BIOLOGY

Worksheet-18

STEP

A PROJECT BY PUNJAB GROUP

Worksheet-18
(Biotechnology)

Q.1 If DNA from two different sources is fused:

A) Recombinant DNA is formed

B) Complementary DNA is formed

C) Mutant DNA is formed

D) cDNA is formed

Q.2 A DNA molecule synthesized from mRNA by reverse transcriptase in laboratory is called:

A) cDNA

B) Extra chromosomal DNA

C) Chromosomal DNA

D) Cytoplasmic DNA

Q.3 Complementary DNA is synthesized by:

A) DNA polymerases

B) DNA ligases

C) Restricted endonucleases

D) Reverse transcriptases

Q.4 The first restriction enzyme was isolated by:

A) John Hopkins

B) Hamilton O. Smith

C) Kary B-Mullis

D) Maxim Gilbert

Q.5 Bacteria produce a variety of restriction enzymes, which cut the DNA at specific sites, characterized by specific sequence of:

A) Four nucleotides

B) Eight nucleotides

C) Six nucleotides

D) Four or six nucleotides

Q.6 Bacteria produce a variety of restriction enzymes, which cut the DNA at specific sites, characterized by specific sequence of DNA arranged:

A) Symmetrically in reverse order

B) Asymmetrically in reverse order

C) Symmetrically in same order

D) Asymmetrically in same order

Q.7 So far 400 such enzymes have been isolated out of which about 20 are frequently used in recombinant DNA technology:

A) Reverse transcriptase

B) Helicases

C) Ligase

D) Restriction endonucleases

Q.8 The single stranded but complementary ends of the two DNA molecules are called "sticky ends" because:

A) They cannot bind

B) They can bind by complementary base pairing

C) They can bind by non-complementary base pairing

D) They cannot bind due to non-complementary base pairing

Q.9 To make a recombinant DNA, one often begins by selecting a _____, the means by which recombinant DNA is introduced into a host cell.

A) Restriction endonuclease

B) DNA ligase

C) Vector

D) Primase

Q.10 Plasmids were discovered by the investigators studying the sex-life of the _____ bacterium *Escherichia coli*.

A) Faecal C) Milk

B) Intestinal D) Soil

Q.11 What was discovered by investigators studying the sex-life of the intestinal bacterium *Escherichia coli*?

A) Restriction enzymes
B) Plasmids
C) DNA ligases
D) Sticky ends

Q.12 Plasmid having antibiotic resistant gene for tetracycline is called:

A) pBR 322 C) RP4
B) pSC 101 D) R388

Q.13 A plasmid that provides resistance against tetracycline as well as ampicillin is called:

A) pSC101 C) RP4
B) pBR322 D) R388

Q.14 For preparation of recombinant DNA, the plasmid is cut with the same enzyme which was used for:

A) Isolation of the gene of interest
B) Cutting all such plasmids
C) Cutting any piece of DNA
D) Cutting extrachromosomal DNA

Q.15 The enzyme that seals the foreign piece of DNA into the vector is called:

A) DNA – polymerase
B) DNA helicase
C) DNA – ligase
D) DNA – Primase

Q.16 A clone can be identical copy of a/an:

A) Molecule
B) Organism
C) Cell
D) Molecule, Cell and Organisms

Q.17 Bacterial cells take up _____, especially, if they are treated with calcium chloride to make them more permeable.

A) Recombinant DNA
B) Plasmid
C) Recombinant plasmid
D) Extra chromosomal DNA

Q.18 Besides plasmids, the other molecular carrier or vector is:

A) DNA of bacteria
B) DNA of plant viruses
C) DNA of bacterial viruses
D) DNA of animal viruses

Q.19 The second step of PCR technique is:

A) Heating DNA for one minute to denature
B) Cooling for two minutes and adding primer
C) Addition of DNA polymerase and waiting for 1.5 minutes
D) Recycling

Q.20 Third step in PCR technique is:

A) Heating DNA for one minute to denature
B) Cooling for two minutes and adding primer
C) Addition of DNA polymerase and waiting for 1.5 minutes
D) Recycling

Q.21 PCR can create:

A) Thousands of copies of a single gene
B) Millions of copies of a single gene
C) Hundreds of copies of a single gene
D) Tens of copies of a single gene

Q.22 PCR can create millions of copies of a single gene or any specific piece of DNA quickly in:

A) Bioreactor
B) Test tube
C) Expression system
D) Petridish

Q.23 PCR is very specific, the targeted DNA sequence can be _____ of total DNA sample.

