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Govt. Public Exam and PTA Questions and Answers

12th std

- Question pattern and distribution of marks in Govt. Public exam
- Govt. Public exam question paper with answers - June 2023, March 2023, May 2022, September 2021, September 2020
- PTA Questions and Answers - 6 Sets
- 1 mark Questions - 232 Nos
- 2 mark Questions - 116 Nos
- 5 mark Questions - 105 Nos
- 8 mark Questions - 83 Nos

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Question Bank

Govt. Public Exams and PTA Questions and Answers

Contents

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Contents

Biology: 12th Std

Govt. Public Exam Question paper

Question Pattern and Distribution of Marks

Part I - Bio-Botany **35 Marks**

Section - I Q1 to Q8	One mark questions 8 Multiple choice questions - No choice	8 x 1 = 8
Section - II Q9 to Q14	Two mark questions 4 questions out of 6	4 x 2 = 8
Section - III Q15 to Q19	Three mark questions 3 questions out of 5, Q19 is Compulsory	3 x 3 = 9
Section - IV Q20 to Q21	Five mark questions 2 questions out of 4; Internal choice (or)	2 x 5 = 10

Part II - Bio-Zoology **35 Marks**

Distribution of marks is similar to part I Bio-Botany

Solved Govt. Public Exam Question Paper - May 2022

Biology - 12th Std

Time : 3.00 Hours Marks : 70

PART-I (BIO-BOTANY)

SECTION - I 8x1=8

1. In which techniques Ethidium Bromide is used ? Ans: **(c) Agarose Gel Electrophoresis**

(a) Polymerised Chain Reaction (b) Southern Blotting Techniques

(c) Agarose Gel Electrophoresis (d) Western Blotting Techniques

2. The first cell of male gametophyte in angiosperm is : Ans: **(b) Microspore**

(a) Nucleus (b) Microspore (c) Primary Endosperm Nucleus (d) Megaspore

3. Deforestation means : Ans: **(c) removal of plants and trees**

(a) growing plants and trees in a pond.

(b) growing plants and trees in an area where there is no forest.

(c) removal of plants and trees.

(d) growing plants and trees in an area where the forest is removed.

4. Crosses between the plants of the same variety are called ..... Ans: **(a) intravarietal**

(a) intravarietal (b) interspecific (c) intergeneric (d) intervarietal

5. EcoRI cleaves DNA at :

(a) GAATTC (b) AGGGTT (c) TATAGC (d) GTATATC *Ans:* **(a) GAATTC**

6. Tectona grandis is coming under the family : Ans: **(b) Lamiaceae**

(a) Dipterocarpaceae (b) Lamiaceae (c) Ebenaceae (d) Fabaceae

7. Pedogenesis refers to :
(a) Population (b) Fossils (c) Soil (d) Water Ans: **(c) Soil**

8. The Dominant Epistasis, ratio is :
(a) 9 : 3 : 4 (b) 9 : 3 : 3 : 1 (c) 9 : 6 : 1 (d) 12 : 3 : 1 Ans: **(d) 12 : 3 : 1**

SECTION-2 4x2=8

9. What is Mellitophily ?
Pollination by ***bees*** is called mellitophily.

10. What are the enzymes you can use to cut terminal end and internal phosphodiester bond of nucleotide sequence ?

For Terminal Bond

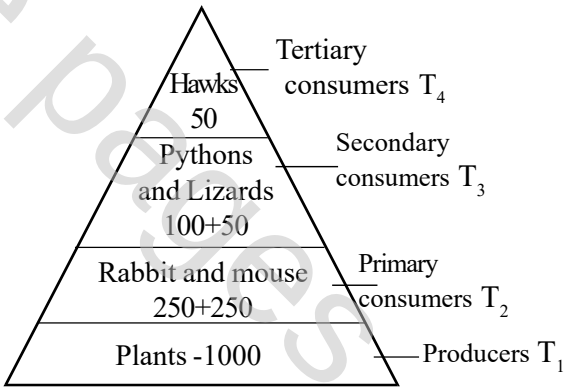
Exonucleases like, ☛ *Bal 31* ☛ *Exonuclease III*

For Internal Bond

Endonucleases like: ☛ *Hind II* ☛ *Bam H1* ☛ *Eco RI*
☛ *TaqI* the surrogate mother's uterus. ☛ *Pvul*

11. What is myrmecophily ?
It is a positive interaction between ants and plants.
1. ***Ants body guard*** the plants.
2. The ***plants*** provide ***food*** and ***shelter*** to these ants.
3. Ants also pollinate the flowers.
☛ Mango ☛ Jamun.

12. Draw a pyramid from following details and name the type of pyramid.
Quantities of organisms are given Hawks-50, Plants-1000, Rabbit and Mouse 250+250. Pythons and Lizard 100+50 respectively.
The data can be arranged as follows:
(i) Plants = 1000 - T_1
(ii) Rabbit and mouse = 500 - T_2
(iii) Python and lizard = 150 - T_3
(iv) Hawks = 50 - T_4
It is a ***pyramid of numbers***.



13. How are microbial inoculants used to increase the soil fertility ?
1. Microbial inoculants act as an ***ecofriendly*** fertilizer.
2. They improve ***plant growth.***
3. They improve the number of ***microorganisms*** in the soil
4. They improve ***biological*** activity in the soil.
5. They are efficient in
◆ *Nitrogen fixation* ◆*Phosphate solubilising* ◆ *Cellulose decomposition*
6. *Rhizobium* fixes the ***atmospheric nitrogen*** in the soil.
7. *Arbuscular* mycorrhizae ***dissolve the phosphates*** found in the soil.
8. ***Seaweed liquid fertilizer*** produces cross linked ***polymers*** in the soil. These polymers improve the ***crumbing*** in the soil and retain the ***moisture*** for a long time.

14. Give definitions for organic farming.

1. An agricultural system using biofertilizers, bio-pesticides and organic manure to sustain the health of the soils.
2. It is an ***alternative agricultural system.***

SECTION-3 3x3=9

15. List out the functions of tapetum.

1. Tapetum supplies ***nutrition*** to the developing microspores.
2. It contributes ***sporopollenin*** through ***ubisch bodies.***
3. It plays an important role in ***pollen wall formation.***
4. It contributes the ***pollenkitt material.***
5. Exine proteins responsible for ***'rejection reaction'*** of the stigma are derived from tapetal cells.

