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This is the CBSE Class XII Biology solved question paper 2011, set I (Ebook). These Solved Question Papers will be helpful to get the latest pattern that how questions are being framed.

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Solved Question Paper 2011 Subject- Biology Class-XII Set-I

Section-A

1. Name the embryonic stage that gets implanted in the uterine wall of a human female.

Answer

Fusion of egg and fertilization outside the body leads to the formation of embryo, which undergoes successive division leading to the formation of blastomere. When embryos division exceed 8 cell stage then they are transferred to uterine wall of a human female

2. State the importance of biofortification.

Answer

Use of improved genetic technology to increase the amount of vitamin, minerals, protein, fat, Micronutrient and mineral content of plant is termed as biofortification.

3. Biotechnologists refer to Agrobacterium tumifaciens as a natural genetic engineer of plants. Give reasons to support the statement.

Answer

Insetition of vector (Agrobacterium tumifaciens) containing gene nematode specific gene into the host plant, whose DNA have the ability to produce both sens and antisens DNA in the host. The tow complementary sequence then form dsRNA which initiate synthesis of RNAi. These RNAi then blocks mRNA synthesis and leads to the death of pathogen.



4. How do algal blooms affect the life in water bodies ?

Answer

Large amount of nutrient content in water cause excessive production of planktonic algae called algal bloom, which impart colour to the water bodies. Algal blooms deminsh water quality, fish mortality extremely toxic to human beings and animals.

5. Name the common ancestor of the great apes and man.

Answer

Australopithecines was first recorded form grassland, while Ramapithecus and Dryopithecus differ on walking style.

6. Write a difference between net primary productivity and gross productivity.

Answer

Gross primary productivity (GPP) – it is defined as the rate of production of organic matter during photosynthesis, utilized as respiration.

Net primary productivity (NPP) – it is the amount of biomass available for the heterotrophs.



7. Mention the contribution of genetic maps in human genome project.

Answer

Genetic and physical maps act as instrumental for the completion of human genome project. Genetic maps were used to study polymorphism among the genes, use of RE



(restriction endonuclease) to determine specific repetitive DNA sequence commonly present.

8. Name the phase all organisms have to pass through before they can reproduce sexually.

Answer

Before attaining sexual maturity every organism undergo 2 drastic changes namely

- 1. Juvenile phase (animals) or vegetative phase (plants)
- 2. Reproductive phase
- Animals starts with adolescence where gonads of male and female mature

With development of characteristic feature.

Plants - starts with flowering.

Section-B

9. Name the enzyme produced by Streptococcus bacterium. Explain its importance in medical sciences.

Answer

Streptococcus bacteria produce a number of enzymes like all prokaryotes. One of these, streptokinase, is extremely useful in medical practice due to its ability to break down blood clots.

10. How is 'Rosie' considered different from a normal cow ? Explain.



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Transgenic animals are being created for obtaining useful biological product from them. They are created by insert in the gene of interest and allowing them to get expressed. Similarly first transgenic cow, Rosie, produced human protein-enriched milk. Milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow-milk.

11.State the use of Biodiversity in modern agriculture.

Answer

Biodiversity is very instrumental in development of agriculture -

- 1. It helps in the conservation and promots farming of all wilde and native varity of plants.
- 2. Agricultural biodiversity is the base of our agricultural food chain, development and safeguard of livestocks etc. For ensuring food security to all peoples.
- 3. It promots sustain management of agricultural resource and promot agriculture.
- **12.**Write the full form of VNTR. How is VNTR different from 'Probe'?

Answer

VNTR stands for Variable Number Tandem Repeat.

Probe is a small fragment of DNA or RNA used for identification of genes in biological system. These fragments are prepared for commercial and hybridization technology either for finding complementary sequence or in diagnosis of disease.

VNTR is a small fragment of DNA containing tandamely repeated sequence, whose number and length vary among chromosome and individuals.



13.Differentiate between benign and malignant tumours.

Answer

Normal cells of human body undergo various stages of growth, division finally leads to the death of the cell, when the process of death is breakdown then it leads to cancer. Cancer is characterized by uncontrollable growth of cells, with lost property of apoptosis (programmed cell death).