A) One part in a million
B) Less than one part in a million
C) More than one part in a million
D) Two parts in a million

Q.24 PCR is considered a chain reaction because DNA polymerase will carry out replication over and over again, until there are:

A) Thousand of copies of desired DNA
B) Millions of copies of desired DNA
C) Hundreds of copies of desired DNA
D) Billions of copies of desired DNA

Q.25 Before carrying out PCR:

A) Gene product must be available
B) Vector must be available
C) Primers must be available
D) Bacteriophage must be available

Q.26 In PCR, primers are sequences of 20 bases that are complementary to the bases on either side of the:

A) Target DNA
B) DNA polymerase
C) Primase
D) RNA polymerase

Q.27 DNA polymerase _____ the replication process.

A) Continue
B) Initiate
C) Extend
D) Continue and extend

Q.28 DNA polymerase copies the target DNA, after the:

A) Primers bind by complementary base pairing
B) The target DNA duplix is unwound
C) The target DNA get denatured
D) The primers get separated from target DNA

Q.29 *Thermus aquaticus* bacterium lives in:

A) Hot springs
B) Hot pools
C) Hot thermal vents
D) Hot ponds

Q.30 By using Taq polymerase in PCR there will be no need to:

A) Add more enzyme
B) Interrupt the process to add more enzyme
C) Interrupt the process
D) Use high temperature

Q.31 An animal developed from an egg, having foreign gene inserted in it is called:

A) Transgenic animal
B) Transgender animal
C) Clone
D) Trans sexual animal

Q.32 It is possible to insert a foreign DNA into an animal egg by:

A) Manual microinjection
B) Vortex mixing
C) Manual microinjection or vortex mixing
D) Using electric current

Q.33 The procedure of transgenic animals has been used to produce larger:

A) Fishes and cows
B) Rabbits and sheeps
C) Cows and pigs
D) Fishes, cows, pig, rabbits and sheep

Q.34 Genetically engineered fishes are now being kept in ponds, that offer:

A) No escape to the wild
B) Mutualistic help to the wild
C) Easy escape to the wild
D) Symbiotic help to the wild

Q.35 A goat is genetically engineered to produce _____, which is secreted in her milk.

A) Prothrombin C) Heparin
B) Antithrombin-III D) Fibrin

Q.36 Genes that code for _____ proteins are incorporated into the animal's DNA and the protein appear in the animal's milk.

A) Therapeutic

B) Therapeutic and diagnostic

C) Diagnostic

D) Osmotic

Q.37 There are plans to produce drugs by transgenic animals, for the treatment of:

A) Cystic fibrosis

B) Blood diseases

C) Cancer

D) Cystic fibrosis, Cancer & Blood diseases

Q.38 The scientists of United States Department of Agriculture have been able to genetically engineer _____ to produce human growth hormone in their urine, instead of in milk.

A) Cows C) Mice

B) Goats D) Squirrels

Q.39 Urine is preferable vehicle for a biotechnology product than milk because of following reasons, EXCEPT:

A) Only female produce milk

B) Females don't produce milk until maturity

C) Each animal urinate throughout life

D) It is less easier to extract proteins from urine than from milk

Q.40 Although each cell contains a copy of all the genes of that genome, certain genes are:

A) Amplified in mature specialized cells

B) Turned off in mature specialized cells

C) Lost in mature specialized cells

D) Mutated in mature specialized cells

Q.41 Insertion of genetic material into human cells for treatment of a disorder is called:

A) Genetic engineering

B) Gene therapy

C) Biotechnology

D) Gene mutation

Q.42 Gene therapy includes procedures that give a patient healthy genes to make up for faulty genes to treat various human illnesses such as:

A) Cancer

B) Cardiovascular diseases

C) Cancer and cardiovascular diseases

D) Tetanus

Q.43 There are two main methods used for gene therapy i.e.