16. What is the difference between missense and nonsense mutation?

Missense Mutation	Nonsense Mutation
1. Codon for ***one amino acid*** is changed into a codon for ***another amino acid.***	1. Codon for ***one amino acid*** is changed into a ***termination*** or ***stop*** codon.
2. New codon encodes a ***different amino acid.***	2. New codon leads to ***premature termination*** of ***translation.***

17. What do you know about the word pBR 322 ?

1. pBR322 is a ***reconstructed plasmid.***
2. 'p' denotes ***plasmid.***
3. 'B' denotes the name of scientist ***B***oliver.
4. 'R' denotes the name of scientist ***R***odriguez.
5. The number ***322*** is the ***serial number of plasmid*** developed from their laboratory.
6. pBR322 is used as ***cloning vector.***
7. It contains 4361 base pairs.
8. It contains ***two*** antibiotic resistance genes.
   They are: 1. amp^R 2. tet^R
9. It contains ***recognition sites*** for the following restriction enzymes:
   - ☞ *Hind III* ☞ *Pvu II* ☞ *Eco RI* ☞ *Pst I*
   - ☞ *Bam HI* ☞ *Cla I* ☞ *Sal I*
10. It also contains the ***'Ori site'.***
11. The ***proteins*** involved in the replication of plasmid are coded by ***Rop.***

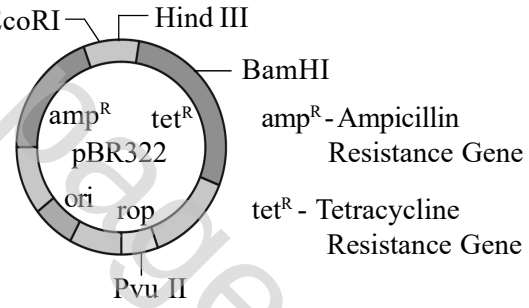


Fig. pBR322.

18. What is CCS ?

- CCS is ***Carbon Capture and Storage.***
- It is a technology of ***capturing CO_2*** and injecting it deep into the ***underground*** rocks, to a depth of ***1km or more.***
- It reduces ***global warming.***

19. Distinguish habitat and niche.

Habitat	Niche
1. A specific ***physical space*** occupied by an organism (species).	1. A ***functional space*** occupied by an organism in the same ecosystem.
2. ***Shared*** by many organisms.	2. ***Occupied by a single species.***
3. Specific to an organism.	3. Organism may change niche with time and season.

SECTION-4 2x5=10

20. (a) Give a detailed account on parthenocarpy, add a note on its significance.

1. The development of fruit without fertilization.
2. Parthenocarpic fruits do not have ***true seeds.***
3. They are ***seedless.***

Eg. ☛ *Banana* ☛ *Papaya* ☛ *Grapes*

Types

1. Genetic parthenocarpy *2. Environmental parthenocarpy*
3. Chemically induced parthenocarpy

1. Genetic Parthenocarpy

It is due to ***hybridization*** or ***mutation.***
Eg. *Citrus*

2. Environmental Parthenocarpy

It is induced by the ***environmental conditions*** like:
☛ *Frost* ☛ *Low temperature* ☛ *Fog* ☛ *High temperature*
Eg. ***Low temperature*** for 3-19 hours is needed for ***Pear.***

3. Chemically Induced Parthenocarpy

It is induced by ***growth promoting substances*** like: *Auxins, Gibberellins*

Significance

1. The ***seedless fruits*** have great significance in ***horticulture.***
2. They have great ***commercial importance.***
3. Useful for the preparation of:
   ☛ *Jams* ☛ *Sauces* ☛ *Jellies* ☛ *Fruit drinks, etc.*
4. ***High proportion*** of ***edible*** part.

(OR)

(b) Differentiate incomplete dominance and co-dominance.

Incomplete dominance	Codominance
1. No ***blending*** of ***alleles.***	***Expression*** of ***both alleles.***
2. F_1 heterozygote has ***intermediate*** phenotype ***between*** the ***parents.***	F_1 heterozygote exhibits ***dominant parent's trait.***
3. Produces a ***new phenotype.***	Does not produce a new phenotype.
4. ***Neither*** of the alleles are dominant	Both the alleles are ***dominant.***
5. Eg. Flowers of *Mirabilis jalapa.*	Eg. ***Flowers of*** *Camellia.*

21. (a) Write the applications of plant tissue culture.

1. ***Hybrid*** production through somatic hybridization.
2. ***Somatic embryoids*** can be encapsulated into ***synthetic seeds*** or artificial seeds.
3. Synthetic seeds help in ***conservation*** of ***plant biodiversity.***
4. Production of ***disease resistant plants*** through meristem and shoot tip culture.
5. Production of ***stress resistant plants*** like
   - Herbicide tolerant
   - Heat tolerant plants.
6. ***Micropropagation*** is useful in forestry.
7. Production of ***secondary metabolites*** from cell culture is used in
   - Pharmaceutical
   - Food industries
   - Cosmetic

(b) What are the King and Queen of spices ? Write their uses.

King of Spices

Pepper

Queen of Spices

Cardamom

Pepper

'Black Gold of India'.

Botanical name - *Piper nigrum*

Area of cultivation - • Kerala • Tamil Nadu • Karnataka

Active Principle - Piperine, an alkaloid

Types

1. Black pepper
2. White pepper

Uses

1. **Flavouring** agent in the preparation of:
   - Sauces
   - Soups
   - Curry powder
   - Pickles
2. Used in **medicine** to
   - Enhance salivary secretion
   - Enhance gastric secretion
   - As a **stomachic** - digestion
3. Enhances **bio-absorption** of medicines.