Benign tumours-

- 1. Uncontrolled cell division results in development of a mass of tissues then is called as lump or tumors.
- 2. Tumors that stick to a single place or at a spot are designated as benign tumours.
- 3. This unregulated growth of cells interfere the function of surrounding organs such as digestive, nervous and circulatory systems sometime they release hormones to alter body function.

Malignant tumours

- 1. Uncontrolled cell division results in development of a mass of tissueswhich tends to skip from the sight of origin into the blood or lymph and travel to other parts of the body, this type of cancer is referred to as malignant timorous.
- 2. Now these cells inhabit new region in the body where they grow, divide also develops new blood vessel to feed them self the process is called as angiogenesis.



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14.The above graph shows Species-Area relationship. Write the equation of the curve 'a' and explain.



Answer

The curve represents Species-Area relationships.

Curve **a** represent the equation $\mathbf{S} = \mathbf{C}\mathbf{A}^2$

Curve **b** represent the equation $\log S = \log C + Z \log A$

- S= Species richness A= Area
- Z = slope of the line (regression coefficient)
- C = Y-intercept

Characteristic feature-

- 1. Within a region richness of species increases with exploration of new areas in limit.
- 2. Straight line represent in the graph represent logarithmic value of species richness.

OR

14. Differentiate between in situ and ex situ approaches of conservation / of biodiversity.

Answer



Simplifying Test Prep Conservation and protection of a ecosystem or an organism in its habitat is done through two different approach

- 1. in situ conservation
- 2. ex situ conservation

in situ conservation-

- 1. This method is applied for the conservation of the flora and fauna where they exists in higher amount and are unavailable at other parts of the region, referred to a biodiversity hotspot.
- 2. Flora and fauna are conserved in their natural habitat only.

ex situ conservation

- 1. This method is applied to most of the endangered flora and fauna.
- 2. Flora and fauna belonging to the category is taken out from natural habitat and kept in special setting like zoo where they are allowed to interbreed and produce new off-springs.

15.The cell division involved in gamete formation is not of the same type in different organisms. Justify.

Answer

Cell division results in the formation of gamete, heterogametic species produce male and female Gametes.

In plant, monera, fungi, algae and bryophytes gametes are haploid in plants body but it may arise either as haploid or diploid. Haploid gametes are produced by mitotic division. While organism such as pteridophytes, gymnosperms, angiosperms and animals including human beings, the parental body is diploid, they undergo reduction division, to produce haploid gametes.



Simplifying Test Prep 16.Identify the type of the given ecological pyramid and give one example each of pyramid of number and pyramid of biomass in such cases.



17. Describe the Lactational Amenorrhea method of birth control.

Answer

It is being observed that breastfeeding delays onset of menstruation in new mothers. Lactational amenorrhea method (LAM) is considered natural method of birth control based on the fact that higher lactation around-the-clock decreases menstruation very unlikely female will get pregnant during the first six months after parturition. Breastfeeding halts the release of hormone that triggers ovulation, more you nurse your baby, less changes of ovulate.

18.Name the type of bioreactor shown. Write the purpose for which it is used.





Answer

Bioreactor is being implemented for increasing production of required culture in higher quantity (individual enzymes, plant material etc.). Bioreactors are highly organized and have options to provide optimal condition by maintaining temperature, pH, substrate, salts, vitamins, oxygen.

Given image is a stirred-tank reactor.

- 1. Usually cylindrical or with a curved base to facilitate mixing of reactor content.
- 2. Stirrer facilitates mixing and use available oxygen.
- 3. Agitator system, an oxygen delivery system and a foam control system, a temperature control system, pH control system and sampling ports so that small volumes of the culture can be withdrawn periodically.

SECTION-C

19. Draw a labelled diagram of the reproductive system in a human female.



Answer



20.Branching descent and natural selection are the two key concepts of Darwinian Theory of Evolution. Explain each concept with the help of a suitable example.

Answer

Natural process is a process in which better adapted organism's leads to better adaptation and survival while less adapted organisms gets eliminated at successive stages. Selected organisms reproduce and produce stable genetic quality to sustain the changes. E.g peppered moth of England, during industrialization white coloured moth gets eliminated while number of black moth increases because of these adaptability.

Branching descent is the process of development of a new species from single common descendant. New species developed became geographically adapted to a new environment ultimately results in complete development of new species.

