Only B is correct
- D. Only A is correct and B is not correct

Answer: B



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238. Which vector can clone a small fragment of DNA ?

- A. Plasmid
- B. Cosmid
- C. Yeast artificial chromosome
- D. Bacterial artificial chromosome

Answer: A



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239. The cutting of DNA at specific locations became possible with the discovery of :

- A. Probes
- B. Ligases
- C. Selectable markers
- D. Restriction enzymes

Answer: D



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240. Which of the following is not a feature of the plasmids ?

- A. Transferable
- B. Single -stranded
- C. Circular structure
- D. Independent replication

Answer: B



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241. The taq polymerase enzyme is obtained form :

- A. *Bacillus subtilis*
- B. *Pseudomonas putida*
- C. *Thermus aquaticus*
- D. *Thiobacillus ferrooxidans*

Answer: C



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242. Which of the following is a restriction endonuclease ?

A. Hind II

B. Rnase

C. Dnase I

D. Protease

Answer: A



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

A. Eco RI

B. Ligase

C. Polymerase III

D. Taq polymerase

Answer: B



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244. Which of the following is not a component of downstream processing ?

- A. Expression
- B. Separation
- C. Purification
- D. Preservation

Answer: A



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245. Which of the following restriction enzymes produces blunt ends ?

A. Xho I

B. Eco RV

C. Sal I

D. Hind III

Answer: B



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246. Stirred-tank bioreactors have been designed for :

- A. purification of product.
- B. addition of preservatives to the product.
- C. availability of oxygen throughout the process.

D. ensuring anaerobic conditions in the culture vessel.

Answer: C



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Exemplar Problems

1. Rising of dough is due to :

A. Hydrolysis of wheat flour starch into sugars.

B. Multiplication of Yeast

C. Production of CO_2

D. Emulsification

Answer: C



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2. An enzyme catalysing the removal of nucleotides from the ends of Dna is :

A. Hind - II

B. Exonuclease

C. DNA ligase

D. Translation

Answer: B



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

A. Transduction

B. Conjugation

C. Transformation

D. Translation

Answer: A



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

A. DNA can be seen in visible light .

B. DNA can be seen without staining in visible light.

C. Ethidium bromide stained Dna can be seen in visible light.

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

Answer: D



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5. Restriction' in restriction enzyme refers to

A. Cleaving of phosphodiester bond in DNA
by the enzyme.

B. Prevention of the multiplication of
bacteriophage in bacteria.

C. Cutting of DNA at specific position only.

D. All of the above.

Answer: B



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6. A recombinant DNA molecule can be produced in the absence of the followingt :

A. E. coli

B. DNA ligase

C. DNA fragments

D. Restriction endonuclease

Answer: A



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7. In agarose gel electrophoresis DNA molecules are separated on the basis of their:

- A. Charge only
- B. Size only
- C. Charge to size ratio
- D. All of these

Answer: B



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8. The most important feature in a plasmid to be used as a vector is :

A. Its size

B. Origin of replication (ori)

C. Presence of a selectable marker

D. Presence of sites for restriction endonuclease

Answer: B



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9. While isolating DNA from bacteria, Which of the following enzymes is not used ?

A. Protease

B. Lysozyme

C. Ribonuclease

D. Deoxyribonuclease

Answer: D



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10. Which of the following has popularised the PCR (polymerase chain Reactions)?

A. A vailability of synthetic primers

B. Easy availability of DNA template

C. A vailability of cheap deoxyribonucleotides

D. A vailability of 'Thermostable' DNA
polymerase

Answer: D



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

- A. Competent cells
- B. Transformed cells
- C. Recombinant cells
- D. None of the above

Answer: B



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

A. binding of DNA to the cells wall

B. Expression of antibiotic resistance gene

C. Uptake of DNA through membrane transport proteins

D. Uptake of DNA though transient pores in the bacterial cell wall

Answer: D



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

- A. Formation of hydrogen bonds between sticky ends of DNA fragments
- B. Formation of phosphodiester bond between two DNA fragments
- C. Ligation of all purine and pyrimidine bases
- D. None of the above

Answer: B



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14. Which of the following bacteria is not a source of restriction endonuclease

- A. *Escherichia coli*
- B. *Bacillus amyloli*
- C. *Haemophilus influenzae*
- D. *Agrobacterium tumefaciens*

Answer: D



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15. Which of the following steps are catalysed by Taq polymerase in PCR reaction?