Cardamom

Botanical name - Elettaria cardamomum

Areas of cultivation - Western Ghats, North Eastern India

Uses

1. Seeds have ***pleasing aroma.***
2. It has a ***warm*** and ***slightly pungent*** taste.
3. It is used for ***flavouring***
   - Confectionaries
   - Beverages
   - Bakery products
4. The ***seeds*** are used in the
   - Curry powder
   - Cakes
   - Pickles
5. Medicinally used as ***stimulant*** and ***carminative.***
6. ***Mouth freshener.***

PART-II (BIO-ZOOLOGY)

SECTION- I 8x1=8

1. Which one of the following are at high risk extinction due to habitat destruction?
(a) Amphibians (b) Mammals (c) Echinoderms (d) Birds Ans: **(a) Amphibians**

2. Competition between species leads to:
(a) Amensalism (b) Extinction (c) Symbiosis (d) Mutation Ans: **(b) Extinction**

3. The matured sperms are stored in the .....
(a) Epididymis (b) Seminiferous tubules
(c) Seminal vesicle (d) Vas deferens Ans: **(a) Epididymis**

4. Which of the following phenotypes is not possible in the progeny of the parental genotypic combination I^AI^O x $I^A I^B$?
(a) A (b) AB (c) B (d) O Ans: **(d) O**

5. A mRNA molecule is produced by :
(a) Duplication (b) Replication (c) Translation (d) Transcription Ans: **(d) Transcription**

6. Cyclosporin-A is an immunosuppressive drug produced from :
(a) Penicillium notatum (b) Aspergillus niger (c) Trichoderma polysporum
(d) Manascus purpureus Ans: **(c) Trichoderma polysporum**

7. Which period was called as "Age of fishes" ?
(a) Devonian (b) Permian (c) Ordovician (d) Triassic Ans: **(a) Devonian**

8. PCR proceeds in three distinct steps governed by temperature, they are in order of:
(a) Annealing, Synthesis, Denaturation (b) Denaturation, Annealing, Synthesis
(c) Denaturation, Synthesis, Annealing (d) Synthesis, Annealing, Denaturation
Ans: **(b) Denaturation, Annealing, Synthesis**

SECTION-2 4x2=8

9. What is parthenogenesis? Give example.

Parthenogenesis

Parthenogenesis is the development of an egg into a complete individual ***without fertilisation.***
Examples: Sea urchins, Whiptail lizards.

10. What is surrogacy?

1. Surrogacy is an ***arrangement,*** where a woman agrees to become ***pregnant*** and ***deliver a child*** for ***another woman.***
2. It is done through Invitro fertilization (IVF).

11. Differentiate template strand from coding strand.

Template Strand	Coding Strand
1. This strand of DNA is used for ***transcription.***	1. This strand of DNA is ***not used*** for transcription.
2. The polarity of this strand is **3'→5'.**	2. The polarity of this strand is **5'→3'.**
3. This strand is transcribed into ***mRNA.***	3. This strand is ***not transcribed*** into ***mRNA.***
4. The nucleotides are ***complementary*** to ***mRNA.***	4. Nucleotides are ***similar*** to that in ***mRNA.***

12. Who disproved Lamarck's theory of acquired characters? How ?

August Weismann

Explanation

1. August Weismann proposed **"*germplasm theory*".**
2. He conducted ***experiments on mice.***
3. He cut the tails of mice and bred for ***20 generations.***
4. All mice were born with tail.
5. He proved that ***change in the somatoplasm*** will not be transferred to the next generation.
6. But, change in the ***germplasm*** was ***inherited.***

13. Write the symptoms of filariasis.

- ⋆ Inflammation of ***lymph node***
- ⋆ Inflammation of ***lower limbs***
- ⋆ Obstruction of ***lymph vessels***
- ⋆ Blocking of the ***lymphatic system***
- ⋆ ***Elephantiasis*** of ***limbs, scrotum*** and ***mammary*** glands.

14. What does gene therapy mean ?

1. Gene therapy is a ***corrective treatment*** for person suffering from ***hereditary disease.***
2. In gene therapy, a ***normal gene*** is ***transferred*** to a person's ***cell*** that ***carries mutant alleles.***

SECTION-3

15. Differentiate foeticide from infanticide.

Foeticide	Infanticide
1. ***Abortion***	***Killing*** the baby.
2. Refers to ***aborting*** the ***foetus*** in the mother's womb.	Refers to ***killing*** the child after birth (infants)

16. Autoimmune disease is a misdirected immunity response. Justify.

Justification

1. ***Auto immunity*** is an abnormal ***immune response*** against ***own body.***
2. The immune system fails to distinguish between ***self*** and ***non-self.***
3. It ***attacks*** its own body.
4. It produces antibodies called ***auto antibodies*** and ***cytotoxic-T cells.***
5. They destroy our ***own*** tissues.
6. Thus, ***auto immunity*** is a misdirected immune response.

17. When does antibiotic resistance develop?

Antibiotic resistance develops when the bacterium builds an ***ability to defeat*** the drug designed against it.

18. Differentiate Natality from Mortality.

No	Natality	Mortality
1.	It is the production of ***new individuals in unit time.***	It is the ***loss of individuals*** in unit time.
2.	Population ***increase.***	Population ***decrease.***
3.	It is equivalent to ***birth rate.***	It is equivalent to ***death rate.***
4.	It is influenced by • Birth • Hatching • Germination • Fission etc. • Fertility	It is influenced by • Destruction by • Wind • Floods • Predators • Accidents

5. It is expressed as ***crude birth rate.***	It is expressed as ***specific mortality.***
6. It is the ***number*** of ***organisms*** born per female ***per unit time.***	It is the number of ***members*** of an ***original population*** dying after the lapse of a given time.
7. Birth rate(b) = $\frac{\text{Number of birth per unit time}}{\text{Average population}}$	Death rate(d) = $\frac{\text{Number of deaths per unit time}}{\text{Average population}}$

19. In the XY chromosomal system of sex determination, males have only one 'X' chromosome, whereas females have two. How does the organism compensate for this dosage differences between the sexes?

- In Females, the dosage difference is compensated by ***inactivation of one X - chromosome.***
- Males have only ***one*** 'X' chromosome, whereas females have ***two.***
- Among the ***two*** 'X' chromosome, one is ***inactivated.***
- The inactivation of 'X' chromosome is called ***Lyon's hypothesis.***
- The inactivated 'X' chromosome is called ***Barr body*** observed by ***Barr*** and ***Bertram.***
- The Barr body is ***heterochromatin.*** It is ***non-functional.***

SECTION-4 2x5=10

20. (a) Explain the structure of Human Ovum with a neat labelled diagram.