A) Ex – vivo and in vivo

B) Ex vivo – Ex vitro

C) Ex – vivo and in vitro

D) In vitro – Ex vitro

Q.44 The children suffering from SCIDS lack an enzyme called:

A) Adenosine deaminase

B) Homogentisic and hydroxylase

C) Phylalanine hydroxylase

D) Homogentisic and dehydrogenase

Q.45 Both T and B cells get maturation by the involvement of gene called:

A) Phenyl alanine hydroxylase

B) ADA

C) Homogentisic acid dehydrogenase

D) Phospho hexokinase

Q.46 Pick up the correct sequence:

A) Mutation ⟶ Deficient ADA ⟶ Immature T and B cells ⟶ SCIDS

B) SCIDS ⟶ Deficient ADA ⟶ Immature T and B cells ⟶ Mutation

C) Mutation ⟶ Deficient ADA ⟶ SCIDS ⟶ Immature T and B cells

D) Mutation ⟶ Immature B and T cells ⟶ Deficient ADA ⟶ SCIDS

Q.47 For the treatment of SCIDS bone marrow stem cells are removed from the blood and are infected with a:

A) Bacteriophage C) Lambda virus
B) Retrovirus D) Bacterium

Q.48 For treatment of SCIDS, the bone marrow stem cells are infected with a retrovirus that carries:

A) A normal enzyme
B) A mutant gene for the enzyme
C) A normal gene for the enzyme
D) A normal gene for T and B cells

Q.49 Bone marrow stem cells are preferred for gene therapy of SCIDS, because:

A) They are larger in size
B) They are numerous in number
C) They divide to produce more cells with same gene
D) They store much enzyme inside them

Q.50 The high levels of cholesterol make a patient subject to:

A) Fatal heart attack at old age
B) A curable heart attack at old age
C) A curable heart attack at young age
D) Fatal heart attack at young age

Q.51 Liver cells are infected with retrovirus containing normal gene for the receptor for the treatment of:

A) SCIDS
B) Cystic fibrosis
C) Hypercholesterolemia
D) Cardio vascular disorder

Q.52 If the patient die due to numerous infections of the respiratory tract, it means he/she suffered from:

A) SCIDS
B) Cystic fibrosis
C) Hypercholesterolemia
D) Parkinsonism

Q.53 In vivo method of treatment is being tried in:

A) SCIDS
B) Cystic fibrosis
C) Hypercholesterolemia
D) Familial hypercholesterolemia

Q.54 Microscopic vesicles that spontaneously form when lipoproteins are put into a solution, are called:

A) Liposomes C) Nucleosomes
B) Lysosomes D) Peroxisomes

Q.55 In case of cystic fibrosis, the solution containing gene coated liposomes is sprayed into patients:

A) Oral cavity C) Thoracic cavity
B) Nostrils D) Mouth

Q.56 The in-vivo method of treatment of cystic fibrosis by gene coated liposomes, has not yet been successful due to:

A) Non gene transfer
B) Limited gene transfer
C) Excessive gene transfer
D) High cost

Q.57 In clinical trials researchers have given genes to cancer patients, that make:

A) Healthy cells more tolerant of chemotherapy
B) Tumor more vulnerable to chemotherapy
C) Healthy cells more tolerant and tumor more vulnerable to chemotherapy
D) Healthy cells more vulnerable and tumor more tolerant to chemotherapy

Q.58 To cure Parkinson's disease, dopamine producing cells, could be grafted directly into the brain as a:

A) Gene therapy
B) Transplant therapy
C) Chemotherapy
D) Gene therapy through transplant

Q.59 The use of natural biological system to produce a product or to achieve an end desired by humans is called:

A) Biotechnology
B) Bioenergetics
C) Genetic engineering
D) Gene therapy

Q.60 Nucleotides sequence that is identical to its complementary strand when each is read in the same chemical direction for example GATC i-e;

5′ … GATC … 3′

3′ … CATG … 5′ these are called as:

A) Flanking sequences
B) Nucleotide order
C) Palindromic sequences
D) Antagonistic sequences

Q.61 An enzyme that cleaves a DNA duplex molecule, at a particular base sequence, usually within or near a palindromic sequence, is called:

A) Polymerase
B) Helicase
C) Restriction endonuclease
D) Ligase

Q.62 To clean up environmental pollutants, increase the fertility of the soil and kill insect pests, genetically engineered:

A) Animals have been used
B) Bacteria have been used
C) Plants have been used
D) Viruses have been used

Q.63 A technique used for correcting defective genes responsible for disease development:

A) Gene therapy
B) Cloning
C) Tissue culture
D) Gene sequencing

Q.64 Which one of the following technique rapidly replicates specific target fragment of DNA without cloning?

A) DNA sequencing
B) Genetic probe
C) Gele electrophoresis
D) Polymerase chain reaction

ANSWER KEY (Worksheet-18)					
1	A	23	B	45	B
2	A	24	B	46	A
3	D	25	C	47	B
4	B	26	A	48	C
5	D	27	D	49	C
6	A	28	A	50	D
7	D	29	A	51	C
8	B	30	B	52	B
9	C	31	A	53	B
10	B	32	C	54	A
11	B	33	D	55	B
12	B	34	A	56	B
13	B	35	B	57	C
14	A	36	B	58	D
15	C	37	D	59	A
16	D	38	C	60	C
17	C	39	D	61	C
18	C	40	B	62	B
19	B	41	B	63	A
20	C	42	C	64	D
21	B	43	A		
22	B	44	A		

EXPLANATION

Q.1 Answer is "Recombinant DNA is formed"

Explanation: Recombinant DNA (rDNA) molecules are DNA molecules formed by laboratory methods of genetic recombination (such as molecular cloning) to bring together genetic material from multiple sources, creating sequence that would not otherwise be found in the genome. Recombinant DNA is possible because DNA molecules from all organisms share the same chemical structure. However, a recombinant DNA formed by the fusion of DNAs taken from two organisms have remotest evolutionary relation is called chimeric DNA as well.

Q.2 Answer is "cDNA"

Explanation: In genetics complimentary DNA (cDNA) is synthesized from a single stranded RNA (e.g. mRNA) template in a reaction catalyzed by the enzyme reverse transcriptase.

Q.3 Answer is "Reverse transcriptases"

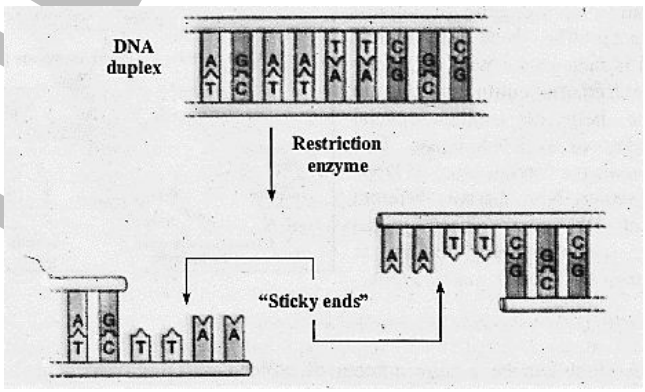
Explanation: Reverse transcriptases are used to synthesize cDNA from RNA (e.g. mRNA) template.

Q.4 Answer is "Hamilton O smith"

Explanation: It is a historical fact.

Q.5 Answer is "Four or six nucleotides"

Explanation: Restriction enzymes cut the DNA at very specific sites characterized by specific sequence of four or six nucleotides arranged symmetrically in reverse order. Such sequences are known as palindromic sequences.