21.Scientists have succeeded in recovering healthy sugarcane plants from a diseased one.1. Name the part of the plant used as explant by the scientists.



2. Describe the procedure the scientists followed to recover the healthy plants. 3. Name this technology used for crop improvement.

Answer 21.

- 1. Plant holds different type of tissues and it is being regarded that meristematic cells (apical and axillary) are capable of dividing at higher rate. These tissues are pluripotent in nature.
- 2. Supplementation of meristem tissue (sugarcane) to nutrient medium in vitro leads to the development of disease free plant. While recent technology involve isolation of single cell from plant followed by digestion of cell wall to obtain protoplasm. Isolated protoplasm from two different species are allowed to fuse for the formation of hybrid protoplast. Leads to the formation of new plants called as somatic hybrid and the process is named as somaic hybridization.
- 3. Plant tissue culture (PTC) is regarded as a efficient method for improvement of crops. This technology is based on totipotency, the ability of a plant cell (explants) to develop into a young one. Selected explants is then subjected to sterile test-tube containing media (micronutrient, macronutrient and growth hormones), which support the growth of the plant. Some of the important application of PTC includes micropropagation and somaclones plants. Yet another important application is recovery of diseased plants to healthy ones.
- **22** A. Name the enzyme that catalyses the transcription of hnRNA.
 - B. Why does the hnRNA need to undergo changes ? List the changes hnRNA undergoes and where in the cell such changes take place.

Answer 22.

A. hnRNA is designated as heterogeneous nuclear RNA. Transcription of hnRNA is catalyses by – RNA polymerase II.



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B. During primary transcription formation of mRNA it is fortified with the presence of coding and non coding regions called as exons and introns. The sequence is then subjected to splicing (process of removal of introns form primary transcript). hnRNA then undergo capping and tailing. Capping is a process where addition of methyl guanosine triphosphate takes place at 5' end of hnRNA, while tailing is done by the addition 200- 300 adenylate residues at 3' end. Resulted mRNA is then transported outside of nucleus by nuclear pore to the cytoplasm for translation.



- **23.**(I) Write the scientific names of the two species of filarial worms causing filariasis.
 - (II) How do they affect the body of infected person(s)?
 - (iii) How does the disease spread?

Answer 23

- (I) Filariasis is caused by organism called Wuchereria, two principal species belong to this category is Wuchereria bancrofti and Wuchereria malayi
- (II) Filarial worm remain in the body for a long time and develops chronic inflammation. They inhabit lymphatic vessels of lower limbs resulting in the



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swelling of lower limbs and the disease is called elephantiasis or filariasis. Genital organ also gets affected resulting in deformities in its shape and size.

- (III) Transmission of infection generally occurs through bite of female mosquito vectors.
- **24.**Name the genus to which baculoviruses belong. Describe, their role in the integrated pest management programmes.

Answer

Baculoviruses belongs to the genus Nucleopolyhedroviru.

Baculoviruses is regarded as natural pest management microorganism. They have show activity against wide range of species specific pathogen. These viruses can attack wide range of arthropod and some other insects. Most importantly these viruses don't show any negative impact on plants, mammals, birds, fish etc and is beneficial for IPM or in ecologically sensitive area.

25.Unambiguous, universal and degenerate are some of the terms used for the genetic code. Explain the salient features of each one of them.

Answer

It has been evidenced that many disease are linked with the change in amino acid sequence in-turn change in protein structure and function. This small combination of amino acids sequence was named as genetic code or codon. Sir Har Gobind Khorana developed chemical method for synthesis of RNA molecule.

Some of the important characteristic feature of genetic codes is-



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(i) Genetic codon is triplet in nature. There are total 64 codons out of which 61 codons code for amino acids and 3 codons do not code for any amino acids, hence they are name as stop codons.

(ii) Unambiguous nature, one codon codes for only single amino acid and are specific.

(iii) degenerate – coding of some amino acids are done by more than one sets of codon therefore they are termed as degenerate.

(iv) mRNA is a sequence of amino acid coded by the codon, they are arranged in continous manner so don't have any punctuations.

(v) Universal sequence of codon represents specific amino acids and are unique to all organisms

(vi) AUG has dual functions, at times it codes for Methionine and it also act as initiator codon.