1. Human ovum is
   - *Non-cleidoic*
   - *Microscopic*
   - *Alecithal*
2. Its ***cytoplasm*** is called ***ooplasm.***
3. Ooplasm has a ***large nucleus*** called the ***germinal vesicle.***
4. The human ovum is surrounded by ***three layers.***
   1. Outer layer - Corona radiata
   2. Middle layer - Zona pellucida
   3. Inner layer - Vitelline membrane

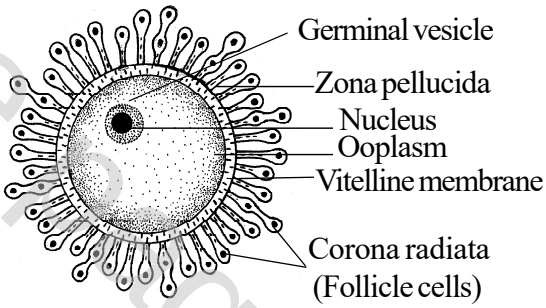


Fig. Structure of human ovum.

1. Corona radiata

- It is a ***thick, outer layer.***
- It is made up of ***follicular cells.***
- These cells are held together by an ***adhesive cementing*** substance.
- This cementing substance is called ***hyaluronic acid.***

2. Zona pellucida

- It is the ***middle layer***
- It is a ***thick*** layer.

3. Vitelline Membrane

- It is the ***innermost*** layer
- This membrane is ***thin*** and ***transparent.***

(OR)

b. Write the salient features of Human Genome Project.

Human genome project is a mega project that sequenced ***every gene*** in the ***human genome.***

1. Human genome contains **3 billion** nucleotide **bases.** But, DNA sequences that encode proteins make up **only 5%** of the genome.
2. An average gene consists of **3000 bases.**
3. The **largest** known human gene is **DMD,** which produces **dystrophin**. DMD gene has **2.4 million bases.**
4. Genes are distributed over **24** chromosomes. **Chromosome 19** has **highest** gene density. **Chromosome 13** and **Y chromosome** have **lowest** gene densities.
5. About **99.9 nucleotide** bases are exactly the **same** in all people.
6. **Functions** of over 50% of the discovered genes are **unknown.**
7. **Less than 2%** of the genome codes for proteins.
8. **Repeated sequences** make up very large portion of the human genome. They have **no direct coding** functions.
9. **Chromosome 1** has 2968 genes. **Chromosome Y** has **231 genes.**
10. About 1.4 million locations are identified where **single base DNA differences** occur in humans.

21. a) Explain the structure of immunoglobulin with suitable diagram.

1. Immunoglobulin is an ***antibody.***
2. It is a protein molecule having a ***'Y' shaped*** structure**.**
3. It comprises of ***four polypeptide chains.***
4. The chains are of ***two*** types namely,
   1. Light chains (L)
   2. Heavy chains (H)
5. An antibody has two light chains and two heavy chains.
6. Hence, an ***antibody*** is represented by H_2L_2.

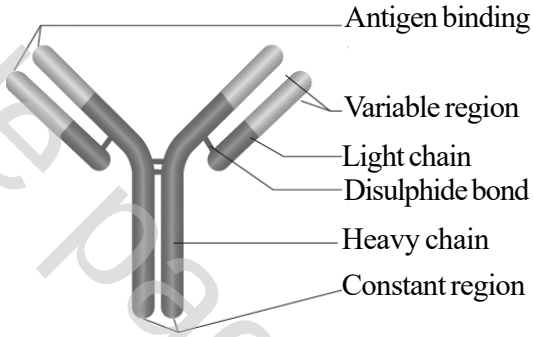


Fig: Structure of Immunoglobulin

7. The ***two*** light chains are ***identical.***
   - Their ***molecular weight*** is ***25,000 Da.***
   - They consist of ***214 amino acids.***
8. The two heavy chains are ***identical*.**
   - Their molecular weight is ***50,000 Da*.**
   - They consist of ***450 amino acids.***
9. The ***polypeptide chains*** are linked together by ***disulphide* (s-s) *bonds*.**
10. One ***light chain*** is attached to a ***heavy chain.***
11. Two ***heavy chains*** are attached to ***each other.***
12. ***Heavy chains*** have a ***flexible hinge*** region at their middle.
13. Each chain has ***two terminals*.** They are
    1. C terminal : Carboxy terminal *2. N terminal : Amino terminal*
14. Each chain has ***two regions*.** They are
    1. Variable region (V) *2. Constant region (C)*
15. Variable region is ***smaller*** at one end.

16. Constant region is ***larger*** at other end.
17. ***Variable*** regions are different in different antibodies.
18. ***Constant regions*** are same in all antibodies.
19. In each antibody, ***heavy*** and ***light*** chains ***combine*** to form an ***antigen binding site.***

(OR)

b) Write an essay on radioactive waste management.

Radioactive Waste

Waste that emits ***ionizing radiation*** is known as ***radioactive waste***.

Methods of Disposal

1. Limit Generation

It is the ***first*** and most ***important*** consideration to manage the waste.

2. Dilute and Disperse

Low radioactive waste can be

- *Diluted*
- *Dispersed*

3. Delay and Decay

- Nuclear wastes ***radioactivity*** in ***nuclear reactors*** and ***accelerators*** are ***very short-lived***.
- ***Delay*** and ***decay*** is an important strategy.

4. Concentrate and Confine

- This is meant for wastes with long ***lasting radioactivity.***
- Waste is contained in ***corrosion resistant containers***.
- These are then transported to ***disposal sites***.

Questions and Answers from Public Exam Question Papers - 2022, 2021, 2020 and PTA Question Papers.

PART-I (BIO-BOTANY)

SECTION - I

1 Mark Questions

1. EcoRI cleaves DNA at **(May 2022)** Ans : **a) GAATTC**
a) GAATTC b) AGGGTT c) TATAGC d) GTATATC

2. Pedogenesis refers to : **(May 2021, 2022)**
a) Populationb) Fossils c) Soil d) Water Ans: **c) Soil**

3. Tectona grandis is coming under the family: **(May 2022)**
a) Dipterocarpaceae b) Lamiaceae c) Ebenaceae d) Fabaceae Ans: **b) Lamiaceae**

4. Deforestation means: **(May 2022)** Ans : **c) removal of plants and trees**
a) growing plants and trees in a pond.
b) growing plants and trees in an area where there is no forest.
c) removal of plants and trees.
d) growing plants and trees in an area where the forest is removed.