Q.6 Answer is "Symmetrically is reverse order"

Explanation: In palindromic sequences four or six nucleotides are arranged symmetrically in reverse order, as the cleavage occurs in zigzag sequence leaving upper longer strand and lower shorter strand on one end and upper shorter strand and lower longer strand in other end.

Q.7 Answer is "Restriction endonucleases"

Explanation: So far 400 restriction endonucleases have been isolated out which about 20 are frequently used in recombinant DNA technology.

Q.8 Answer is "They can bind by complementary base paring"

Explanation: Due to base pairing affinity sticky ends can stick together, whenever brought closer to each other.

Q.9 Answer is "Vector"

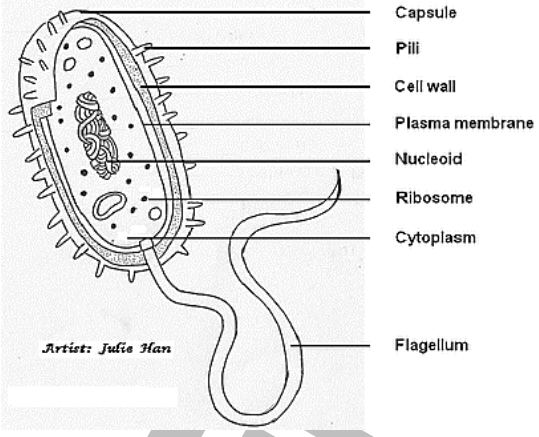
Explanation: To make recombinant DNA, one often begins by selecting a vector, the means by which recombinant DNA is introduced into a host cell. One common type of vector is a plasmid. Plasmids were discovered by investigators studying the sex life of the intestinal bacterium *Escherichia coli*.

Q.10 Answer is "Intestinal"

Explanation: Plasmids were discovered by investigators studying the sex life of the intestinal bacterium *Escherichia coli*.

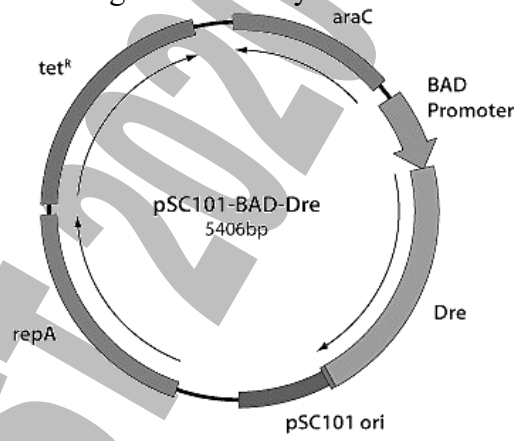
Q.11 Answer is "Plasmids"

Explanation: Plasmids were discovered by investigators studying the sex life of the intestinal bacterium *Escherichia coli*.



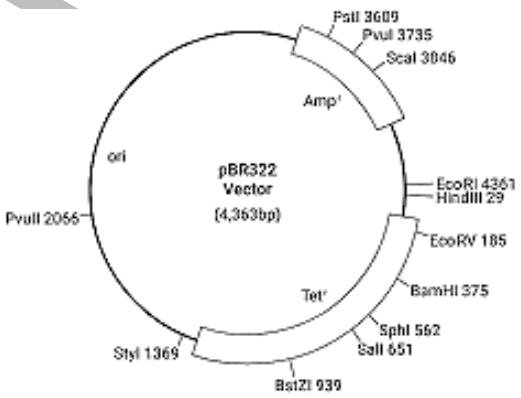
Q.12 Answer is "pSC 101"

Explanation: pSC 101 has antibiotic resistant gene for tetracycline.



Q.13 Answer is "pBR322"

Explanation: pBR 322 has antibiotic resistant genes for tetracycline as well as ampicillin.



Q.14 Answer is "Isolation of gene of interest"

Explanation: Because restriction enzymes cut the DNA at specific sites.

Q.15 Answer is "DNA ligase"

Explanation: Because it is DNA binding enzyme.

Q.16 Answer is "Molecule, Cell and Organism"

Explanation: Cloning can be carried out at these three levels i.e. cell, organism ad molecule (gene cloning) level.

