Biotechnology Principles and Processes

Question1

Match List-I with List-II :

	List-I		List-II
A.	Genetically engineered Human Insulin	I	Gene therapy
B.	GM Cotton	II	E. coli
C.	ADA Deficiency	III	Antigen-antibody interaction
D.	ELISA	IV	Bacillus thuringiensis

Choose the correct answer from the options given below:

[NEET 2024 Re]

Options:

A.

A-III, B-II, C-IV, D-I

B.

A-II, B-I, C-IV, D-III

C.

A-IV, B-III, C-I, D-II

D.

A-II, B-IV, C-I, D-III

Answer: D

Solution:

In genetically engineered human insulin, E. coli is used as host cell.

⇒ For creating GM cotton, bacteria Bacillus thuringiensis is used.

⇒ Gene therapy is one of the treatment for ADA deficiency.

⇒ ELISA test is based on antigen-antibody interaction.

Question2

Cryopreservation technique is used for :

[NEET 2024 Re]

Options:

A.

Protection of environment

B.

Protection of Biodiversity hotspots

C.

Preservation of gametes in viable and fertile condition for a long period

D.

In-situ conservation

Answer: C

Solution:

Cryopreservation technique is a type of ex-situ conservation in which gametes of threatened species can be preserved in viable and fertile conditions for long period.

Hence the correct answer is option (3).

Question3

Identify the incorrect statement related to gel electrophoresis.

[NEET 2024 Re]

Options:

A.

Separated DNA fragments can be directly seen under UV radiation

B.

Separated DNA can be extracted from gel piece

C.

Fragment of DNA moves toward anode

D.

Sieving effect of agarose gel helps in separation of DNA fragments

Answer: A

Solution:

Option (1) is the correct answer because separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. We cannot see pure DNA fragments in visible light and without staining.

⇒ The DNA fragments separate (resolve) according to their size through sieving effect provided by agarose gel.

⇒ DNA is a negatively charged molecule, hence it moves towards the positive electrode (anode).

Question4

Given below are two statements :

Statement I: In the lac operon, the z gene codes for beta-galactosidase which is primarily responsible for the hydrolysis of lactose into galactose and glucose.

Statement II: In addition to lactose, glucose or galactose can also induce lac operon.

In the light of the above statements, choose the correct answer from the options given below :

[NEET 2024 Re]

Options:

A.

Statement I is true but Statement II is false

B.

Statement I is false but Statement II is true

C.

Both Statement I and Statement II are true

D.

Both Statement I and Statement II are false

Answer: A

Solution:

In the lac operon the z-gene codes for β-galactosidase which is primarily responsible for the hydrolysis of lactose into its monomeric units, galactose and glucose.

Glucose and galactose cannot act as the inducers of lac operon. Rather, lactose or allolactose act as inducers of lac operon.

Question5

Recombinant DNA molecule can be created normally by cutting the vector DNA and source DNA respectively with:

[NEET 2024 Re]

Options:

A.

Hind II, Hind II

B.

Hind II, Alu I

C.

Hind II, EcoRI

D.

Hind II, BamHI

Answer: A

Solution:

Option (1) is the correct answer because, unless we cut the vector and the source DNA with the same restriction enzyme, the recombinant vector molecule cannot be created.

In options (2), (3) and (4), restriction enzymes are different for cutting the vector DNA and source DNA, so they cannot be the answers.

Question6

The Bt toxin in genetically engineered Bt cotton kills the pest by:

[NEET 2024 Re]

Options:

A.

Creating pores in the midgut

B.

Damaging the respiratory system

C.

Degenerating the nervous system

D.

Altering the pH of body fluids

Answer: B

Solution:

Option (1) is the correct answer because the activated toxin binds to the surface of midgut epithelial cells and creates pore that cause cell swelling and lysis and eventually cause death of the insect.

Bt toxin doesn't kill pest by affecting their respiratory system, nervous system and it doesn't alter the pH of body fluids. So, options (2), (3) and (4) are not the answer.

Question7

Select the restriction endonuclease enzymes whose restriction sites are present for the tetracycline resistance (tet^R) gene in the pBR 322 cloning vector.

[NEET 2024 Re]

Options:

A.

Bam HI and Sal I

B.

Sal I and Pst I

C.

Pst I and Pvu I

D.

Pvul and Bam HI

Answer: A

Solution:

The correct answer is option (1), because the restriction sites for restriction endonucleases Bam HI and Sal I are present within the tet^R gene in the pBR 322 cloning vector.

Options (2), (3) and (4) are incorrect because the restriction sites of Pst I and PvuI are present within the amp^R gene in the pBR 322 cloning vector.

Question8

Which of the following are correct about EcoRI?
A. Cut the DNA with blunt end
B. Cut the DNA with sticky end
C. Recognise a specific palindromic sequence
D. Cut the DNA between the base G and A when encounters the DNA sequence 'GAATTC'
E. Exonuclease

Choose the correct answer from the options given below:

[NEET 2024 Re]

Options:

A.

B, C, E only

B.

A, D, E only

C.

A, C, D only

D.

B, C, D only

Answer: D

Solution:

The correct answer is option (4) as

EcoRI does not cut the DNA with blunt ends. Instead, it cuts the DNA with sticky / cohesive / staggered ends on each strand.

EcoRI is a restriction endonuclease that recognises a specific palindromic sequence and cuts at a specific site within the DNA, known as the restriction site. It is not an exonuclease as exonucleases remove nucleotides from the free ends of the DNA.

$$5'-G-A-A-T-T-C-3'$$

The recognition sequence for EcoRI is $3'-C-T-T-A-A-G-5'$ and it cuts the DNA between bases G and A only when the sequence GAATTC is present in the DNA.

Therefore, 'A' and 'E' represent incorrect features about EcoRI, whereas 'B', 'C' and 'D' are correct features of EcoRI.

The other options, i.e., (1), (2) and (3) are incorrect as they represent incorrect combinations of features w.r.t. EcoRI.

Question9

Following are the steps involved in the process of PCR.
A. Annealing
B. Amplification (~1 billion times)
C. Denaturation
D. Treatment with Taq polymerase and deoxynucleotides
E. Extension

Choose the correct sequence of steps of PCR from the options given below :

[NEET 2024 Re]

Options:

A.

C ⟶ A ⟶ D ⟶ E ⟶ B

B.

A ⟶ B ⟶ E ⟶ D ⟶ C

C.

A ⟶ C ⟶ E ⟶ D ⟶ B

D.

D ⟶ B ⟶ E ⟶ C ⟶ A

Answer: A

Solution:

The correct answer is option (1) as the correct sequence of steps involved in the process of PCR are :

(C) Denaturation

(A) Annealing

(D) Treatment with Taq polymerase and deoxynucleotides

(E) Extension

(B) Amplification (~1 billion times).

That is C⟶A⟶D⟶E⟶B

Option (2), (3) and (4) are incorrect as they represent incorrect sequence.

Question10

The “Ti plasmid” of Agrobacterium tumefaciens stands for

[NEET 2024]

Options:

A.

Tumour inhibiting plasmid

B.

Tumor independent plasmid

C.

Tumor inducing plasmid

D.

Temperature independent plasmid

Answer: C

Solution:

The correct answer is option (3) as Ti plasmid of Agrobacterium tumefaciens is tumor inducing plasmid, containing T-DNA which causes tumor in several dicot plants.

Options (1), (2) and (4) are not correct.

Question11

Thermostable DNA polymerase used in PCR was isolated from : [NEET 2023 mpr]

Options:

A.

Thermus aquaticus

B.

Escherichia coli

C.

Agrobacterium tumifaciens

D.

Bacillus thuringiensis

Answer: A

Solution:

Solution:

The thermostable DNA polymerase, often referred to as Taq polymerase, was indeed isolated from this bacterium. Taq polymerase is able to withstand the high temperatures used in the polymerase chain reaction (PCR), making it ideal for this application. Other bacteria listed (Escherichia coli, Agrobacterium tumefaciens, Bacillus thuringiensis) are not known for having thermostable DNA polymerases used in PCR.

Question12

Ligation of foreign DNA at which of the following site will result in loss of tetracyclin resistance of pBR322 : [NEET 2023 mpr]

Options:

A.

Pst I

B.

Pvu I

C.

EcoR I

D.

BamH I

Answer: D

Solution:

Solution:

In pBR322, a commonly used plasmid in genetic engineering, certain restriction sites are present within the antibiotic resistance genes, which provide resistance to tetracycline and ampicillin. Here's what would happen if foreign DNA is inserted at each of the following restriction sites:

Option A : Pst I - The PstI site is present in the ampR gene (ampicillin resistance gene). Insertion of DNA here would disrupt the ampicillin resistance gene, causing a loss of ampicillin resistance, but it would not affect tetracycline resistance.

Option B : Pvu I - Similar to PstI, the PvuI site is also present in the ampR gene. Therefore, insertion of DNA here would cause a loss of ampicillin resistance, but it wouldn't affect the plasmid's tetracycline resistance.

Option C : EcoR I - The EcoRI site is not present within either the ampR or tetR genes in pBR322. Inserting DNA at this site would not disrupt either the ampicillin or tetracycline resistance genes.

Option D : BamH I - The BamH I site is within the tetR gene. If foreign DNA is inserted at this site, it would disrupt the tetracycline resistance gene, causing a loss of tetracycline resistance.

So, the correct answer to the question "Ligation of foreign DNA at which of the following site will result in loss of tetracycline resistance of pBR322?"