5. In which techniques Ethidium Bromide is used? **(May 2021, 2022)**
a) Polymerised Chain Reaction b) Southern Blotting Techniques
c) Agarose Gel Electrophoresis d) Western Blotting Techniques
Ans: **c) Agarose Gel Electrophoresis**

6. The first cell of male gametophyte in angiosperm is : **(May 2022)** Ans : **(b) Microspore**
a) Nucleus b) Microspore c) Primary Endosperm Nucleus d) Megaspore

7. The Dominant Epistasis, ratio is : **(May 2022)**
a) 9 : 3 : 4 b) 9 : 3 : 3 : 1 c) 9 : 6 : 1 d) 12 : 3 : 1 Ans : **d) 12:3:1**

8. Crosses between the plants of the same variety are called **(May 2022)**
a) intravarietal b) Interspecific c) intergeneric d) intervarietal Ans: **a) intravarietal**

9. The unit for measuring ozone thickness: **(May 2021)**
a) Dobson b) Joule c) Watt d) Kilo Ans: **a) Dobson**

10. Parthenocarpic fruits lack : **(May 2021)**
a) Mesocarp b) Endocarp c) Seed d) Epicarp Ans : **c) Seed**

11.———— was the first scientist to use the term heterosis **(May 2021)** Ans : **c) G.H. Shull**
a) Muller and Stadler b) Cotton Mather c) G.H. Shull d) William S. Gaud

12. In Mendel's experiments with garden pea, round seed shape (RR) was dominant over wrinkled seeds (rr), Yellow cotyledon (YY) was dominant over green cotyledon (yy). What are the expected phenotypes in the F_2 generation of the cross RRYY x rryy? **(May 2021)**
a) Only wrinkled seeds with green cotyledons b) Only round seeds with green cotyledons
c) Round seeds with yellow cotyledons and wrinkled seeds with yellow cotyledons
d) Only wrinkled seeds with yellow cotyledons
Ans : **c) Round seeds with yellow cotyledons and wrinkled seeds with yellow cotyledons**

13. Restriction enzymes are: **(May 2021)**
a) Not always required in genetic engineering c) Nucleases that cleave DNA at specific sites
b) Essential tools in genetic engineering d) Both (b) and (c) Ans : **d) Both (b) and (c)**

SECTION - II

2 Mark Questions

1. Define multiple alleles. **(May 2021)**

- ***Two*** or ***more alternative alleles*** of a gene they ***occupy*** the ***same locus.***
- They control different alternatives of a ***single trait.***
- They show ***intragenic gene interactions.***
- Eg. *ABO blood group alleles.*

2. Name the chemicals used in gene transfer. **(May 2021)**

1. Polyethylene glycol- PEG
2. Dextran sulphate

3. What is Co-evolution ? **(May 2021)**

1. ***Reciprocal changes*** in ***genetic*** and ***morphological characters*** of organisms due to ***interaction*** between ***organisms for generations*** is called co-evolution.
2. It is a type of ***co-adaptation***.
3. It is a ***mutual change.***
4. Examples:
   - ***Corolla length*** and ***proboscis length*** of butterflies and moths (Habenaria and moth).
   - ***Bird's beak shape*** and ***flower shape*** and ***size.***

4. Pyramid of energy is always upright. Give reasons. **(May 2021)**

1. The ***bottom*** of the pyramid of energy is occupied by the ***producers.***
2. There is a gradual ***decrease*** in the energy from ***producers*** to ***consumers***.
3. During the transfer of food energy from one trophic level to other, only about 10% is stored at every trophic level. Rest of the energy ***(90%)*** is ***lost*** in the form of ***heat, respiration,*** and ***decomposition***. This is called the ***ten percent law***.
4. So, the ***pyramid of energy*** is always ***upright***.

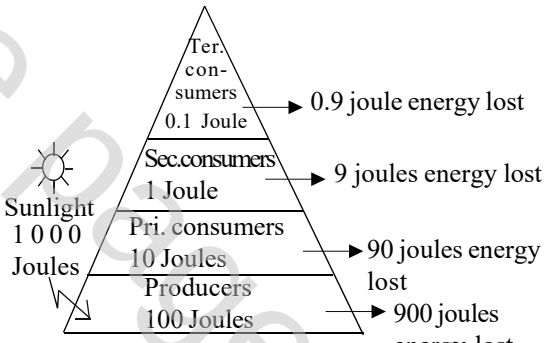


Fig. Pyramid of energy.

5. Differentiate primary introduction from secondary introduction. **(May 2021)**

Primary introduction	Secondary introduction
1. Introduced ***without any alteration*** in the original genotype of the crop.	1. Introduced ***with an alteration*** in the original genotype of the crop.
2. Not subjected to hybridization and selection to superior variety.	2. Subjected to ***hybridization*** and ***selection*** to isolate superior variety.
3. Well adapted to the new environment ***without alteration***.	3. Well adapted to the new environment ***after alteration***.
4. Eg. : **IR8** - Rice	4. Eg. : ***Tea*** varieties collected from China

SECTION - III

3 Mark Questions

1. Mention the name of man-made cereal. How it is formed? **(May 2021)**

Triticale is the man-made cereal.

Formation

1. *Triticale* is a hybrid plant formed by crossing ***Triticum durum*** (Macaroni wheat) and ***Secale cereale*** (rye).
2. *Triticum durum* has ***high-protein*** content.
3. *Secale cereale* has ***high*** content of the ***amino acid***, ***lysine.***
4. The hybrid *Triticale* obtained ***high protein*** content of wheat and ***high lysine*** content of rye.
5. *Triticale* can be divided into three main groups based on the ploidy level.
   - Tetraploidy
   - Octoploidy
   - Hexaploidy
6. ***Tetraploidy*** is obtained by the cross between ***diploid wheat*** and ***rye.***
7. ***Hexaploidy*** is obtained by the cross between ***tetraploid wheat Triticum durum*** and ***rye.***