- A. Extension of primer end on the template DNA
- B. Annealing of primers to template DNA
- C. Denaturation of template DNA
- D. All of the above

Answer: A



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16. A bacterial cell was transformed with a recombinant DNA that was generated using a human gene. However, the transformed cells did not produce the desired protein. Reason could be

A. Human gene may have intron which bacteria cannot process.

B. Amino acid codons for humans and bacteria are different

C. Human protein is formed but degraded by bacteria.

D. All of the above .

Answer: A



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17. Which of the following should be chosen for best yield if one were to produce a recombinant

protein in large amounts ?

- A. A stirred-tank bioreactor without in-lets and out-lets
- B. Laboratory flask of largest capacity
- C. A continuous culture system
- D. Any of the above

Answer: C



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18. Who among the following was awarded the Nobel Prize for the development of PCR technique ?

A. Kary Mullis

B. Herbert Boyer

C. Arthur Kornberg

D. Hargovind Khurana

Answer: A



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19. Which of the following statements does not hold true for restriction enzyme ?

A. It is an endonuclease

B. It is isolated from viruses

C. It recognises a palindromic nucleotide sequence

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

Answer: B



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20. Image of a molecular biologist associated with studies on the properties restriction enzyme of the E. coli bacterium is given below.

Identify him:



A. Paul Berg

B. Stanley Cohen

C. Herbert Boyer

D. Hamilton O. Smith

Answer: C



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21. Read the following five statements (A to E) and select the option with all correct statements :

The cutting of DNA at specific locations became possible with molecular scissors'-restriction enzymes.

Palindromes are groups of letters that form the

same words read both forward and backward.

Sexual reproduction preserves the genetic information, while asexual reproduction permits variation.

DNA fragments are positively charged molecules, they can be separated by forcing them to move towards the cathode under an electric field.

(E) Each restriction endonuclease recognises a specific palindromic nucleotide sequences in the DNA.

A. (*A*), (*D*) and (*E*)

B. (*B*), (*C*) and (*E*)

C. (*A*), (*C*) and (*D*)

D. (*A*), (*B*) and (*E*)

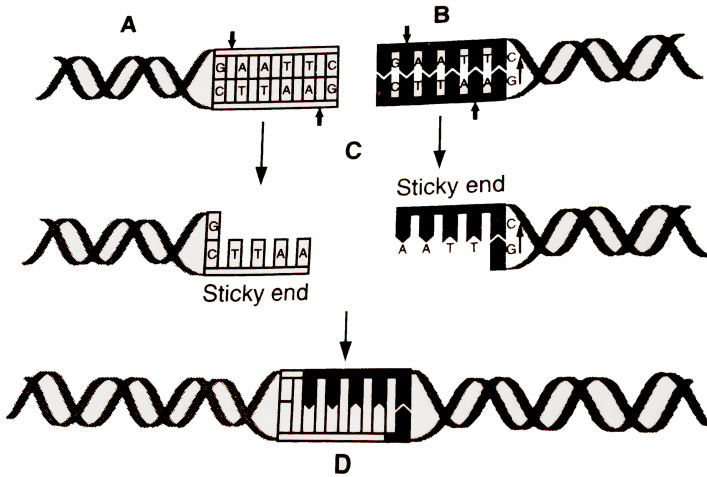
Answer: D



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22. Steps in formation of recombinant DNA by action of restriction endonuclease enzyme -Eco RI is given below. Identify A, B, C and D and

select correct options :



A. A-vector DNA , B-Foreign DNA, C-Eco RI, D-

Recombinant DNA

B. A-Foreign DNA , B-Vector DNA, C-Eco RI , D-

Recombinant DNA

C. A-Recombinant DNA, B-Foreign DNA, C-Eco

RI, D-Vector DNA

D. A-Vector DNA , B-Eco Ri, C-Foreign DNA D-
Recombinant DNA

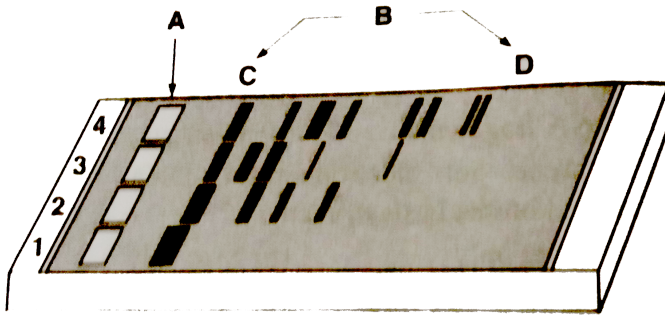
Answer: A



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23. A typical agarose gel electrophoresis showing migration of undigested (lane 1) and digested set DNA fragments (lane 2 to 4) is show below. Identify A, B ,C and D by selecting

the option :