Question13

	List - I		List - II
(A)	Kanamycin	(I)	Delivers genes into animal cells
(B)	ClaI	(II)	Selectable marker
(C)	Disarmed retroviruses	(III)	Restriction site
(D)	Kanamycin Rgene	(IV)	Antibiotic resistance

Choose the correct answer from the options given below : [NEET 2023 mpr]

Options:

A.

(A)-(II), (B)-(III), (C)-(I), (D)-(IV)

B.

(A)-(III), (B)-(I), (C)-(IV), (D)-(II)

C.

(A)-(IV), (B)-(III), (C)-(I), (D)-(II)

D.

(A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Answer: A

Solution:

Solution:

(A) Kanamycin - (II) Selectable marker : Kanamycin is an antibiotic, and a resistance gene for kanamycin is often used as a selectable marker in genetic engineering. Cells that have been successfully transformed with the desired DNA will also carry the kanamycin resistance gene, and thus will survive in a culture medium containing kanamycin, while cells without the gene will not.

(B) ClaI - (III) Restriction site : ClaI is a restriction enzyme used in molecular biology to cut DNA at specific sites (restriction sites).

(C) Disarmed retroviruses - (I) Delivers genes into animal cells : Retroviruses are often used as vectors in gene therapy to deliver genes into animal cells. They can be "disarmed" to make them safe for use in humans or other animals.

(D) Kanamycin gene - (IV) Antibiotic resistance : The kanamycin resistance (Kan^R) gene is a type of antibiotic resistance gene. It produces a protein that inactivates kanamycin, allowing bacteria containing this gene to survive in the presence of this antibiotic.

Question14

Select the incorrect statement with respect to Multiple Ovulation Embryo Transfer (MOET) Technology.
[NEET 2023 mpr]

Options:

A.

Fertilised eggs at 4 to 6 cells - stages are recovered non-surgically from super-ovulating cow and transferred to surrogate mother.

B.

It is used to increase herd size in a short time

C.

Cow is administered with hormones to induce super-ovulation.

D.

Super-ovulating cow is either mated with elite bull or is artificially inseminated.

Answer: A

Solution:

Solution:

Option A : Fertilised eggs at 4 to 6 cells - stages are recovered non-surgically from super-ovulating cow and transferred to surrogate mother.
This statement is incorrect. In MOET, fertilised eggs or embryos are usually recovered from the super-ovulating cow at around the 8-32 cell stage, not at the 4 to 6 cell stages. This is the primary error in the statement.

Option B : It is used to increase herd size in a short time.
This statement is correct. MOET is indeed used to rapidly increase the size of a herd, by allowing one cow to produce multiple offspring in a relatively short period of time.

Option C : Cow is administered with hormones to induce super-ovulation.
This statement is correct. In MOET, the cow is given hormones to stimulate the release of multiple eggs (super-ovulation), which can then be fertilised and transferred to surrogate mothers.

Option D : Super-ovulating cow is either mated with an elite bull or is artificially inseminated.
This statement is correct. The super-ovulating cow is either naturally bred with a high-quality bull or artificially inseminated to ensure fertilisation of the multiple eggs.

Therefore, the correct answer is Option A because it incorrectly states the stage at which fertilised eggs are recovered from the cow in MOET.

Question15

During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out
[NEET 2023]

Options:

A. DNA

B. Histones

C. Polysaccharides

D. RNA

Answer: A

Solution:

Solution:

Option (1) is the correct answer as, during isolation of the genetic material, purified DNA ultimately precipitates out after the addition of chilled ethanol.

Option (2) is not the answer as, proteins can be removed by treatment with proteases.

Option (4) is not the answer as RNA can be removed by treatment with ribonuclease.

Question16

In gene gun method used to introduce alien DNA into host cells, microparticles of metal are used.
[NEET 2023]

Options:

A. Zinc

B. Tungsten or gold

C. Silver

D. Copper

Answer: B

Solution:

Option (2) is the correct answer because in gene gun method, microparticles of tungsten or gold are used. Gold or tungsten are inert in nature so they do not alter the chemical composition of cells.

Question17

Upon exposure to UV radiation, DNA stained with ethidium bromide will show
[NEET 2023]

Options:

A. Bright blue colour

B. Bright yellow colour

C. Bright orange colour

D. Bright red colour

Answer: C

Solution:

Solution:

Option (3) is the correct answer because in recombinant DNA technology the separated DNA fragments can be visualised only after staining the DNA with a substance known as ethidium bromide followed by exposure to U.V. radiation. You can see bright orange coloured bands of DNA in an ethidium bromide stained gel exposed to U.V. light.

Question18

Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.
A Insertion of recombinant DNA into the host cell
B Cutting of DNA at specific location by restriction enzyme
C Isolation of desired DNA fragment
D Amplification of gene of interest using PCR

Choose the correct answer from the options given below :
[NEET 2023]

Options:

A. C, A, B, D

B. C, B, D, A

C. B, D, A, C

D. B, C, D, A

Answer: D

Solution:

The correct answer is option (4) because recombinant DNA technology involves several steps in specific sequence such as isolation of DNA, fragmentation of DNA by restriction endonucleases, isolation of desired DNA fragment, ligation of the DNA fragment into a vector, transferring the recombinant DNA into the host, culturing the host cells in a medium at large scale and extraction of the desired product.

Question19

Which of the following is not a cloning vector?
[NEET 2023]

Options:

A. YAC

B. pBR322

C. Probe

D. BAC

Answer: C

Solution:

Solution:

Option (3) is correct answer because a single stranded DNA or RNA tagged with a radioactive molecule is called a probe and it helps in the detection of mutated gene.

Option (1), (2) and (4) are not correct because YAC, BAC, pBR322 are vectors.

Question20

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) :
When a particular restriction enzyme cuts strand of DNA, overhanging stretches or sticky ends are formed.
Reason (R):
Some restriction enzymes cut the strand of DNA a little away from the centre of the palindromic site.

In the light of the above statements, choose the correct answer from the options given below
[NEET Re-2022]

Options:

A. (A) is not correct but (R) is correct

B. Both (A) and (R) are correct and (R) is the correct explanation of (A)

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

D. (A) is correct but (R) is not correct

Answer: B

Solution:

Solution:

Both the statements are correct and Reason is the correct explanation of Assertion.

Sticky ends are produced by those restriction enzymes which cut the DNA strand a little away from the centre of the palindromic site, but between the same two bases of the opposite strand.

Question21

Separation of DNA fragments is done by a technique known as [NEET Re-2022]

Options:

A. Gel electrophoresis

B. Polymerase Chain Reaction

C. Recombinant technology

D. Southern blotting

Answer: A

Solution:

Solution:

The cutting of DNA by restriction endonucleases results in the formation of fragments of DNA. These fragments can be separated by a technique known as gel electrophoresis.

Question22

The enzyme (a) is needed for isolating genetic material from plant cells and enzyme (b) for isolating genetic material from fungus. Choose the correct pair of options from the following: [NEET Re-2022]

Options:

A. (a) Cellulase
(b) Lipase

B. (a) Cellulase

(b) Protease

C. (a) Cellulase
(b) Chitinase

D. (a) Chitinase
(b) Lipase

Answer: C

Solution:

Solution:

The genetic material from cells can be separated by lysing the cell wall, if present. The cell wall in plant cells is digested by cellulase and in fungal cells by chitinase enzyme.

Question23

List-I	List-II
(a) Gene gun	(i) Replacement of a faulty gene by a normal healthy gene
(b) Gene therapy	(ii) Used for transfer of Gene
(c) Gene cloning	(iii) Total DNA in the cells of an organism
(d) Genome	(iv) To obtain identical copies of a particular DNA molecule

Choose the correct answer from the options given below : [NEET Re-2022]

Options:

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

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

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

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

Answer: B

Solution:

Gene gun	Used to transfer DNA in plant cells
Gene therapy	Replacement of defective gene a faculty gene by normal functional gene
Gene cloning	To obtain identical copies of desired gene
Genome	Total DNA content in the cell of an organism

Question24

Pathogenic bacteria gain resistance to antibiotics due to changes in their :
[NEET Re-2022]

Options:

A. Nucleoid

B. Cosmids

C. Plasmids

D. Nucleus

Answer: C

Solution:

Solution:

R-plasmid or resistance plasmids allow specific bacteria to gain resistance against antibiotics.

Question25

Which of the following methods is not commonly used for introducing foreign DNA into the plant cell?
[NEET Re-2022]

Options:

A. Bacteriophages

B. Agrobacterium mediated transformation

C. Gene gun

D. 'Disarmed pathogen' vectors

Answer: A

Solution:

Solution:

Bacteriophages are used to insert foreign DNA into the bacteria(not into the plants).

Question26

Refer to the following statements for agarose- gel electrophoresis :
(a) Agarose is a natural polymer obtained from sea-weed.
(b) The separation of DNA molecules in agarose-gel electrophoresis depends on the size of DNA.
(c) The DNA migrates from negatively-charged electrode to the positively-charged electrode
(d) The DNA migrates from positively-charged electrode to the negatively-charged electrode.

Choose the most appropriate answer from the options given below [NEET Re-2022]

Options:

A. (b), (c) and (d) only

B. (a) and (b) only

C. (a), (b) and (c) only

D. (a), (b) and (d) only

Answer: C

Solution:

Solution:

Fragments of DNA after the action of restriction endonuclease can be separated by a technique known as gel electrophoresis.

DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode (positively charged) under electric field.

Question27

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) :
Polymerase chain reaction is used in DNA amplification.
Reason (R) :
The ampicillin resistant gene is used as a selectable marker to check transformation

In the light of the above statements, choose the correct answer from the options given below :
[NEET-2022]

Options:

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

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

C. (A) is correct but (R) is not correct

D. (A) is not correct but (R) is correct

Answer: B

Solution:

Solution:

Option (2) is the correct answer because both the statements are correct but the given reason is not the correct explanation. Polymerase chain reaction is used in DNA amplification.