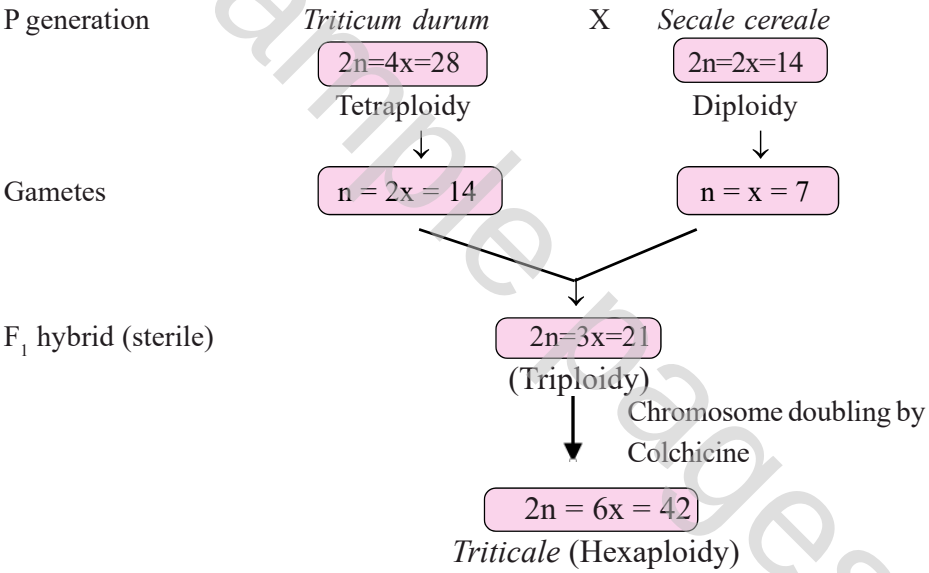


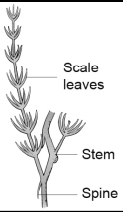
Fig. Triticale formation.

8. ***Octoploidy*** is obtained by the cross between ***hexaploid*** **wheat** ***T. aestivum*** and ***rye.***

2. What are the materials used to grow microorganism like Spirulina? **(May 2021)**

1. Waste water from potato processing plants - Containing starch.
2. Straw
3. Molasses
4. Animal manure
5. Sewage

3. Differentiate cladode from phyllode with example. **(May 2021)**

Cladode	Phyllode
Internodes get modified into fleshy green structure called cladode. Eg. Asparagus 	The ***petiole*** is modified into a fleshy leaf like structure called phyllode. Eg. Acacia 

Increase in greenhouse gases lead to irreversible changes in major ecosystems and climate patterns.

For example, coral ecosystem is affected by increase in temperature, especially ***coral bleaching*** observed in Gulf of Mannar, Tamil Nadu.

Clouds and Dust particles can also produce Green House effect. That is why clouds, dusts and humid nights are warmer than clear dust free dry nights.

16. Enumerate the characteristic features of anemophilous plants. **(PTA-3)**

1. The flowers are
   - *Small*
   - *Inconspicuous*
   - *Colourless*
   - *Not scented*
   - *Nectarless*
2. The stamens are ***numerous.***
3. The filaments are:
   - *Long*
   - *Exerted*
   - *Versatile*
4. Anthers produce ***enormous*** quantities of ***pollen grains.***
5. Pollen grains are:
   - *Minute*
   - *Light*
   - Dry
6. Pollen grains can be carried to long distances by ***wind.***
7. Stigmas are:
   - *Large*
   - *Protruding*
   - *Branched*
   - *Feathery*
8. ***Stigmas*** are sticky.
9. The ***inflorescence*** are :
   - *Pendulous*
   - *Catkin -like*
   - *Spike* to expose the florets

17. Plasmid is a good vector in genetic engineering. Discuss. **(PTA-3)**

Gene transfer is mediated with the help of a plasmid vector is known as ***indirect*** or ***vector mediated gene transfer.***

Among the various vectors used for plant transformation, the Ti-plasmid from ***Agrobacterium tumefaciens*** has been used extensively.

This bacterium has a large size plasmid, known as ***Ti plasmid*** (Tumor inducing) and a portion of it referred as ***T-DNA*** (transfer DNA) is transferred to plant genome in the infected cells and cause plant tumors (crown gall).

Since this bacterium has the natural ability to transfer T-DNA region of its plasmid into plant genome, upon infection of cells at the wound site, it is also known as the ***natural genetic engineer of plants.***

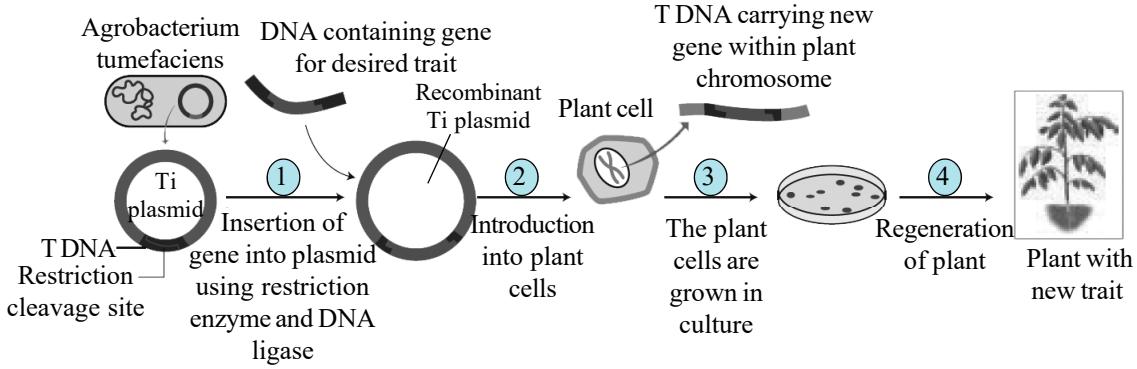


Fig. Agrobacterium mediated gene transfer in plants.

PART-I (BIO-ZOOLOGY)

SECTION - I

1 Mark Questions

1. Which one of the following are at high risk extinction due to habitat destruction? **(May 2022)**
(a) Amphibians (b) Mammals (c) Echinoderms (d) Birds Ans: **(a) Amphibians**

2. Competition between species leads to: **(May 2022)**
(a) Amensalism (b) Extinction (c) Symbiosis (d) Mutation Ans: **(b) Extinction**

3. The matured sperms are stored in the ..... **(May 2021, 2022)**
(a) Epididymis (b) Seminiferous tubules
(c) Seminal vesicle (d) Vas deferens Ans: **(a) Epididymis**

4. Which of the following phenotypes is not possible in the progeny of the parental genotypic combination I^AI^O x $I^A I^B$? **(May 2022)**
(a) A (b) AB (c) B (d) O Ans: **(d) O**

5. A mRNA molecule is produced by : **(May 2021, 2022)** Ans: **(d) Transcription**
(a) Duplication (b) Replication (c) Translation (d) Transcription