Q.17 Answer is "Recombinant plasmid"

Explanation: Aqueous calcium chloride is used in genetic transformation of cells by increasing the cell membrane permeability, inducing competence for DNA uptake (allowing DNA fragments to enter the cell more readily).

Q.18 Answer is "DNA of bacterial viruses"

Explanation: DNA of bacteriophage or phage virus or bacterial virus is also used as vector.

Q.19 Answer is "Cooling for two minutes and adding primer"

Explanation: First the DNA to be cloned is heated for one minute to break the duplex and separate the both strands.

Then it is cooled down for 2 minutes and primer is added

Q.20 Answer is "Addition of DNA polymerase and waiting for 1.5 minutes"

Explanation: In third step of PCR DNA polymerase is added and then we wait for 1.5 minutes.

Q.21 Answer is "Millions of copies of a single gene"

Explanation: As it is less time taking and more efficient method in which a chain reaction is generated.

Q.22 Answer is "Test tube"

Explanation: PCR is carried out in a laboratory test tube.

Q.23 Answer is "Less than one part in a million"

Explanation: Because it is carried out in a test tube without interruption.

Q.24 Answer is "Millions of copies of desired DNA"

Explanation: PCR can create millions of copies of a single gene or any specific piece of DNA quickly in test tube.

Q.25 Answer is "Primers must be available"

Explanation: As DNA polymerase cannot initiate a polynucleotide chain, rather it can elongate a polynucleotide chain.

Q.26 Answer is "Target DNA"

Explanation: Target DNA is a DNA to be cloned.

Q.27 Answer is "Continue and extend the replication process"

Explanation: It starts a chain reaction and keep on carrying out replication until test tube is filled.

Q.28 Answer is "Primer binds by complementary base pairing"

Explanation: In PCR both strands of DNA act as template for new strands to be synthesized.

Q.29 Answer is "Hot springs"

Explanation: As these are thermal bacteria, they are adapted to survive in high temperature.

Q.30 Answer is "Interrupt the process to add more enzyme"

Explanation: A high temperature is maintained to discourage duplex formation and chain reaction proceeds in which same enzyme is used again and again.

Q.31 Answer is "Transgenic animal"

Explanation: An animal in which we have incorporated a desired foreign gene to get produced our desired product is called transgenic animal.

Q.32 Answer is "Manual microinjection and vertex mixing"

Explanation: These are two available methods to insert a desired gene into an animal egg.

Q.33 Answer is "Fishes, Cows, Pigs, Rabbits and sheeps"

Explanation: It is possible by tempering their genetic makeup.

Q.34 Answer is "No escape to the wild"

Explanation: Due to their massive size and more vigour the wild flora fall easy prey to them.

Q.35 Answer is "Antithrombin-III"

Explanation: It is an anti-clotting factor used in microsurgeries to discourage formation of clot at site of surgery.

Q.36 Answer is "Therapeutic and diagnostic proteins"

Explanation: Some proteins are used for treatment of diseases. They are called therapeutic proteins and diagnostic proteins as they are used to diagnose and treat diseases. Both are being produced as biotechnology products.

Q.37 Answer is "Cystic Fibrosis, Cancer and blood diseases"

Explanation: In future it is being envisioned to get drugs prepared by transgenic animals against cystic fibrosis, cancer and blood diseases.

Q.38 Answer is "Mice"

Explanation: The scientists of United States Department of Agriculture have been able to genetically engineer mice to produce human growth hormone in their urine, instead of in milk.

Q.39 Answer is "It is less easier to extract proteins from urine than from milk"

Explanation: As urine normally does not contain any protein thus it is easier to extract proteins from urine than from milk.

Q.40 Answer is "Turned off in mature specialized cells"

Explanation: When a cell is assigned a specialized job, only those genes remain active which are associated with that particular job, rest are turned off, however, they can be switched on again if needed.

Q.41 Answer is "Gene therapy"

Explanation: Treating some genetic disorder by replacing a faulty gene with normal gene is called gene therapy.