Ampicillin resistance gene is a selectable marker that helps to check transformation by selection of transformants.

Question28

Which one of the following statement is not true regarding gel electrophoresis technique?
[NEET-2022]

Options:

A. The process of extraction of separated DNA strands from gel is called elution.

B. The separated DNA fragments are stained by using ethidium bromide.

C. The presence of chromogenic substrate gives blue coloured DNA bands on the gel.

D. Bright orange coloured bands of DNA can be observed in the gel when exposed to UV light.

Answer: C

Solution:

Solution:

Option (3) is the incorrect statement, as bright colored bands of DNA can be observed in the gel whenEtBr (Ethidium bromide) treated DNA is exposed to UV light.

Question29

In the following palindromic base sequences of DNA, which one can be cut easily by particular restriction enzyme?
[NEET-2022]

Options:

A. 5'GATACT3'; 3'CTATGA5'

B. 5'GAATTC3'; 3'CTTAAG5'

C. 5'CTCAGT3'; 3'GAGTCA5'

D. 5'GTATTC3'; 3'CATAAG5'

Answer: B

Solution:

Solution:

Option (2) is the correct answer as a palindromic DNA sequence is a DNA sequence of base pairs that reads same on the two strands when orientation of reading is kept the same. Out of the four options, option (2) is the only palindromic sequence.

5'GAATTC3'

3'CTTAAG5'

Question30

Given below are two statements:
Statement I:
Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence.
Statement II:
Restriction endonucleases cut the DNA strand a little away from the centre of the palindromic site.

In the light of the above statements, choose the most appropriate answer from the options given below:
[NEET-2022]

Options:

A. are correct Statement II and Statement I Both

B. are incorrect Statement II and Statement I Both

C. is incorrect Statement II is correct but Statement I

D. is correct Statement II is incorrect but Statement I

Answer: A

Solution:

Solution:

Option(1) is the correct answer because both the statements I and II are correct.

Each restriction endonuclease recognises a specific palindromic nucleotide sequences in the DNA. It will bind to the DNA and cut each of the two strands of double helix at specific points.

Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome site; but between the same two bases on the opposite strands. So both the statements I and II are correct.

Question31

Which of the following is not a desirable feature of a cloning vector? [NEET-2022]

Options:

A. Presence of origin of replication

B. Presence of a marker gene

C. Presence of single restriction enzyme site

D. Presence of two or more recognition sites

Answer: D

Solution:

Solution:

Option (4) is the correct answer. Cloning vectors are the carriers of the desired gene in the host cell.

The features desirable in a cloning vector are:-• Presence of origin of replication• Presence of marker genes• Presence of very few, preferably single recognition site for the commonly used restriction enzymes

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Question32

During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out : [NEET 2021]

Options:

A. RNA

B. DNA

C. Histones

D. Polysaccharides

Answer: B

Solution:

Solution:

Various enzymes like protease, RNase, etc. are added to break down substances like proteins, RNA, etc. Once all these substances are broken down, DNA is left which is precipitated out by adding chilled ethanol.

Histones are basic proteins that help condense DNA in a cell.

Question33

Which of the following is a correct sequence of steps in a PCR

(Polymerase Chain Reaction)?
[NEET 2021]

Options:

A. Denaturation, Annealing, Extension

B. Denaturation, Extension, Annealing

C. Extension, Denaturation, Annealing

D. Annealing, Denaturation, Extension

Answer: A

Solution:

Solution:

The first step in the polymerase chain reaction is denaturation during which strands of dsDNA separate. This requires temperature around 94°C.

This is followed by annealing in which primers anneal to 3' end of template DNA strand.

Annealing is followed by extension in which Taq polymerase adds nucleotides to 3'OH end of primers.

Question34

Which of the following is not an application of PCR (Polymerase Chain Reaction)?
[NEET 2021]

Options:

A. Molecular diagnosis

B. Gene amplification

C. Purification of isolated protein

D. Detection of gene mutation

Answer: C

Solution:

Solution:

PCR is Polymerase Chain Reaction.

It is used for making multiple copies of the gene.

Hence PCR is used for

• Gene amplification.

• PCR-based assays have been developed that detect the presence of gene sequences of the infectious agents.

• It is also used in detecting mutations.

• Protein is not the target of PCR. Hence, plays no role in its purification.

Question35

Plasmid pBR322 has Pstl restriction enzyme site within gene amp^{R} that confers ampicillin resistance. If this enzyme is used for inserting a gene for β-galactoside production and the recombinant plasmid is inserted in an E.coli strain
[NEET 2021]

Options:

A. It will not be able to confer ampicillin resistance to the host cell

B. The transformed cells will have the ability to resist ampicillin as well as produce β-galactoside

C. It will lead to lysis of host cell

D. It will be able to produce a novel protein with dual ability

Answer: A

Solution:

Solution:
pBR322 is a commonly used cloning vector. When the gene for β-galactoside is inserted in the ampicillin resistance gene by using Pst I, the recombinant E.coli will lose ampicillin resistance due to insertional inactivation of the antibiotic resistance gene.
The host (recombinant) cell will produce β-galactoside which is not a novel protein nor does it have dual ability.
The transformed cells cannot resist ampicillin as they have lost ampicillin resistance.
A recombinant E. coli is produced and the host cell will not undergo lysis due to insertion of β-galactoside gene.

Question36

A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is:
[NEET 2021]

Options:

A. Degenerate primer sequence

B. Okazaki sequences

C. Palindromic Nucleotide sequences

D. Poly(A) tail sequences

Answer: C

Solution:

• Each restriction endonuclease recognizes a specific palondromic nucleotide sequence in the DNA. Once it finds its specific recognition sequence it bind to DNA and cuts each of the two strands of DNA.

• During post transcriptional modification in eukaryotes, poly(A) tail (200–300 adenylate residues) are added at 3' end of hnRNA.

• During DNA replication Okazaki fragments are synthesized discontinuously and joined by DNA ligase.

• A PCR primer sequence is termed degenerate if some of its position have several possible bases.

Question37

During the process of gene amplification using PCR, if very high temperature is not maintained in the beginning, then which of the following steps of PCR will be affected first? [NEET 2021]

Options:

A. Annealing

B. Extension

C. Denaturation

D. Ligation

Answer: C

Solution:

Solution:

● Option (3) is correct. High temperature about 94°C is required for the process of denaturation which is the first step of PCR.

● Ligation of DNA fragments is performed with the help of an enzyme called DNA ligase.

● Annealing is performed at 50°-60°C which is the second step that can get affected.

● Addition of nucleotides to the primer, synthesizing a new DNA strand using only the template sequences with the help of enzyme DNA polymerase is called primer extension/ polymerisation.

Question38

Match the organism with its use in biotechnology.

(a) Bacillus thuringiensis	(i) Cloning vector
(b) Thermus	(ii) Construction of first rDNA molecule
(c) Agrobacterium tumefaciens	(iii) DNA polymerase
(d) Salmonella typhimurium	(iv) Cry proteins

Select the correct option from the following:

	(a)	(b)	(c)	(d)
(1)	(iv)	(iii)	(i)	(ii)
(2)	(iii)	(ii)	(iv)	(i)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(ii)	(iv)	(iii)	(i)

[NEET-2020]

Options:

A. a

B. b

C. c

D. d

Answer: A

Solution:

Solution:

(a) Bacillus thuringiensis is a source of Cryproteins.

(b) Thermus aquaticus is a source of thermostable DNA polymerase (Taq polymerase) used in PCR.

(c) Agrobacterium tumefaciens is a cloning vector.

(d) The construction of 1st recombinant DNA molecule was performed using native plasmid of Salmonella typhimurium.

Question39

In gel electrophoresis, separated DNA fragments can be visualized with the help of
[NEET-2020]

Options:

A. Ethidium bromide in UV radiation

B. Acetocarmine in UV radiation

C. Ethidium bromide in infrared radiation

D. Acetocarmine in bright blue light

Answer: A

Solution:

The separated DNA fragments can be visualised only after staining the DNA with Ethidium bromide followed by exposure to UV radiation.

Question40

Bt cotton variety that was developed by the introduction of toxin gene of Bacillus thuringiensis (Bt) is resistant to [NEET-2020]

Options:

A. Fungal diseases

B. Plant nematodes

C. Insect predators

D. Insect pests

Answer: D

Solution:

Solution:

Bt cotton is resistant to cotton bollworm (Insect pest).

Cry I Ac and Cry II Ab genes have been introduced in cotton to protect it from cotton bollworm. This makes Bt cotton as biopesticide.

Question41

Identify the wrong statement with regard to Restriction Enzymes. [NEET-2020]

Options:

A. They cut the strand of DNA at palindromic sites.

B. They are useful in genetic engineering.

C. Sticky ends can be joined by using DNA ligases

D. Each restriction enzyme functions by inspecting the length of a DNA sequence.

Answer: D

Question42

The specific palindromic sequence which is recognized by EcoRI is [NEET-2020]

Options:

A. 5'- GGAACC - 3'
3'- CCTTGG - 5'

B. 5'- CTTAAG - 3'
3'- GAATTC - 5'

C. 5'- GGATCC - 3'
3'- CCTAGG - 5'

D. 5'- GAATTC - 3'
3'- CTTAAG - 5'

Answer: D

Solution:

Solution:

The correct option is (4) because the specific palindromic sequence which is recognised by EcoRI is

5'- GAATTC - 3'

3'- CTTAAG - 5'

Question43

The sequence that controls the copy number of the linked DNA in the vector, is termed
[NEET-2020]

Options:

A. Ori site

B. Palindromic sequence

C. Recognition site

D. Selectable marker

Answer: A

Solution:

Solution:

The correct option is (1) because Ori sequence is responsible for controlling the copy number of the linked DNA in the vector. Ori i.e. origin of replication is responsible for initiation of replication.