A. A-DNA bands , B-Wells ,C-Largest , D-

Smallest

B. A-Wells , B-DNA bands , C-Smallest, D-

Largest

C. A-Wells , B-DNA bands , C-Largest, D-

Smallest

D. A-Smallest, B-Wells , C-DNA bands, D-
Largest

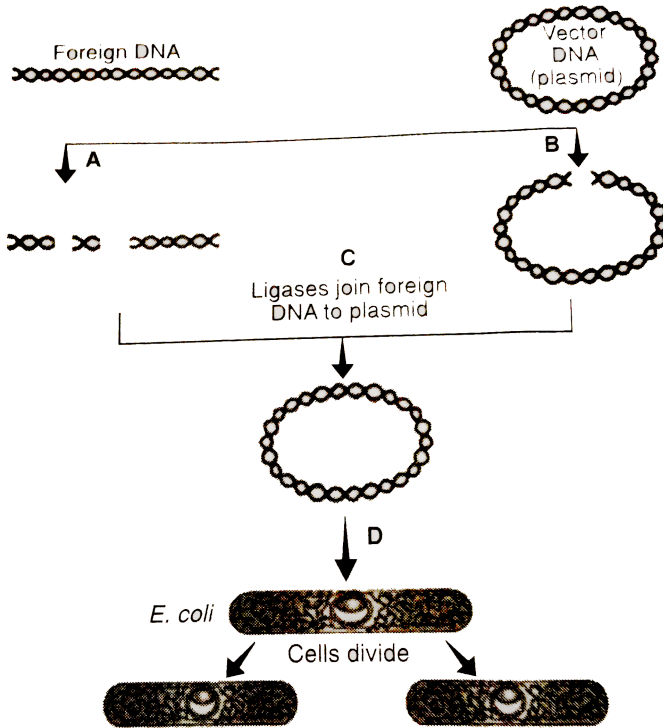
Answer: C



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24. Diagrammatic representation of recombinant DNA technology is given below.

Select the correct option:



A-Restriction endonuclease , B-Restriction endonuclease , C-DNA ligase , D-Transformation

B. A-Restriction endonuclease , B-Restriction
exonuclease , C-DNA ligase , D-
Translocation

C. A-Restriction endonuclease , B- Restriction
endonuclease, C-DNA polymerase, D-
Transposition

D. A-Restriction endonuclease B-Restriction
exonuclease, C-DNA ligase , D-Transduction

Answer: A



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25. Consider the following statements.

A. Endonucleases remove nucleotides from the ends of the DNA whereas, exonucleases make cuts a specific positions within the DNA.

Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome sites.

C. Asexual reproductions provides opportunities for variations and formulation of unique combinations of genetic setup. Itbrtgt D. DNA fragments can be separated by a technique

known as gel electrophoresis.

Of the above statements:

A. A and B are correct

B. B and D are correct

C. A and C are correct

D. A and C are correct

Answer: B



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26. Which of the following is a part of biotechnology

A. In vitro fertilisation leading to a 'test-tube' baby .

B. Synthesising a gene and using it .

C. Developing a DNA vaccine.

D. All of the above.

Answer: D



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27. Select the correct option:

(A) PCR	(i) Restriction endonuclease
(B) <i>Hind</i> III	(ii) DNA into plant cells
(C) Biolistics	(iii) DNA amplification
(D) Cloning vehicle	(iv) Vector

- A. (A) (B) (C) (D)
(ii) (i) (iv) (iii)
- B. (A) (B) (C) (D)
(i) (iv) (iii) (ii)
- C. (A) (B) (C) (D)
(iii) (i) (ii) (iv)
- D. (A) (B) (C) (D)
(iii) (i) (iv) (ii)

Answer: C



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28. Which one of the following statements is incorrect ?