26 Water is very essential for life. Write any three features both for plants and animals which enable them to survive in water scarce environment.

Answer

Water is instrumental for survival of plant and animal on earth. Life on earth has originated in water and is unsustainable without it. Productivity, sustainability and distribution of plants and animals depend upon it. Some organisms are designed to tolerate a wide range of salinity called as eurohaline while some organism can't tolerate this salinity in water are called as stenohaline.



Simplifying Test Prep In harsh condition (desert) these plants and animals adapt to these harsh environment which is called as adaptation. Adaptation may result in change of morphology, physiology or behaviour, it evolve after a long evolutionary time scale.

Animal adaptation

- 1. Kangaroo rats of North America maintain water requirement by internal fat oxidation.
- 2. Some animals have the ability to concentrate urine so that minimum amount of water is lost during excretion.

Plant adaptation

- 1. Desert plants develop thick cuticle and deeply placed stomata to decrease rate of transpiration.
- 2. Use of CAM photosynthetic pathway helps stomata to remain inactive or closed during day time.
- 3. Some desert plants develop spikes to replace leaf so that rate of photosynthesis is done by flat stems.

OR

26.How do organisms cope with stressful external environmental conditions which are localised or of short duration?

Answer

Plants and animals are well adapted to compensate the change in external climate. When we move to higher altitude we feel nausea, fatigue and heart palpitation symptom of altitude sickness, because of lower atmospheric pressure (less oxygen). To this problem body compensate by increasing RBC production with decrease in binding capacity of Hb and increase breathing rate.

Desert lizard doesn't have any physiological ability to manage change in temperature, but have distinct method for maintaining their body temp constant. They absorb heat



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when their body temperature drops below comfort zone and moves in shaded place after attaining the normal temperature

- **27.**A. State the consequence if the electrostatic precipitator of a thermal plant fails to function.'
 - B. Mention any four methods by which the vehicular air pollution can be controlled.

Answer

A. Respiration is the basic requirement of human being for survival. During respiration we inhale many gases apart from O2, which gets accumulates in the alveoli leading to respiratory related diseases. Concentration and exposure of the pollutant act as key for conversion mild to chronic disease.

Particulate matter is considered very harmful, major step for the removal of particulate matter is the implementation of electrostatic precipitator. They are placed near the exhaust of thermal power plant. Precipitator has electrode wire with thousands of volt, releasing electrons which get attached to the dust particles (negatively charge). On the other side collecting plates attract charged dust particle, where scrubber cleans gases like sulphur oxide.





Figure Electrostatic precipitator

- B. Automobile are major source of air pollution, PCB have suggested that particulate size 2.5 micrometers or less in diameter (PM 2.5) are responsible for causing the greatest harm to human health. Four important methods that can be implemented to reduce pollution
 - 1. Use of lead free petrol or use of diesel in vehicle.
 - 2. Catalytic converter such as platinum-palladium and rhodium is used for decreasing emission of poisonous gases.
 - 3. Use of unleaded petrol
 - 4. Conversion of unburned hydrocarbon to CO_2 and H_2O .

Section-D

28.Give reasons why:

- a. Most zygotes in angiosperms divide only after certain amount of endosperm is formed.
- b. Groundnut seeds are exalbuminous and castor seeds are albuminous.
- c. Micropyle remains as a small pore in the seed coat of a seed.



- d. Integuments of an ovule harden and the water content is highly reduced, as the seed matures.
- e. Apple and cashew are not called true fruits.

Answer

- a. Development of embryo depends upon the amount of endosperm present in the nucleus, as the embryo obtain its nutrition form the endosperm only. PEN then undergoes successive division and results in formation of free nuclei, subsequently it forms cell wall.
- b. Utilization of the endosperm vary among plants, in some plants endosperm is gets exhaust or used up so they are called exalbuminous e.g groundnut while in some plant endosperm persist in there seeds and are used during seed germination are termed as albuminous such as castor.
- c. Seeds are covered by a hard covering called as integument, except at the top part of seed called as micropyle. Mycropyle helps in the entry of O₂ and H₂O during seed germination. Pollen tube when reaches ovary it enters ovule by micropyle and then synergids cell move through filiform apparatus.
- d. Maturation of seed is preceded by reduction in water content and increase hardening of integuments. Reduced content of water makes the seed metabolically slow and dry.Then embryo enters into dormancy stage. When seeds are subjected to adequate moisture, oxygen and suitable temperature they start to grow.
- e. Maturation of ovules into seed and development of ovary into fruit occur simultaneously. When fruit develops from thalamus rather than from ovary are termed as false fruit.