Question44

Choose the correct pair from the following
[NEET-2020]

Options:

A. Polymerases - Break the DNA into fragments

B. Nucleases - Separate the two strands of DNA

C. Exonucleases - Make cuts at specific positions within DNA

D. Ligases - Join the two DNA molecules

Answer: D

Solution:

Solution:

Ligases join the two DNA molecules.

Question45

A selectable marker is used to:
[NEET OD 2019]

Options:

A. help in eliminating the non-transformants, so that the transformants can be regenerated

B. identify the gene for a desired trait in an alien organism

C. select a suitable vector for transformation in a specific crop

D. mark a gene on a chromosome for isolation using restriction enzyme

Answer: A

Question46

Given below are four statements pertaining to separation of DNA fragments using gel electrophoresis. Identify the incorrect statements.
(a) DNA is negatively charged molecule and so it is loaded on gel towards the Anode terminal
(b) DNA fragments travel along the surface of the gel whose concentration does not affect movement of DNA.
(c) Smaller the size of DNA fragment larger is the distance it travels through it.
(d) Pure DNA can be visualized directly by exposing UV radiation.
Choose correct answer from the options given below
[NEET OD 2019]

Options:

A. (a), (c) and (d)

B. (a), (b) and (c)

C. (b), (c) and (d)

D. (a), (b) and (d)

Answer: D

Question47

An enzyme catalysing the removel of nucleotides from ends of DNA is: [NEET OD 2019]

Options:

A. DNA ligase

B. Endonuclease

C. Exonuclease

D. Protease

Answer: C

Question48

Match the following enzymes with their functions:

(a) Restriction endonucleas	(i) Joins the DNA fragements
(b) Restriction exonuclease	(ii) Extends primers on genomic DNA template
(c) DNA ligase	(iii) Cuts DNA at specific position
(d) Taq polymerase	(iv) Removes nucleotides from the ends of DNA

Select the correct option from the following : [NEET OD 2019]

Options:

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

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

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

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

Answer: B

Question49

The two antibiotic resistance genes on vector pBR322 are for [NEET OD 2019]

Options:

A. Ampicillin and Tetracycline

B. Ampicillin and Chloramphenicol

C. Chloramphenicol and Tetracycline

D. Tetracycline and Kanamycin

Answer: A

Question50

Which one of the following equipments is essentially required for growing microbes on a large scale, for industrial production of enzymes? [NEET 2019]

Options:

A. Sludge digester

B. Industrial oven

C. Bioreactor

D. BOD incubator

Answer: C

Solution:

Solution:

To produce enzyme in large quantity equipment required are bioreactors. Large scale production involves use of bioreactors.

Question51

Following statements describe the characteristics of the enzyme Restriction Endonuclease. Identify the incorrect statement. [NEET 2019]

Options:

A. The enzyme binds DNA at specific sites and cuts only one of the two strands.

B. The enzyme cuts the sugar-phosphate backbone at specific sites on each strand.

C. The enzyme recognizes a specific palindromic nucleotide sequence in the DNA.

D. The enzyme cuts DNA molecule at identified position within the DNA.

Answer: A

Solution:

Solution:

Restriction enzymes cut DNA molecules at a particular point by recognising a specific sequence. Each restriction endonuclease functions by inspecting the length of a DNA sequence. Once it finds its specific recognition sequence, it will bind to the DNA and cut each of the two strands of the double helix at specific points in their sugar- phosphate backbone.

Question52

DNA precipitation out of a mixture of biomolecules can be achieved by treatment with
[NEET 2019]

Options:

A. Chilled ethanol

B. Methanol at room temperature

C. Chilled chloroform

D. Isopropanol

Answer: A

Solution:

Solution:

During the isolation of desired gene, chilled ethanol is used for the precipitation of DNA.

Question53

Which of the following is commonly usedas a vector for introducing a DNA fragment in human lymphocytes?
[NEET 2018]

Options:

A. Retrovirus

B. Ti plasmid

C. pBR 322

D. λ phage

Answer: A

Solution:

Solution:

Retrovirus is commonly used as vector for introducing a DNA fragment in human lymphocyte.

Gene therapy : Lymphocyte from blood of patient are grown in culture outside the body, a functional gene is introduced by using a retroviral vector, into these lymphocyte.

Question54

The correct order of steps in Polymerase Chain Reaction (PCR) is [NEET 2018]

Options:

A. Extension, Denaturation, Annealing

B. Annealing, Extension, Denaturation

C. Denaturation, Annealing, Extension

D. Denaturation, Extension, Annealing

Answer: C

Solution:

Solution:

This technique is used for making multiple copies of gene (or DNA) of interest in vitro.

Each cycle has three steps

(1) Denaturation

(2) Primer annealing

(3) Extension of primer

Question55

The DNA fragments separated on an agarose gel can be visualised after staining with : [NEET 2017]

Options:

A. Acetocarmine

B. Aniline blue

C. Ethidium bromide

D. Bromophenol blue

Answer: C

Question56

DNA fragments are:
[NEET 2017]

Options:

A. Negatively charged

B. Neutral

C. Either positively or negatively charged depending on their size

D. Positively charged

Answer: A

Question57

The process of separation and purification of expressed protein before marketing is called :
[NEET 2017]

Options:

A. Downstream processing

B. Bioprocessing

C. Postproduction processing

D. Upstream processing

Answer: A

Question58

A gene whose expression helps to identify transformed cell is known as :
[NEET 2017]

Options:

A. Vector

B. Plasmid

C. Structural gene

D. Selectable marker

Answer: D

Question59

What is the criterion for DN A fragments movement on agarose gel during gel electrophoresis ?
[NEET 2017]

Options:

A. The smaller the fragment size, the farther it moves

B. Positively charged fragments move to farther end

C. Negatively charged fragments do not move

D. The larger the fragment size, the farther it moves

Answer: A

Question60

Stirred-tank bioreactors have been designed for
[NEET 2016 P2]

Options:

A. ensuring anaerobic conditions in the culture vesse

B. purification of product

C. addition of preservatives to the product

D. ailability of oxygen throughout the process

Answer: D

Question61

A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using
[NEET 2016 P2]

Options:

A. ligase

B. Eco RI

C. Taq polymerase

D. polymerase II

Answer: A

Solution:

Solution:

Ligase are the enzymes used to join substrates. Here in case of DNA T_4 DNA ligase is used.

Question62

Which of the following is not a component of downstream processing? [NEET 2016 P2]

Options:

A. Expression

B. Separation

C. Purification

D. Preservation

Answer: A

Solution:

Solution:

Expression of recombinant DNA is parts of upstream processing.

Question63

Which of the following restriction enzymes produces blunt ends? [NEET 2016 P2]

Options:

A. Hind III

B. Sal I

C. Eco RV

D. Xho I

Answer: C

Solution:

Eco RV has restriction sequence –

5' - GAT ATC - 3'

3' - CTA TAG - 5'

Question64

Which of the following is not a feature of the plasmids ? [NEET 2016 P1]

Options:

A. Single - stranded

B. Independent replication

C. Circular structure

D. Transferable

Answer: A

Solution:

Solution:

Plasmide are double stranded DNA.

Question65

The taq polymerase enzyme is obtained from : [NEET 2016 P1]

Options:

A. Pseudomonas putida

B. Thermus aquaticus

C. Thiobacillus ferroxidans

D. Bacillus subtilis

Answer: B

Question66

Which of the following is a restriction endonuclease?
[NEET 2016 P1]

Options:

A. RNase

B. Hind II

C. Protease

D. DNase I

Answer: B

Question67

Which of the following is not required for any of the techniques of DNA fingerprinting available at present?
[NEET 2016 P1]

Options:

A. DNA -DNA hybridization

B. Polymerase chain reaction

C. Zinc finger analysis

D. Restriction enzymes

Answer: C

Question68

The DNA molecule to which the gene of interest is integrated for cloning is called
[NEET 2015]

Options:

A. Transformer

B. Template

C. Vector

D. Carrier

Answer: C

Solution:

Solution:
Vector is a DNA molecule that carries a foreign DNA segment and replicates inside a host cell. The vector DNA and foreign DNA carrying gene of interest are cut by the same restriction endonuclease enzyme to produce complementary sticky ends. With the help of DNA ligase enzyme, the complementary sticky ends of the two DNAs are joined to produce a recombinant DNA (rDNA), which is then introduced into the host cell.

Question69

The cutting of DNA at specific locations became possible with the discovery of
[NEET 2015]

Options:

A. Restriction enzymes

B. Selectable markers

C. Probes

D. Ligases

Answer: A

Solution:

Solution:
Restriction enzymes are used to cut DNA at specific locations.

Question70

An analysis of chromosomal DNA using the Southern hybrization technique does not use:
[NEET 2014]

Options:

A. Electrophoresis

B. Blotting

C. Autoradiography

D. PCR

Answer: D

Solution:

Solution:
PCR is only for amplification of DNA.