Q.42 Answer is "Cancer and cardiovascular diseases"

Explanation: Gene therapy is effective against disorders of genetic origin. Tetanus is not a genetic disease, it is infectious disease.

Q.43 Answer is "Ex-vivo and In-vivo"

Explanation: In ex-vivo method cells or tissues are taken out of the body and after insersion of normal genes they are implanted in the body. However in in-vivo method genes/gene is/are inserted into the cells or at their original site in the body

Q.44 Answer is "Adenosine deaminase"

Explanation: Such children lack an enzyme adenosine deaminase (ADA) that is involved in the maturation of T and B cells and therefore, they are subjected to life threatening infections.

Q.45 Answer is "ADA"

Explanation: ADA (adenosine deaminase) is involved in the maturation of T and B cells and therefore, the person lacking it are subjected to life threatening infection.

Q.46 Answer is "Mutation – Deficient ADA – immature Tand B cells $\rightarrow$ SCIDS"

Explanation: When that gene which is responsible for the formation of ADA

mutates, no ADA will be formed and as a result T and B cells will remain unable to acquire maturity and as a consequence severe immune deficiency will occur.

Q.47 Answer is "Retrovirus"

Explanation: The retrovirus acts as a vector for gene therapy.

Q.48 Answer is "A normal gene for the enzyme"

Explanation: Retrovirus acts a vector and carrier a normal gene for the synthesis of ADA enzyme with its DNA (recombinant DNA).

Q.49 Answer is "They divide to produce more cells with same gene"

Explanation: Stem cells keep on dividing by mitosis and in this way the number is continuously added up which gradually overcome the immune deficiency.

Q.50 Answer is "Fatal heart attack at young man"

Explanation: Otherwise at young age the tendency of heart attack is much lesser.

Q.51 Answer is "Hypercholesterolemia"

Explanation: In familial hypercholesterolemia liver cells lack specific receptor sites needed to remove cholesterol from blood.

Q.52 Answer is "Cystic fibrosis"

Explanation: Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of chloride ions.

Q.53 Answer is "Cystic fibrosis"

***Explanation*:** The gene is introduced into the nasal sinus by coating it on liposomes which are sprayed just like inhalers in the nasal sinuses.

Q.54 Answer is "Liposomes"

Explanation: Liposomes are spherical vesicles of phospholipid bilayer which are used as a vehicle for administration of nutrients and pharmaceutical drugs and for insertion of desired genes into cells or tissues.

Q.55 Answer is "Nostrils"

Explanation: For treatment of cystic fibrosis a solution containing gene coated liposomes is sprayed into patient's nostrils.

Q.56 Answer is "Limited gene transfer"

Explanation: Due to limited gene transfer, this methodology has not yet been successful.

Q.57 Answer is "Healthy cells more tolerant and tumor more vulnerable to chemotherapy"

Explanation: It will help a lot in cancer treatment.

Q.58 Answer is "Gene therapy through transplant"

Explanation: Parkinson's disease is caused by deficiency of dopamine, a neurotransmitter of brain. When its deficiency is made up it is cured.

Q.59 Answer is "Biotechnology"

Explanation: The definition have been given in glossary at page II of textbook of biology part-II.

Q.60 Answer is "Palindromic sequences"

Explanation: The definition and example have been given in glossary at page VIII of textbook of biology part-II.

Q.61 Answer is "Restriction endonuclease"

Explanation: The definition have been gene in glossary at page IX of textbook of biology part-II.

Q.62 Answer is "Bacteria have been used"

Explanation: Bacteria have been used for such purposes.

Q.63 Answer is "Gene therapy"

Explanation: Researchers may use one of the several approaches for correcting faulty genes. Gene therapy is the most common approach.

Q.64 Answer is "Polymerase chain reaction"

Explanation: In this technique DNA polymerase is compelled to polymerize a given piece of DNA again and again, So that multiple copies are produced, thus the technique is known as polymerase chain reaction (PCR).

STEP

A PROGRAM BY PUNJAB GROUP