OR

- 28. A. Draw a labelled diagram of L.S. of an embryo of grass (any six labels).
 - B, Give reason for each of the following:
 - (i) Anthers of angiosperm flowers are described as dithecous.
 - (ii) Hybrid seeds have to be produced year after year.



- I. Each anther of angiosperm is bilobed in nature with two layered protection called theca (dithecous). Each theca is separated by longitudinal grooves. Bilobed nature is distinct in transverse section, microsporangia is located at the corners of tetragonal structure.
- II. Use of hybrid vegetable and crop is growing exponentially in present era. They have significantly increased productivity of the plants with higher nutritive value. There



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exists a problem with hybrid plants is that "seeds have to be produced year after year". The main problem is –

1. After first generation, hybrid plants loose there characteristic property (don't maintain hybrid nature)

2. Production of hybrid seeds needs more money and became expensive for farmers.

29.Describe the mechanism of pattern of inheritance of ABO blood groups in humans.

Answer

Cross between two species results in the formation of F1 generation where either of the parents may show dominance or they may represent characteristic feature of both parents called as incomplete dominance.

Mendel in his experiment found that they may exist two different form of a gene exist in a species designated as multiple allele. Functional nature of govern the possible genotypic outcome.

Classical example of multiple allele is the ABO blood group system in human being; controlled by the gene I. I^A and I^B are responsible for the production of antigen A and B present on the surface of RBC. Plasma membrane of RBC posse's sugar polymer that protrudes out of its surface and the type of sugar present on the surface is controlled by gene I. I^A and I^B allele is responsible for coding glycosyl tranferase enzyme responsible for developing modification in the terminal sugar molecule.

Gene I has three different type of allele IA, IB and i. IA and IB differ very minutely on the sugar molecule while I don't produce any sugar molecule. Here allele A and B are dominant in nature while ii fail to produce any antigenic molecule so express blood



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group O. As human being is diploid in nature each person may express only A or B allele to categorise as blood group A or B, but at times both I^A and I^B are expressed and produce different sugar molecule on cell membrane a classical example of co – dominance. Since there are three different type of allele are present six possible genotypes may be observed in human.

Allele from Parent 1	Allele from Parent 2	Genotype of offspring	Blood types of offspring
IA	ΙΑ	ΙΑΙΑ	A
IA	I ^B	IAIB	AB
IA	i	I^i	A
I ^B	IA	ΙΑΙΒ	AB
Ів	Гв	IBIB	В
IB	i	I ^B i	В
i	i	ii	0

29. A. Why is haemophilia generally observed in human males? Explain the conditions under which a human female can be haemophilic.

Answer

Haemophilia is sex linked recessive disease; it is transmitted from unaffected female carrier to male child with haemophilia. Here female genes are in heterozygous condition while the male remain expressive of this gene. This disease is characterized by absence of protein required for clotting of blood. It infected individual encounters a cut he will face non stop bleeding. The family pedigree of Queen Victoria shows a number of haemophilic descendents as she was a carrier of the disease.



29. B. A pregnant human female was advised to undergo M.T.P. It was diagnosed by her doctor that the foetus she is carrying has developed from a zygote formed by an XX-egg fertilized by Y-carrying sperm. Why was she advised to undergo M.T.P.?

Answer

MTP stands for medical termination of pregnancy (MTP) or it may be called as abortion in common language. The process of termination is illegal in India, but under certain medical condition it is being done.

There may be some condition were your doctor may advised for M.T.P. because her foetus may be carrying abnormal number of chromosomes.

In normal human being fusion of two gamete sperm and egg result in the development of zygote, with 23 pairs of chromosomes, or 46 chromosomes. Gamete develops after meiosis containing one set of chromosome so called haploid (22 autosome) and one sex chromosome. Fusion of sperm (male) and egg (female) gamete forms diploid zygote with 22 pairs of autosome and a pair of sex chromosome.