Question71

Which vector can clone only a small fragment of DNA? [NEET 2014]

Options:

A. Bactrial artifical chromosome

B. Yeast artificial chromosome

C. Plasmid

D. Comid

Answer: C

Solution:

Plasmid can clone only a small fragment of DNA about 10 kbp size
Cosmid – 45 kbp
YAC – 1 Mbp/ 1000 kbp – 2,500 kbp
BAC – 300 to 350 kbp

Question72

Commonly used vectors for human genome sequencing are: [NEET 2014]

Options:

A. T- DNA

B. BAC and YAC

C. Expression Vectors

D. T/A Cloning Vectors

Answer: B

Solution:

Commonly used vectors for human genome sequencing are BAC (Bacterial artificial chromosome)and YAC (Yeast Artificial chromosome)

Question73

The colonies of recombinant bacteria appear white in contrast to blue colonies of nonrecombinant bacteria because of (NEET 2013)

Options:

A. insertional inactivation of alpha galactosidase in recombinant bacteria.

B. inactivation of glycosidase enzyme in recombinant bacteria.

C. non-recombinant bacteria containing beta galactosidase.

D. insertional inactivation of alpha galactosidase in non-recombinant bacteria

Answer: A

Solution:

Solution:
Insertional inactivation means inactivation of an enzyme by the presence of an insert (recombinant DNA). In the presence of a chromogenic substrate, active alpha-galactosidase enzyme yields blue coloured colonies (non recombinants). While insertional inactivation of alpha-galactosidase enzyme inactivates the enzyme resulting in white colour colonies (recombinants). Thus, it is due to insertional inactivation of alpha-galactosidase in recombinant bacteria that the colonies of recombinant bacteria appear white in contrast to the blue colonies of non-recombinant bacteria.
So, the correct answer is 'Insertional inactivation of alpha galactosidase in recombinant bacteria'.

Question74

DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by (NEET 2013)

Options:

A. electrophoresis

B. restriction mapping

C. centrifugation

D. polymerase chain reaction

Answer: A

Solution:

DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by electrophoresis. The polymerase chain reaction is simply DNA replication in a test tube. Restriction mapping is the process of obtaining structural information on a piece of DNA by the use of restriction enzymes, e.g., endonucleases that recognise specific 4 to 8 base regions of DNA

Question75

Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?
(NEET 2013)

Options:

A. Algae Methylase

B. Fungi Chitinase

C. Bacteria- Lysozyme

D. Plant cells Cellulase

Answer: A

Solution:

Solution:
(a) : Cell wall of algae is made up of cellulose, pectin and mucilage. These substances cannot be degraded by methylase. Methylase is a type of transferase enzyme that transfers a methyl group from a donor to an acceptor.

Question76

During the process of isolation of DNA, chilled ethanol is added to
(KN NEET 2013)

Options:

A. precipitate DNA

B. break open the cell to release DNA

C. facilitate action of restriction enzymes

D. remove proteins such as histones

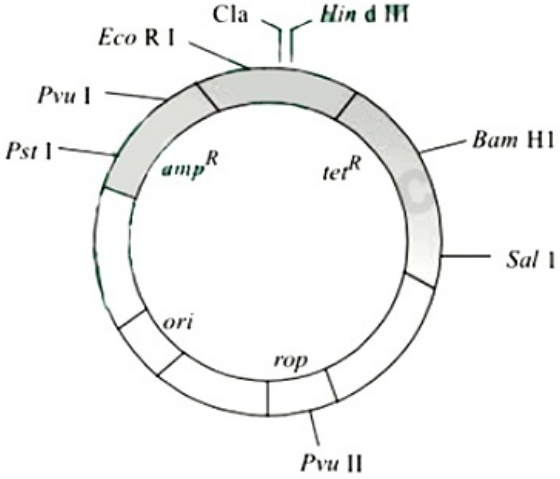
Answer: A

Solution:

(a) : Ethanol is much less polar than water. Adding it to the solution disrupts the screening charges exerted by water. The electrical attraction between phosphate and any positive ions (Na^+) present in solution becomes strong enough to form a stable ionic bond and DNA precipitates. Ethanol precipitation is a widely used technique to purify, or concentrate nucleic acid.

Question77

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)?



(2012)

Options:

A. ori-original restriction enzyme

B. rop -reduced osmotic pressure

C. HindIII, EcoRI - selectable markers

D. amp^R, tet^R−antibiotic resistance genes

Answer: D

Solution:

Solution:
23. (d) : In pBR322, ori-represents site or origin of replication rop-codes for proteins that take part in the replication of plasmid.
Hin d III, Eco RI- recognition sites of restriction endonucleases. amp^R and tet^R− antibiotic resistance genes.

Question78

PCR and restriction fragment length polymorphism are the methods for (2012)

Options:

A. study of enzymes

B. genetic transformation

C. DNA sequencing

D. genetic fingerprinting

Answer: D

Solution:

Solution:
(d) : Polymerase chain reaction (PCR) is used to amplify a small DNA fragment to obtain its large quantity. PCR is very helpful in DNA fingerprinting in such cases where the culprit has to be identified from a very small blood, semen or other cell sample from a crime scene.

Question79

A single strand of nucleic acid tagged with a radioactive molecule is called
(2012)

Options:

A. vector

B. selectable marker

C. plasmid

D. probe

Answer: D

Solution:

Solution:
(d) : Probes are single stranded, radiolabelled molecules of nucleic acids with known sequence. The probes having sequence complementary to the gene to be identified are supplied. They bind with the particular gene segment. Radiation imaging identifies the location of that particular segment which bind with probe. Probes are used as identification tool.

Question80

Which one is a true statement regarding DNA polymerase used in PCR?
(2012)

Options:

A. It is used to ligate introduced DNA in recipient cells.

B. It serves as a selectable marker.

C. It is isolated from a virus.

D. It remains active at high temperature

Answer: D

Solution:

Solution:
(d) : In PCR, Taq polymerase is used which is obtained from Thermus aquaticus bacteria. It is a relatively thermostable enzyme thus used in PCR as during the process the step involving denaturation of DNA strands requires high temperature.

Question81

For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of (2012)

Options:

A. silver or platinum

B. platinum or zinc

C. silicon or platinum

D. gold or tungsten

Answer: D

Solution:

Solution:
(d) : A gene or a biolistic particle delivery system, originally designed for plant transformation, is a device for injecting cells with genetic information. The payload is an elemental particle of a heavy metal such as gold or tungsten coated with plasmid DNA. The device is used to transform almost any type of cell including plants, and is not limited to genetic material of the nucleus. It can also transform organelles, including plastids.

Question82

Biolistics (gene-gun) is suitable for (Mains 2012)

Options:

A. disarming pathogen vectors

B. transformation of plant cells

C. constructing recombinant DNA by joining with vectors

D. DNA fingerprinting

Answer: B

Solution:

Solution:
(b) : Biolistics is a technique for introducing genetic material into living cells, especially plant cells, in which DNA-coated microscopic particles (tungsten or gold particles) are bombarded with a very high velocity into the target cell using a special gun. The microprojectiles, typically $1\mathrm{mm}$ in diameter, are accelerated to high velocity by a specially modified small calibre gun and penetrate the cell walls and plasma membrane with minimal damage. Hence, the novel DNA can be inserted into intact plant cells ultimately transforming it without using a vector.

Question83

In genetic engineering, the antibiotics are used (Mains 2012)

Options:

A. as selectable markers

B. to select healthy vectors

C. as sequences from where replication starts

D. to keep the cultures free of infection

Answer: A

Solution:

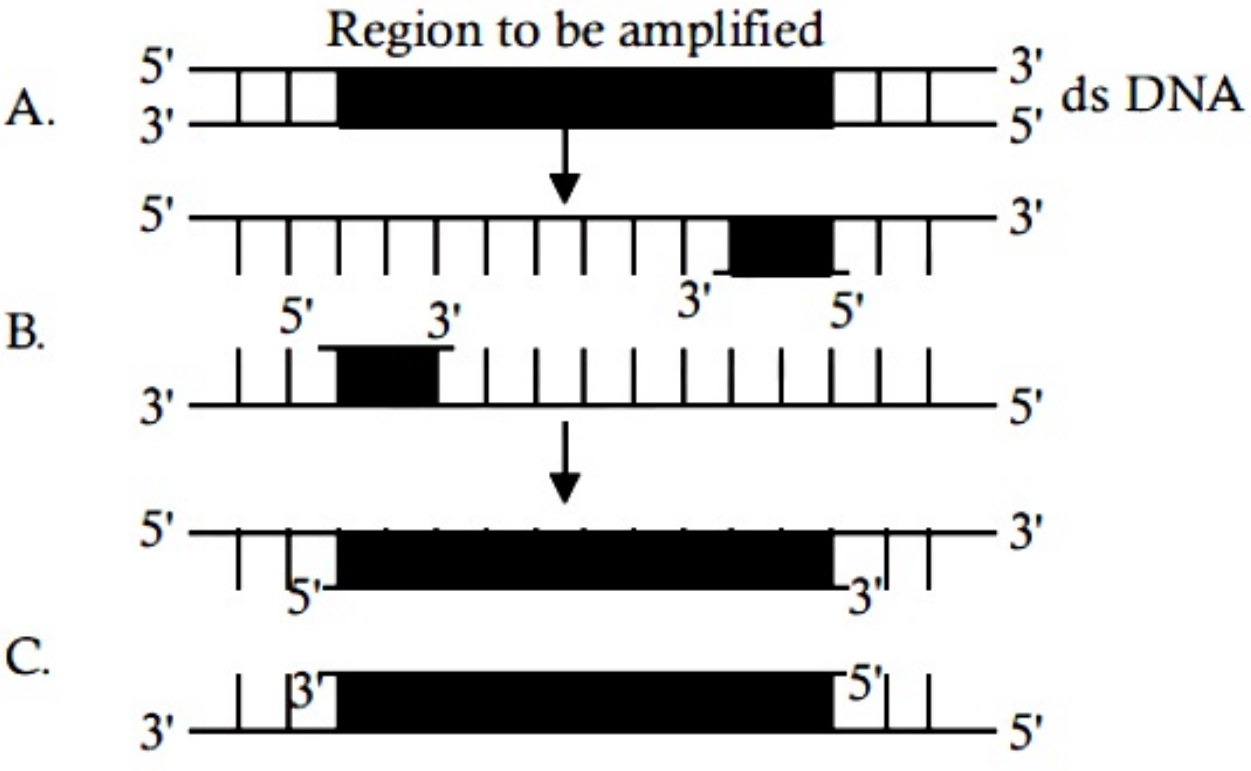
Solution:
(a) : Selectable markers are those genes which help in selecting those host cells which contain vectors (i.e., transformants) and eliminating the non-transformants. The genes encoding resistance to antibiotics such as tetracycline, ampicillin, kanamycin etc., are useful selectable markers for E.coli. Plasmid pBR322 has two resistance genes ampicillin resistance ($\mathrm{amp}^{\mathrm{r}}$) and tetracyclin resistance ($\mathrm{tet}^{\mathrm{r}}$) which are considered useful for selectable markers.