A. Transformation is a procedure through which a piece of DNA is introduced in a host bacterium .

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

C. DNA is directly injected into the nucleus of an animal cell by micro-injection .

D. *Agrobacterium tumefaciens*, a pathogen of several monocot plants is able to deliver a piece of DNA known as 'T-DNA'

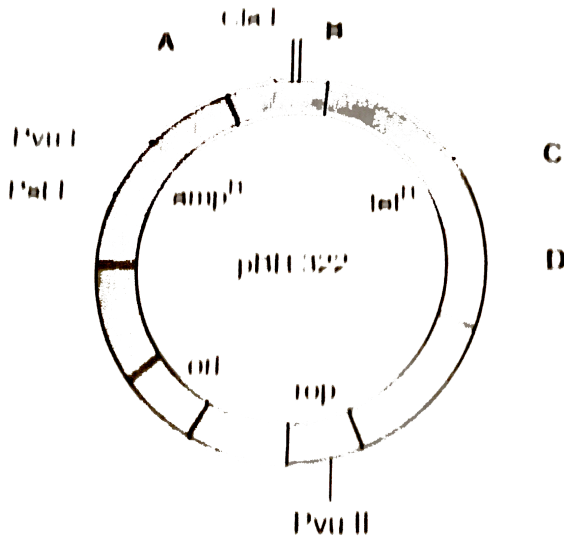
Answer: D



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29. *E. coli* cloning vector pBR322 showing restriction sites ori and antibiotic resistance

genes is given below. Select the correct option .



- A. A-Hind III, B-Eco RI, C-Bam HI, D-Sal I
- B. A-Eco RI, B-Hind III, C-Bam H I , D-Sal I
- C. A-Eco RI , B-Bam H I, C-Hind III, D-Sal I
- D. A-Bam H I , B-Eco RI, C-Sal I, D- Hind III

Answer: B



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30. Which of the following statement/s regarding nucleic acids is /are wrong ?

Amplification of gene of interest is done by polymerase Chain Reaction.

Origin of replication (ori) is a sequence from where RNA replication starts.

The tumour inducing (Ti) plasmid of *Agrobacterium tumifaciens* can be modified into a cloning vector .

DNA technology involves the use of restriction

endonucleases.

Biolistics or gene gun is suitable to introduce DNA to plant cells.

A. II only

B. II and IV only

C. III and V only

D. I, II and IV only

Answer: A



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31. The basic step /s in genetically modifying an organism is /are :

A. identification of DNA with desirable genes.

B. introduction of the identified DNA into the host .

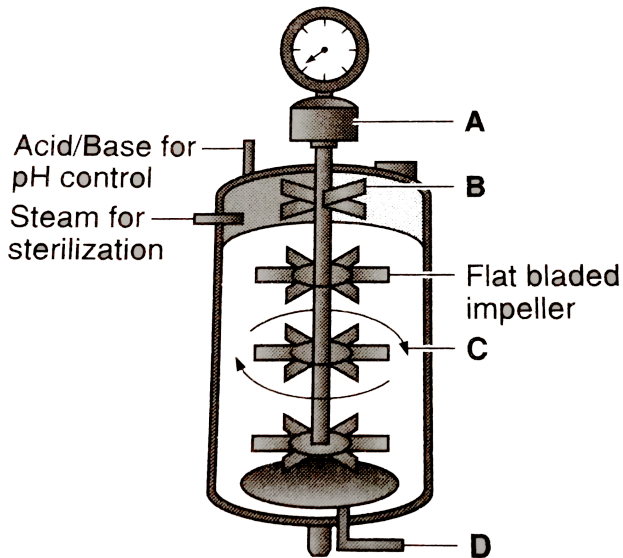
C. maintenance of introduced DNA in the host and transfer of the DNA to its progeny.

D. all of the above

Answer: D

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32. Diagram of a simple stirred-tank bioreactor is given below. Select the correct option :



A. A-Motor , B-Culture broth, C-Foam breaker,
D-Sterile air

B. A-Motor , B-Foam breaker, C-Culture broth ,
D-Sterile air

C. A-Motor, B-Foam breaker , C-Sterile air, D-
Culture broth

D. A- Sterile air ,B-Motor, C-Foam breaker, D-
Culture broth

Answer: B



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33. Select the correct option:

(A) Ti plasmid	(i) Sea weeds
(B) <i>Taq</i> polymerase	(ii) Sealing enzyme
(C) DNA ligase	(iii) PCR
(D) Agarose	(iv) <i>Agrobacterium tumifaciens</i>

- A. (A) (B) (C) (D)
(iii) (i) (iv) (ii)
- B. (A) (B) (C) (D)
(i) (iv) (iii) (ii)
- C. (A) (B) (C) (D)
(iv) (iii) (ii) (i)
- D. (A) (B) (C) (D)
(iii) (iv) (i) (ii)

Answer: C



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