Male (sperm) posses heterogametic sex chromosome X and Y, while female have only homogametic chromosome XX. Here sperm cell is the determining factor –

1. Sperm cell containing an X chromosome fertilizes an egg, zygote will be XX or female

2. Sperm cell contains a Y chromosome fertilize egg then, zygote will be XY or male.

But if doctor notices that is formed by XX- egg & fertilised by Y carrying sperm i.e the resulting zygote will be XXY, Abnormality in chromosome number called as aneuploidy. There may arise some situation such as –

- **1.** Trisomic presence of one or two additional chromosome.
- 2. Monosomic absence of one chromosome.



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Above given problem deals with trisomic condition, nondisjunction abnormality such as Klinefelter syndrome where males have an extra X chromosome. Genotype of which is XXY or sometime it may be XXYY, XXXY. Down syndrome is most commonly result nondisjunction affecting autosomal chromosome 21. Down syndrome is also referred to as trisomy 21 because of the extra chromosome.

- **30.** A. Describe the characteristics a cloning vector must possess.
 - B. Why DNA cannot pass through the cell membrane ? Explain. How is a bacterial cell made 'competent' to take up recombinant DNA from the medium?

Answer

A. As we all know that malaria is transmitted through mosquito bite and so we called them as a vector of malaria. Similarly plasmid is used as vector for transmission of desired DNA from one organism to other organism.

Characteristics features of cloning vector

- 1. Presence of suitable cloning vector and selectable marker.
- 2. Convenient insertion and removal of plasmid DNA, by the use of RE.
- 3. Easy propagation and maintenance of the clone.

Production of antibiotic resistance within the plasmid vector is done by the help of DNA ligase for joining the inserted gene. Resultant is a new sequence of DNA ready for implantation in e.coli.

Genetic modification of organism is done by -

- (i) Identification and isolation of DNA containing desirable genes;
- (ii) Insertion of identified DNA into the host;
- (iii) Maintenance and transfer of introduced DNA in the host and its progeny.



B. Implementation of DNA into the plasmid is not sufficient until it is subjected into recipient cell. So in order to insert required DNA into the cells they are made competent because DNA is hydrophilic in nature.

Bacterial cells are made competent by

- 1. Treating bacteria with specific concentration of divalent cation results in increase efficiency of DNA to move inside bacterium cell wall.
- 2. Followed by the incubation of cell with recombinant DNA on ice, then place them briefly at 420C (heat shock), and again back on ice.

Some other methods available for introduction of desired DNA are-

OR

- 1. micro-injection, recombinant DNA is directly injected into the nucleus of an animal cell
- 2. biolistics or gene gun method is suitable for plant cells, where cells are bombarded with high speed micro-particles of gold or tungsten coated with DNA.

30 If a desired gene is identified in an organism for some experiments, explain the process of the following:

(i) cutting this desired gene at specific location

(ii) Synthesis of multiple copies of this desired gene

Answer

I. Cutting of the desired gene at specific location is attained by the implementation of restriction enzymes (RE). These enzymes are specialized to cut the fragment of DNA at specific locations. Digested or cut fragments are subjected to Agarose gel



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electrophoresis principally based on the charge of particle. As DNA is negatively charged they move toward anode.

RE are classified into two major class based on its structure and ability to cut at specific locations-

- Type I it cleaves DNA randomly at any place which is away from recognition site.
- Type II it cleaves DNA at specific locations, e.g Hind II (name is given on the basis of organism from which it is isolated). Used in most research laboratory.
- II. Polymerase Chain Reaction (PCR) is being incorporated with molecular biology tools to obtain higher copy of desired gene. Two sets of chemically synthesised oligonucleotides and DNA polymerase are being used in vitro for the multiplication of desired gene.
 - Use of PCR is very popular because it produces approximately billion copies of a gene in less than 20 minutes. Such higher number of product is achieved by use of thermostable DNA polymerase (isolated from a bacterium, Thermus aquaticus).
 - Components used during PCR Template DNA, DNA polymerase, Primers and buffer.

Steps of PCR -

- Denature DNA- DNA is heated to 95°C, which break hydrogen bonds that hold DNA strands together in helix.
- Primer annealing- mixture is cooled from 45-72°C, allowing primer to bind to their respective complementary sequence.



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• Extension- reaction is hen heated at 72°C so that DNA polymerase can synthesis new strand.

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