The presence of restriction sites within the markers tet $^{\mathrm{r}}$ and $\mathrm{amp}^{\mathrm{r}}$ permits an easy selection for cells transformed with the recombinant pBR322. Insertion of the DNA fragment into the plasmid using enzyme Pst I or Pvu I places the DNA insert non-functional. Bacterial cells containing such a recombinant pBR 322 will be unable to grow in the presence of ampicillin, but will grow on tetracycline. Similarly, when restriction enzyme Bam HI or Sal I is used, the DNA insert is placed within the gene tet making it non-functional. Bacterial cells possessing such a recombinant pBR322 will, therefore, grow on ampicillin but not on tetracyclin.

Question84

The figure below shows three steps (A, B, C) of Polymerase Chain

Reaction (PCR). Select the option giving correct identification together with what it represents?



(Mains 2012)

Options:

A. B− denaturation at a temperature of about 98˚C separating the two DNA strands

B. A - denaturation at a temperature of about 50˚C

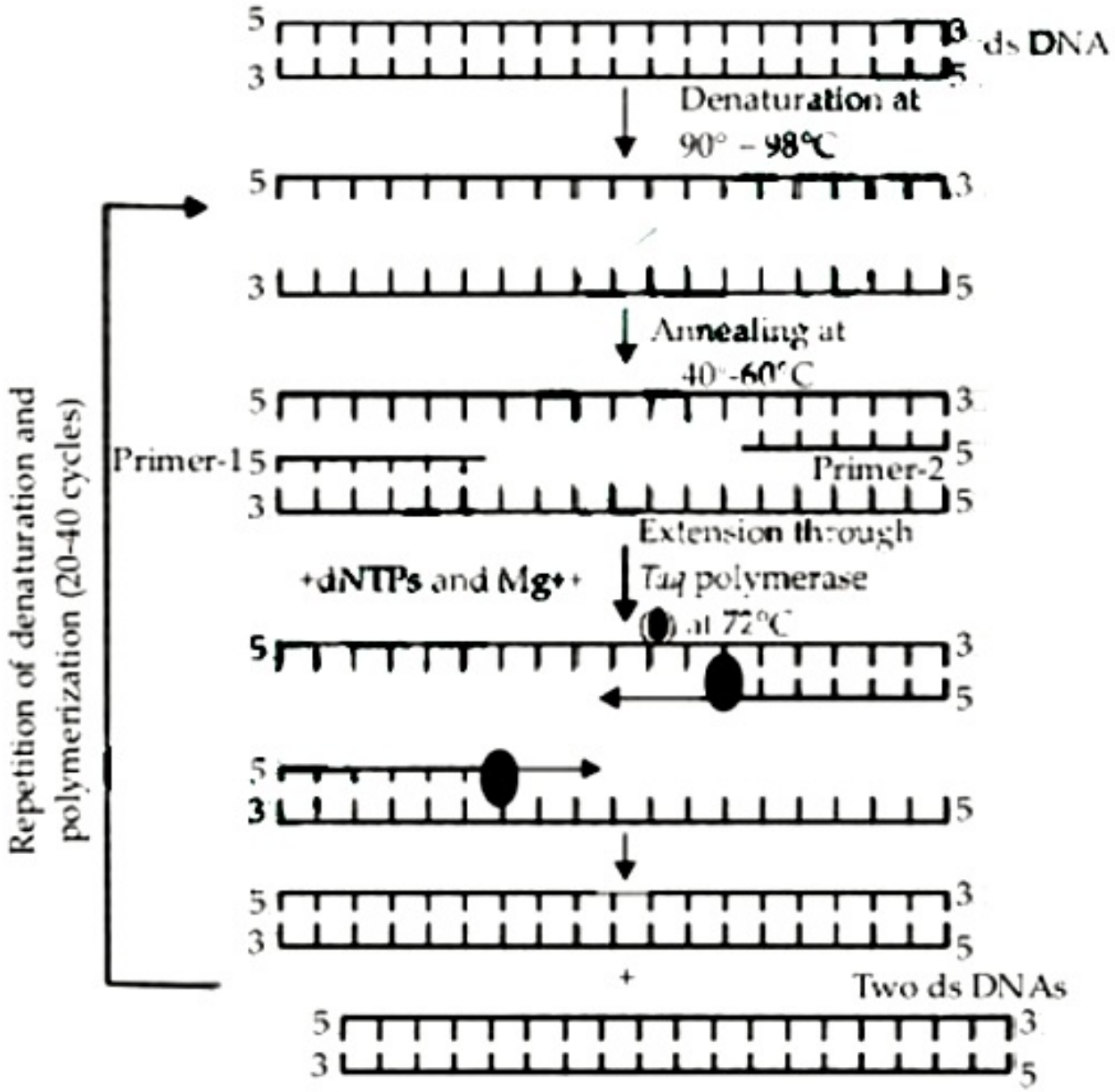
C. C - extension in the presence of heat stable DNA polymerase

D. A - annealing with two sets of primers

Answer: C

Solution:

Solution:
(c) : A schematic representation of PCR can be illustrated as follow.



Question85

Which one of the following represents a palindromic sequence in DNA? (Mains 2012)

Options:

A. 5'-GAATTC-3'
3'-CTTAAG-5'

B. 5'-CCAATG-3'
3'-GAATCC-5'

C. 5'-CATTAG-3'

3'-GATAAC-5'

D. 5'-GATACC-3'
3'-CCTAAG-5'

Answer: A

Solution:

(a) : Palindromes are groups of letters that form the same words when read both forward and backward, e.g., "MADAM". As against a word-palindrome where the same word is read in both directions, the palindrome in DNA is a sequence of base pairs that reads same on the two strands when orientation of reading is kept the same. For example, the following sequences read the same on the two strands in 5′ 3′ direction. This is also true if read in the 3′ 5′ direction.
In this case, it is
5′ − GAATTC − 3′
3′ − CTTAAG − 5′

Question86

Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?
5’ —— GAATTC —— 3’
3’ —— CTTAAG —— 5’
(2011)

Options:

A. Replication completed

B. Deletion mutation

C. Start codon at the 5 Dend

D. Palindromic sequence of base pairs

Answer: D

Solution:

Solution:
A palindromic sequence is a nucleic acid sequence on double-stranded DNA or RNA wherein reading 5' (five-prime) to 3' (three prime) forward on one strand matches the sequence reading 5' to 3' on the complementary strand with which it forms a double helix. This definition of palindrome thus depends on complementary strands being palindromic of each other.
So the correct option is 'Palindromic sequence of base pairs'.

Question87

There is a restriction endonuclease called EcoRI. What does "co" part in it stand for?
(2011)

Options:

A. colon

B. coelom

C. coenzyme

D. coli

Answer: D

Solution:

Solution:
(d) : The enzyme restriction endonuclease EcoRI is found in the colon bacteria E . coli. So, here 'co' stands for coli. According to nomenclature of restriction enzyme, the first letter used for the enzyme is the first letter of the genus name (in italics) of the bacterium, then comes the first two letters of its species (also in italics), next is the strain of the organism. At last is a Roman numeral signifying the order of discovery. Here, the enzyme EcoRI was isolated from the bacterium Escherichia coli (co), strain RY13(R) and it was first endonuclease (I) isolated from E.coli.

Question88

Agarose extracted from sea weeds is used in (2011)

Options:

A. spectrophotometry

B. tissue culture

C. PCR

D. gel electrophoresis

Answer: D

Solution:

Solution:
(d) : In gel electrophoresis DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel. Agarose is a natural polymer extracted from sea weeds and is commonly used as a matrix.

Question89

Which one of the following techniques made it possible to genetically engineer living organisms? (Mains 2011)

Options:

A. Recombinant DNA techniques

B. X-ray diffraction

C. Heavier isotope labelling

D. Hybridization

Answer: A

Solution:

Solution:
Genetic engineering, also known as recombinant DNA technology, means altering the genes in a living organism to produce a genetically modified organism (GMO) with a new genotype. Various kinds of genetic modification are possible: inserting a foreign gene from one species into another, forming a transgenic organism; altering an existing gene so that its product is changed; or changing gene expression so that it is translated more often or not at all.

Question90

Which one of the following is used as vector for cloning genes into higher organisms?
(2010)

Options:

A. Baculovirus

B. Salmonella typhimurium

C. Rhizopus nigricans

D. Retrovirus

Answer: D

Solution:

Solution:
(d) : Retroviruses in animals have the ability to transform normal cells into cancerous cells. We have transformed these pathogens into useful vectors for delivering genes of interest to humans. Retroviruses have been disarmed and are now used to deliver desirable genes into animal cells. So, once a gene or a DNA fragment has been ligated into a suitable retroviral vector it is transferred into a bacterial, plant or animal host (where it multiplies).

