SHIKSHA CLASSES

Subject : Biology **Ch. : 12. Biotechnology** **Total Marks : 20**

Class : XII

Q.1 : Select & write the most appropriate answer from the given alternatives for each sub-question. [3]

i) Molecular scissor used in genetic engineering is …….

Ans : (c) Restriction endonuclease

ii) Plasmids are found in …….

Ans : (b) Bacteria

iii) The example of biopiracy related to Indian plants …….

Ans : (b) Turmeric.

Q.2 : A) Write the answer in ONE sentence: [6]

1) What is PCR?

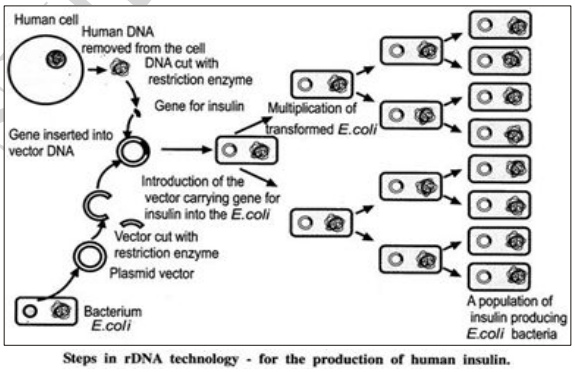
Ans : PCR (Polymerase Chain Reaction) is the technique by which gene amplification can be done artificially. PCR can also be defined as in vitro technique of gene amplification.

2) Name the hormone which is used against diabetes.

Ans : Insulin is the hormone which is used against diabetses.

B) Diagrammatic representation of rDNA technology.

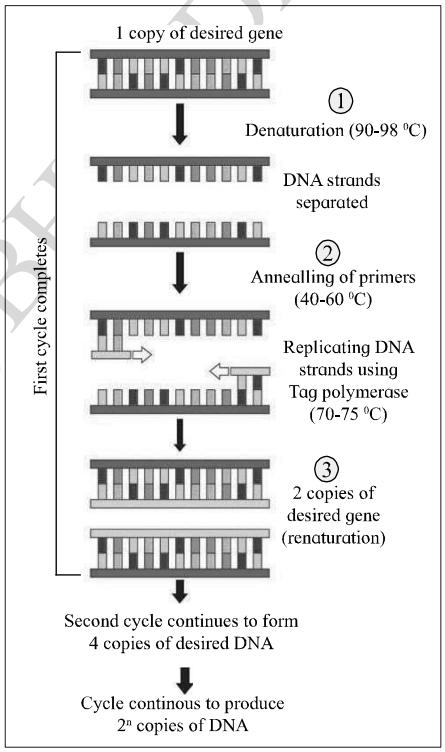
Ans :



Steps in rDNA technology - for the production of human insulin.

C) Diagrammatic representation of DNA replication through polymerase chain reaction.

Ans :



DNA replication through polymerase chain reaction

Q. 3 : A) Attempt any ONE of the following : [6]

1) Write a note on plasmid.

Ans : Plasmids are small extra - chromosomal, double standed circular forms of DNA that replicate autonomously.

Plasmid are seen in bacterial cells, yeast and animal cell. The term plasmid was introduced by Joshua Laderberg in 1952.

Plasmids are considered as replicons as they are capable of autonomos replication in suitable host.

Plasmid form transferable genetic material size of plasmids variable from 1 to over 1,000 base pairs (kbp)

Plasmid are not required for survival of organism in which they are located.

They help bacteria for survival during unfavourable, condition. They are designated by lower case of p (p) which is later followed by the first letter of researcher's name & the numberical number given by the researcher.

2) Give significance of biopiracy.

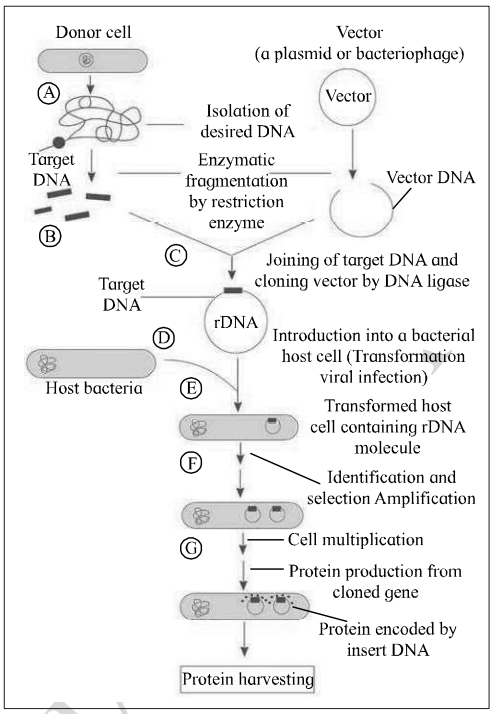
Ans : i) For proper and lawful working of biopatent, the nation should be rich in bio-diversity, people residing there should have traditional knowledge and the nation should also have sufficient financial resources.

ii) However, it is generally observed that industrialized nations are rich in financial resources and technology but lack bio-diversity whereas developing countries are rich in bio-diversity and traditional knowledge but are short of financial resources and advanced technology. These situations lead to biopiracy.

iii) Industrialized nations have always been enjoying immense profits by patenting the indigenous biomedical knowledge and bioresources of third world communities without paying any compensation to the indigenous group who originally developed such knowledge.

B) Sketch outline of the process of recombinant DNA technology.

Ans :



Outline of the process of recombinant DNA technology

Q.4 : Write down the steps involved in PCR. [5]

Ans : One cycle of polymerase chain reaction involves three basic steps.

i) Denaturation ii) Annealing
iii) Polymerization

i) Denaturation :

The desired DNA is heated to a high temperature of about 91^0 C and forms single stranded DNA. It results in the separation of the two strands of DNA. each of which would function as a template for the synthesis of a new molecule of DNA. DNA with G-C pair need higher temperature.

ii) Annealing :

a) It is the process in which the two primers (oligonucleotides) hybridise to each of the strands of DNA.

b) This step is carried out at a lower temperature, which depends on the length and the sequence of nucleotides of the primers; the binding usually occurs at the 3' end of the strands.

c) It requires temperature 55^0C.

iii) Polymeriation :

In this step the *Taq polymerase* carries out the synthesis of DNA region between the two primers by using deoxynucleoside triphosphates (dNTPs) and Mg^{2+} The optimum temperature for this polymerisation reaction is 72^0C.

The cycles are repeated number of times according to the need. The products of one cycle function as the template for the subseqent cycle. Consequently, after n number of cycles, it is possible to generate 2n molecules from a single template molecule.

OR

Write the applications of transgenic animals.

Ans : A representative, but non-inclusive, list of purposes for which transgenic animals have been used, indicates the wide-ranging application of this biotechnology:

i) in medical research, transgenic animals are used to identify the functions of specific factors in complex homeostatic systems through over- or under-expression of a modified gene (the inserted transgene);

ii) in toxicology: as responsive test animals (detection of toxicants);

iii) in mammalian developmental genetics;

iv) in molecular biology, the analysis of the regulation of gene expression makes use of the evaluation of a specific genetic change at the level of the whole animal;

v) in the pharmaceutical industry, targeted production of pharmaceutical proteins, drug production and product efficacy testing;

vi) in biotechnology: as producers of specific proteins;

vii) genetically engineered hormones to increase milk yield, meat production;

viii) genetic engineering of livestock and in aquaculture affecting modification of animal physiology and/or anatomy; cloning procedures to reproduce specific blood lines; and

ix) developing animals specially created for use in xenografting.

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