6. Cyclosporin-A is an immunosuppressive drug produced from : **(May 2022)**
(a) Penicillium notatum (b) Aspergillus niger
(c) Trichoderma polysporum (d) Manascus purpureus Ans: **(c) Trichoderma polysporum**

7. Which period was called as "Age of fishes" ? **(May 2022)**
(a) Devonian (b) Permian (c) Ordovician (d) Triassic Ans: **(a) Devonian**

8. PCR proceeds in three distinct steps governed by temperature, they are in order of: **(May 2022)**
(a) Annealing, Synthesis, Denaturation (b) Denaturation, Annealing, Synthesis
(c) Denaturation, Synthesis, Annealing (d) Synthesis, Annealing, Denaturation
Ans: **(b) Denaturation, Annealing, Synthesis**

9. Radioactive wastes can be disposed off by _____. **(May 2022)**
(a) composting (b) burning (c) surface impoundments (d) a deep geological repository
Ans: **(d) a deep geological repository**

10. In which mode of reproduction variation are seen ? **(May 2022)**
(a) Asexual (b) Parthenogenesis (c) Sexual (d) Both (a) and (b) Ans: **(c) Sexual**

11. When a Drosophila body cells contain 3 sets of autosomes and 2 X chromosomes, what will be the sex of the fly ? **(May 2022)**
(a) metamale (b) male (c) intersex (d) female Ans**:(c) intersex**

12. The total number of nitrogenous bases in human genome is estimated to be about _____. **(May 2022)**
(a) 35 million (b) 3.5 million (c) 3.1 billion (d) 35,000 Ans: **(c) 3.1 billion**

13. A contraceptive pill prevents ovulation by : **(May 2022)**
(a) stimulating release of FSH and LH (b) blocking fallopian tube
(c) causing immediate degeneration of released ovum
(d) inhibiting release of FSH and LH Ans:**(d) inhibiting release of FSH and LH**

14. Organisms which can survive a wide range of temperature are called ____. **(May 2021, 2022)**
(a) Endotherms (b) Ectotherms (c) Stenotherms (d) Eurytherms Ans: **(d) Eurytherms**

11. What is referred to as bio-magnification ? **(May 2021, PTA-3)**

Enhanced concentration of heavy metals in organisms as the ***trophic level*** increases is called biomagnification.

12. What is ovulation? In which day of menstrual cycle it takes place? **(March 2020)**

The rupture of the Graafian follicle and the release of the ovum from the ovary wall into the peritonial cavity is called ovulation.

Ovulation occurs at about the 14th day of the menstrual cycle.

13. Write the cause of Down's Syndrome. **(March 2020, PTA-3)**

1. **Down's syndrome** is the result of autosomal aneuploidy.
2. It is also known as ***trisomy-21.***
3. Persons with Down's syndrome have ***47 chromosomes.***
   - ***22 AA + A + XY*** males
   - ***22 AA + A + XX*** females

14. What are Operons? How many operon groups are present in *E.coli?* **(March 2020)**

Operon is a cluster of ***related genes,*** that are found next to each other and are ***transcribed together*** to form a ***single mRNA*.**

In E.coli, nearly 260 genes are grouped into 75 different operons.

15. Write any two differences between active and passive immunity. **(March 2020)**

Active Immunity	Passive Immunity
1. ***Produced actively***	1. Received ***passively.***
2. It is produced due to ***contact*** with ***pathogen*** or by its ***antigen.***	2. It is produced due to ***antibodies*** obtained from outside.
3. It is ***durable*** and ***effective***.	3. It is ***transient*** and ***less effective*.**
4. ***Effective*** only after a ***short period.***	4. Immunity develops ***immediately.***
5. Immunological memory is ***present.***	5. Immunological memory is absent.
6. ***Booster*** dose is effective	6. Booster dose is ***less effective*.**

16. Which is referred to as industrial alcohol? Why? **(March 2020)**

Ethanol is referred to as industrial alcohol.

Reason

- Ethanol (C_2H_5OH) is used in industries, laboratories and as fuel.
- Ethanol is used as ***biofuel*** or a ***biofuel additive*** to gasoline.

17. What is the most important application of human stem cells? **(March 2020)**

1. Stem cells are used to generate desired ***cells*** and ***tissues.***
2. It is used for ***cell based therapies.***
3. It is used to ***regenerate damaged*** and ***diseased organs.***
4. Human stem cells are used to ***test new drugs.***

18. Scrotum acts as a thermo regulator for spermatogenesis why?**(PTA-1)**

- Sperm production requires ***lower temperature*** than body temperature.
- Sperms are ***not viable*** at normal ***internal body*** temperature.
- Scrotum provides an ***optimal temperature*** for the sperm, when found outside the abdominal cavity.
- It provides 2-3°C lower than the ***normal internal*** body temperature.

32. 5/ →3/ direction of nucleic acid. Write the meaning of 5/ and 3/ in the above statement. **(PTA-4)**

The symbol 5' refers to carbon in the sugar to which a **phosphate (PO_4)** functional group is attached. The symbol 3' refers to carbon in the sugar to which **hydroxyl (OH)** functional group is attached.

33. Why is typhoid called as enteric fever? **(PTA-4)**

1. Enteric means ***intestine.***
2. The ***infection site*** of typhoid is intestine.
3. Its symptoms are ***headache, abdominal discomfort, fever*** and ***diarrhoea***. Hence, it is called enteric fever.

34. How are the different fish communities living in a pond ecosystem? **(PTA-4)**

Catla, Rohu and Mrigal live in the same pond.

They share the same habitat but ***different ecological niche.***

Catla is a ***surface feeder***.

Rohu is a ***column feeder*** or ***middle feeder.***

Mrigal is a ***bottom feeder***.

The mouth of the three fishes are designed to suit their niche.

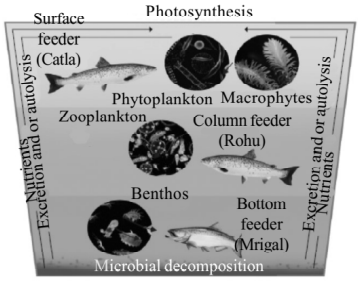


Fig. Types of feeders (niche) in a pond ecosystem

35. Describe species - area relationship on log scale. **(PTA-4)**

Log S = log C+ Z log A

where

S = Species richness — Z = Slope of the line (Regression coefficient)

A = Area — C = Y- intercept

36. Why sexual method of reproduction is better than asexual reproduction. **(PTA-5)**

1. ***Sexual reproduction*** is the fusion of ***gametes*** from ***two parents.***
2. It gives ***genetic variations***.
3. It leads to ***evolution***.