Question91

DNA or RNA segment tagged with a radioactive molecule is called
(2010)

Options:

A. vector

B. probe

C. clone

D. plasmid

Answer: B

Solution:

Solution:
The clone is a population of genetically identical individuals normally produced asexually or by vegetative reproduction. A plasmid is an extrachromosomal small DNA molecule which can replicate independently. They are mostly found in bacteria but are also present in archaea and eukaryotic organisms. An engineered DNA molecule that can serve to carry foreign genetic material into another cell to facilitate the expression of the foreign gene, for example, plasmids, cosmids, and artificial chromosomes. A probe is a radiolabeled single-stranded DNA/ RNA fragment used to search for a gene of interest or other DNA sequence. For the purpose, the base sequence of the probe is complementary to the target sequence to facilitate its base pairing with the target gene

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Question92

Restriction endonucleases are enzymes which (2010)

Options:

A. make cuts at specific positions within the DNA molecule

B. recognize a specific nucleotide sequence for binding of DNA ligase

C. restrict the action of the enzyme DNA polymerase

D. remove nucleotides from the ends of the DNA molecule

Answer: A

Solution:

Solution:
(a) : Restriction endonucleases were found by Arber in 1962 in bacteria. They act as "molecular scissors" or chemical scalpels. They recognize the specific base sequence at palindrome sites in DNA duplex and cut its strands. For example, restriction endonuclease E co RI found in the colon bacteria E. coli reocgnizes the base sequence GAATTC in DNA duplex and cuts its strands between G and A.

Question93

Stirred-tank bioreactors have been designed for (2010)

Options:

A. addition of preservatives to the product

B. purification of the product

C. ensuring anaerobic conditions in the culture vessel

D. availability of oxygen throughout the process

Answer: D

Solution:

Solution:
(d) : A stirred-tank bioreactor is usually cylindrical or with a curved base to facilitate the mixing of the reaction contents. The stirrer facilitates even mixing and oxygen availability throughout the bioreactor. Alternatively air can be bubbled through the reactor.

Question94

Which of the following are used in gene cloning? (2010)

Options:

A. Nucleoids

B. Lomasomes

C. Mesosomes

D. Plasmids

Answer: D

Solution:

Solution:
(d) : Plasmid is a small circular double stranded DNA molecule present in the cytoplasm of the bacterial cell. It can replicate independently of bacterial chromosome. Due to this characteristic of plasmid, it is used as the vector (vectors are for the transferring of a piece of DNA to target gene) in gene cloning.

Question95

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) Plasmid
(iii) Plasmodium
(iv) Bacteriophage
(Mains 2010)

Options:

A. (i), (ii) and (iv)

B. (i) only

C. (i) and (iii)

D. (ii) and (iv)

Answer: D

Solution:

Solution:
(d) : Plasmid and bacteriophage are used as vectors in genetic engineering. Plasmid is an autonomously replicating circular extra chromosomal DNA found in bacteria. They can be transferred from cell to cell in a bacterial colony. This characteristic is being used in biotechnology for transferring desirable gene into target gene of the host. Bacteriophage is a bacterial virus which can infect it, quickly multiply within and destroy (lyse) their host (virus) cells. During infection bacteriophages inject their DNA into these cells. The injected DNA selectively replicate and are expressed in the host that results in a multiplication of phages that ultimately burst out of the cell (by lysis). This ability of transferring DNA from the phage genome to specific host during infection process gave scientists the idea that specially designed phage vectors could be used for gene cloning.

Question96

Which one of the following is commonly used in transfer of foreign DNA into crop plants?
(2009)

Options:

A. Meloidogyne incognita

B. Agrobacterium tumefaciens

C. Penicillium expansum

D. Trichoderma harzianum

Answer: B

Solution:

Solution:
(b) : Agrobacterium tumefaciens has been extensively used in genetic engineering experiments. It is the causative agent of crown gall, an important disease of many commercial crops. This disease has come to be recognized in recent years as being caused by a DNA plasmid (Ti plasmid) carried by bacterium and transferred to the plant cells. Following the

discovery of the relationship between crown gall and the Ti plasmid, this plasmid has come to be widely used in plant genetic engineering as a vector in order to inject a novel gene in host plant to form a transgenic plant.

Question97

Gel electrophoresis is used for
(2008)

Options:

A. construction of recombinant DNA by joining with cloning vectors

B. isolation of DNA molecules

C. cutting of DNA into fragments

D. separation of DNA fragments according to their size

Answer: D

Solution:

Solution:
Gel electrophoresis is used to separate macromolecules, like DNA, RNA, and proteins. DNA fragments are separated according to their size. Proteins can be separated according to their size and their charge. Gel electrophoresis is used for a range of purposes, like to get a DNA fingerprint for forensic purposes, for paternity testing, to check a PCR reaction

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Question98

The linking of antibiotic resistance gene with the plasmid vector became possible with
(2008)

Options:

A. DNA polymerase

B. exonucleases

C. DNA ligase

D. endonucleases

Answer: C

Solution:

Solution:
(c) : The construction of the first recombinant DNA emerged from the possibility of linking a gene encoding antibiotic resistance with a native plasmid. The cutting of DNA at specific locations became possible with the discovery of the so-

called 'molecular scissors' - restriction enzymes. The cut piece of DNA was then linked with the plasmid DNA. This plasmid DNA acts as vector to transfer the piece of DNA attached to it. The linking of antibiotic resistance gene with the plasmid vector became possible with the enzyme DNA ligase, which acts on cut DNA molecules and joins their ends. This makes a new combination of circular autonomously replicating DNA created in vitro and is known as recombinant DNA.

Question99

Restriction endonuclease (2006)

Options:

A. synthesizes DNA

B. cuts the DNA molecule randomly

C. cuts the DNA molecule at specific sites

D. restricts the synthesis of DNA inside the nucleus

Answer: C

Solution:

Solution:
Restriction endnucleases are synthesised by bacteria as part of their defence mechanism. It is an enzyme that cuts DNA at or near specific recognition nucleotide sequences known as restriction sites. These enzymes are found in bacteria to provide a defence mechanism against viruses by cleaning the toxic viral DNA

Question100

Two microbes found to be very useful in genetic engineering are (2006)

Options:

A. crown gall bacterium and Caenorhabditis elegans

B. Escherichia coli and Agrobacterium tumefaciens

C. Vibrio cholerae and a tailed bacteriophage

D. Diplococcus sp. and Pseudomonas sp

Answer: B

Solution:

Solution:
(b) : E.coli contains many important standard cloning vectors widely used in gene cloning experiments like pBR322 contains origin of replication (ori). Other cloning vectors like PACYC177, pBR324, PRK 64.6 contain ampicillin resistance

gene they are also found in E.coli. Among higher plants, Ti plasmid of Agrobacterium tumefaciens and Ri plasmid of A.*rhizogenes* is the best known vector.
T-DNA from Ti or Ri plasmid of Agrobacterium is considered to be a very potential vector for cloning experiments with higher plants.

Question101

Restriction endonucleases (2004)

Options:

A. are present in mammalian cells for degradation of DNA when the cell dies

B. are used in genetic engineering for ligating two DNA molecules

C. are used for in vitro DNA synthesis

D. are synthesized by bacteria as part of their defense mechanism.

Answer: D

Solution:

Solution:
(d) : Restriction endonucleases are enzymes that digest double stranded DNA following recognition of specific nucleotide sequences. This is achieved by cleaving the two phosphodiester bonds, one within each strand of the DNA duplex. They are found in bacteria and their function in bacteria is to cut up any invading virus as a part of its defence mechanism, thus restricting the multiplication of viruses in the bacterial cell. Different species of bacteria produce different restriction endonucleases.

Question102

In transgenics, expression of transgene in target tissue is determined by (2004)

Options:

A. enhancer

B. transgene

C. promoter

D. reporter

Answer: D

Solution:

(d) : The plants, in which a functional foreign gene has been incorporated by any biotechnological methods that generally is not present in plant, are called transgenic plants. When plant cell are transformed by any of the transformation methods it is necessary to isolate the transformed cells/tissue. There are certain selectable marker genes present in vectors that facilitate the selection process. In transformed cells the selectable marker genes or are introduced through vector. There is a number of marker genes which are commonly described as reporter genes screenable genes. Some of the reporter genes which are most commonly used in plant transformation are : cat, gus, lux, nptII., etc.

Question103

In recent years, DNA sequences (nucleotide sequence) of mt DNA and Y chromosomes were considered for the study of human evolution, because
(2003)

Options:

A. they are small and therefore, easy to study

B. they are uniparental in origin and do not take part in recombination

C. their structure is known in greater detail

D. they can be studied from the samples of fossil remains

Answer: B

Solution:

Solution:
(b) : Sequence of both mt DNA and Y chromosomes are considered for the study of human evolution because they are uniparental in origin. mt DNA is inherited along with the maternal cytoplasm and Y chromosome is inherited from father. So they do not take part in recombination. In addition, mt DNA has a higher mutation rate then nuclear DNA so that it is more useful for short term evolutionary studies.

Question104

Which one of the following bacteria has found extensive use in genetic engineering work in plants?
(2003)

Options:

A. Clostridium septicum

B. Xanthomonas citri

C. Bacillus coagulens

D. Agrobacterium tumefaciens

Answer: D

Solution:

Agrobacterium tumefaciens is called as nature's genetic engineer.
Plant transformation is mediated by Agrobacterium tumefaciens, a soil plant pathogenic bacterium. It has become the most used method for the introduction of foreign genes into plant cells and the subsequent regeneration of transgenic plants. It naturally infects the wound sites in dicotyledonous plant, causing the formation of the crown gall tumors.

Question105

Manipulation of DNA in genetic engineering became possible due to the discovery of
(2002)

Options:

A. restriction endonuclease

B. DNA ligase

C. transcriptase

D. primase

Answer: A

Solution:

Solution:
(a) : DNA restriction endonuclease are important class of restriction exonucleases, class II, which cut double-stranded DNA molecules only at sites characterized by a specific nucleotide sequence. Restriction enzymes are isolated from bacterial cells, and are tools for molecular biologists. Several hundred restriction enzymes are now known, each with a specific sequence requirement dictating where it will cut DNA. Some, such as Hind III, make staggered cuts leaving 'sticky ends', three nucleotides long protruding on one strand from each severed terminus; others make clean cuts in both strands at the same place and thus generate 'blunt ends'. Digesting DNA with a restriction enzyme therefore creates a characteristic set of fragments, which can be isolated by electrophoresis and subsequently analysed.

Question106

A mutant strain of T4 - Bacteriophage, R-II, fails to lyse the E . coli but when two strains R-IIX and R-IIY are mixed then they lyse the E. coli. What may be the possible reason?
(2001)

Options:

A. Bacteriophage transforms in wild.

B. It is not mutated.

C. Both strains have similar cistrons.

D. Both strains have different cistrons

Answer: D

Solution:

Solution:
(d) : A mutant strain of T_4 -bacteriophage, RII, fails to lyse the E .coli but when two strains R -II (X) and R-IIY are mixed then they lyse the E.coli because both strains have different cistrons.

Question107

In Lederberg's replica plating experiment what shall be used to obtain streptomycin resistant strain
(2001)

Options:

A. minimal medium and streptomycin

B. complete medium and streptomycin

C. only minimal medium

D. only complete medium.

Answer: A

Solution:

Solution:
(a) : If streptomycin resistant mutant are to be obtained, material should be allowed to grow on medium lacking streptomycin so that both mutant and wild types may grow. These colonies are imprinted on petriplates to form the master pattern and other plates having streptomycin can then be pressed on velveteen to get an impression. The plate now containing only mutants for streptomycin resistance will grow.

Question108

Which of the following cut the DNA from specific places?
(2001)

Options:

A. E.coli restriction endonuclease I

B. Ligase

C. Exonuclease

D. Alkaline phosphate

Answer: A

Question109

Maximum number of bases in plasmids discovered so far (2001)

Options:

A. 50 kilo base

B. 500 kilo base

C. 5000 kilo base

D. 5 kilo base.

Answer: B

Solution:

Solution:
(b) : A plasmid is a DNA molecule separate from the chromosomal DNA and capable of autonomous replication. In many cases, it is typically circular and double-stranded. It usually occurs in bacteria, and is sometimes found in eukaryotic organisms. The size of plasmids varies from 1 to over 400 kilobase pairs (kbp) There may be one copy, for large plasmids, to hundreds of copies of the same plasmid in a single cell. The term plasmid was first introduced by the American molecular biologist Joshua Lederberg in 1952 .

Question110

The bacteria generally used for genetic engineering is (2000)

Options:

A. Agrobacterium

B. Bacillus

C. Pseudomonas

D. Clostridium.

Answer: A

Solution:

Agrobacterium tumefaciens is a soil plant pathogenic bacterium that carries Ti plasmid. It can transfer a particular segment of the tumor-inducing (Ti) plasmid into the nucleus of infected cells. The transferred T-DNA is then integrated into the host genome and transcribed with it. This ability of Agrobacterium tumefaciens to transfer the T-DNA in the host genome is explored in genetic engineering to transfer the desired DNA segment of up 25kb, carrying the gene of the interest, into the genome of selected organisms. Thus, the correct answer is option A.

Question111

Plasmid has been used as vector because (2000)

Options:

A. it is circular DNA which have capacity to join to eukaryotic DNA

B. it can move between prokaryotic and eukaryotic cells

C. both ends show replication

D. it has antibiotic resistance gene

Answer: A

Question112

The process of replication in plasmid DNA, other than initiation, is controlled by (1999)

Options:

A. mitochondrial gene

B. plasmid gene

C. bacterial gene

D. none of these

Answer: C

Solution:

(c) : The DNA plasmid replicates in a semiconservative manner. The initiation of replication is controlled by plasmid gene and elongation and termination are controlled by bacterial genes.

Question113

Which of the following is related to genetic engineering? (1999)

Options:

A. Heterosis

B. Mutation

C. Plastid

D. Plasmid

Answer: D

Solution:

Solution:
In molecular cloning, a vector is a DNA molecule used as a vehicle or carrier which carries the desired gene from donor to recipient cell, where it can be replicated and/or expressed. The plasmid is extrachromosomal circular DNA which acts as vector DNA. The plasmid is the most important vector as it possesses multiple cloning sites, an origin of replication and a selectable marker.

Question114

Recombinant DNA is achieved by cleaving the pro-DNAs by (1998)

Options:

A. ligase

B. restriction endonulcease

C. primase

D. exonucleases.

Answer: B

Solution:

(b) : Recombinant DNA is the product obtained after isolating a specific DNA segment and then inserting it into another DNA molecule at a desired position. Restriction endonucleases are the enzymes that digest DNA at specific sites to isolate a specific DNA segment. Thus they are required for producing recombinant DNA.

Question115

Two bacteria found to be very useful in genetic engineering experiments are
(1998)

Options:

A. Nitrobacter and Azotobacter

B. Rhizobium and Diplococcus

C. Nitrosomonas and Kliebsiella

D. Escherichia and Agrobacterium.

Answer: D

Solution:

Solution:
Till today, the most important in genetic engineering of plants has been the Ti plasmid of soil bacterium, Agrobacterium tumefaciens. E.Coli has been extensively used as "work horse" for genetic engineering e.g., production of humulin, somatotropin. E. coli is one of the most thoroughly studied of all living things. It is a favorite organism for genetic engineering as cultures of it can be made to produce unlimited quantities of the product of an introduced gene. Several important drugs (insulin, for example) are now manufactured in E. coli. Thus, option B is correct. Nitrosomonas, Klebsiella, Nitrobacter, Azotobacter, Rhizobium and Diplococcus are not used in genetic engineering.

Question116

Restriction endonucleases are
(1998)

Options:

A. used for in vitro DNA synthesis

B. used in genetic engineering

C. synthesized by bacteria

D. present in mammalian cells for degradation of DNA.

Answer: B

Solution:

Restriction endonucleases were found by Arber in 1962 in bacteria. They act as "molecular scissors" or chemical scalpels. They recognize the specific base sequence at palindrome sites in DNA duplex and cut its strands. For example, restriction endonuclease E co RI found in the colon bacteria E. coli reocgnizes the base sequence GAATTC in DNA duplex and cuts its strands between G and A.

Question117

Genetic engineering is possible, because (1998)

Options:

A. we can cut DNA at specific sites by endonucleases like DNase I

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

C. the phenomenon of transduction in bacteria is well underwood

D. we can see DNA by electron microscope.

Answer: B

Solution:

Solution:
Genetic engineering means making changes in the original genome with the help of recombinant DNA to introduce desirable characters in the plant or animal which are naturally absent in them and remove such genes that are harmful to the plants and animals..

-The process of genetic engineering is possible due to the presence of restriction endonuclease which helps us to modify the original DNA sequence. -Restriction endonucleases are also known as restriction enzymes which can Identify and cut DNA only at certain sites known as restriction sites. -Since the restriction enzymes can cut the DNA strands they are also known as molecular scissors. -Restriction enzymes can be naturally obtained from bacterial cells.
The restriction endonuclease can be easily used to alter the DNA sequence hence a non-desirable sequence can be easily removed and a desirable sequence can be inserted to change the genetic arrangement of the organism to get the desirable phenotype, Hence the genetic material obtained from bacteria that can be used in vitro facilitates the genetic engineering. Therefore, this is the correct option.

Question118

The restriction enzymes are used in genetic engineering, because (1995)

Options:

A. they can cut DNA at specific base sequence

B. they are nucleases that cut DNA at variable sites

C. they can degrade harmful proteins

D. they can join different DNA fragments.

Answer: A

Solution:

The goal of genetic engineering is changing the genetic makeup of an organism. To achieve this goal, scientists must have a way of rearranging genes to create new combinations of DNA. Restriction enzymes are one tool that can be used to accomplish this goal. A restriction enzyme or restriction endonuclease is an enzyme that cuts DNA at or near specific recognition nucleotide sequences known as restriction sites. To cut DNA, all restriction enzymes make two incisions, once through each sugar-phosphate backbone (i.e., each strand) of the DNA double helix.

Question119

Which of the following organelles is related with genetic engineering? (1994)

Options:

A. Mitochondria

B. Plasmids

C. Golgi bodies

D. Lysosomes

Answer: B

Solution:

(b) : Plasmids are extrachromosomal genetic element found in many bacteria and in a few eukaryotic cells. Plasmids are closed circles of double-stranded DNA. ranging in size from one to 200 kilobases. They frequently carry genes conferring antibiotic resistance. Plasmids are becoming important tools for genetic engineering since they have the ability to replicate and migrate to daughter cells. Plasmids are widely used as carriers of cloned genes, as for example the E . coli plasmid pBR322. When plasmids are used as cloning vectors and carry a novel DNA sequence they are referred to as chimeric plasmids.