37. Is Phenylketonuria related to albinism? Give reason for your answer. **(PTA-5)**

Yes, Phenylketonuria related to albinism.

Reason

1. Phenylketonuria and albinism are ***Mendelian disorders.***
2. These disorders are transmitted to the offspring on the same line as the Mendelian pattern of inheritance.
   - Both of them are ***inborn errors*** and caused due to an ***autosomal recessive gene***.
   - Both of them are ***pigment disorders***.

38. Gene flow can be a strong agent of evolution. Explain how? **(PTA-5)**

Movement of genes between individuals of different population is called ***gene flow.***

- Gene flow is brought about by
  1. Immigration
  2. Emigration
- Gametes carry genes between ***males*** and ***females*** during ***fertilization.***

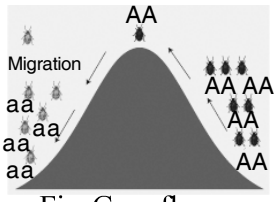


Fig: Gene flow

32. Discuss the various responses of living organisms towards abiotic factors. **(PTA-5)**

Types of responses observed by organisms are:

1. Regulate 2. Conform 3. Migrate 4. Suspend

1. Regulate

- It is the response made by such organisms.
- These organisms ***regulate homeostasis*** by ***physiological means.***
- They maintain a ***constant internal*** environment.
- They also maintain ***ionic/osmotic*** balance.
- These animals are called ***regulators.***

Eg. • Birds • Mammals
• Lower vertebrates • Invertebrates

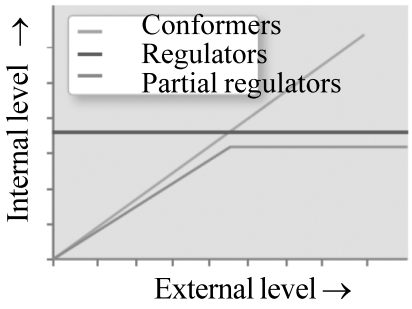


Fig. Organism's response to environmental stressors.

2. Conform

It is the response made by such organisms.

These organisms change their ***body temperature*** with the ambient temperature.

• Aquatic animals change the ***osmotic concentration*** of their ***body fluid*** with that of ambient ***water osmotic concentration.***

- These animals are called ***conformers.***

3. Migrate

- It is the response by organisms to move from their ***stressful habitat.***
- The organisms ***temporarily*** move to a ***new, hospitable area.***
- They ***return*** to their original habitat when the ***stressful period*** is ***over.***
- These animals are called ***migrators.***
- Eg. ***Birds*** migrating from ***Siberia*** to ***Vedanthangal*** to escape severe winter periods.
- Conformers too relocate in ***extreme conditions.***

4. Suspend

- It is the response adapted by ***organisms*** that are ***unable*** to ***migrate.***
- These organisms avoid the stress by ***becoming inactive.***
- The ***three types*** of adaptations that are common are:

1. Hibernation 2. Aestivation 3. Diapause

1. Hibernation

- Hibernation is adopted during ***extreme winter.*** It is called ***winter sleep.***
- Organisms avoid stress by becoming ***inactive.***

Eg. *Bears*

2. Aestivation

- ***Aestivation*** is adopted during ***extreme summer.*** It is called ***summer sleep.***
- It helps the organisms to avoid ***summer related problems*** like:

* Heat * Desiccation

3. Diapause

- Diapause is the ***suspended period*** during the life cycle of an organism to overcome ***unfavourable environmental*** conditions.

According to this theory, the ***five basic factors*** involved in this process.

1. *Gene mutation*
2. *Chromosomal mutation*
3. *Genetic recombination*
4. *Natural selection*
5. *Reproductive isolation*

1. Gene mutation

- ***Changes*** in the ***structure*** of the gene.
- It is also called ***point mutation.***
- It ***alters*** the ***phenotype*** of organisms.
- It produces ***variations*** in their offspring.

2. Chromosomal mutation

1. ***Changes*** in the ***structure*** of the chromosomes.
2. It is due to
   - *Deletion* - *Inversion* - *Addition* - *Translocation* - *Duplication*
3. It alters the ***phenotype*** of organisms.
4. It produces ***variations*** in their offspring.

3. Genetic recombination

1. This is due to ***crossing over*** of genes during ***meiosis.***
2. This brings about ***genetic variations*** in the ***same species.***
3. It leads to ***heritable variations.***

4. Natural selection

1. Nature either selects or rejects the genetic changes.
2. It is the ***driving force of evolution.***

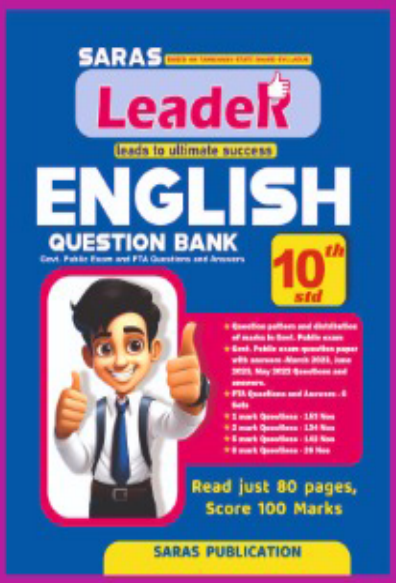
5. Reproductive isolation

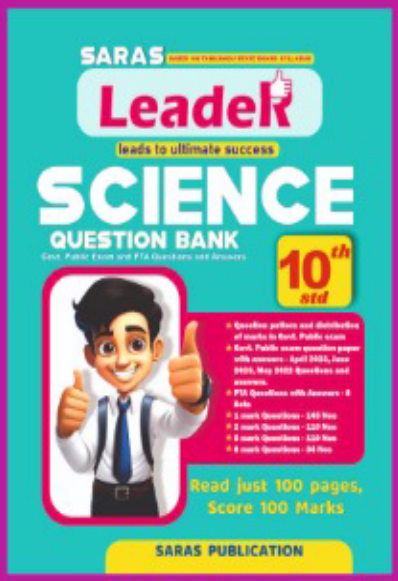
It prevents ***interbreeding*** between related organisms.

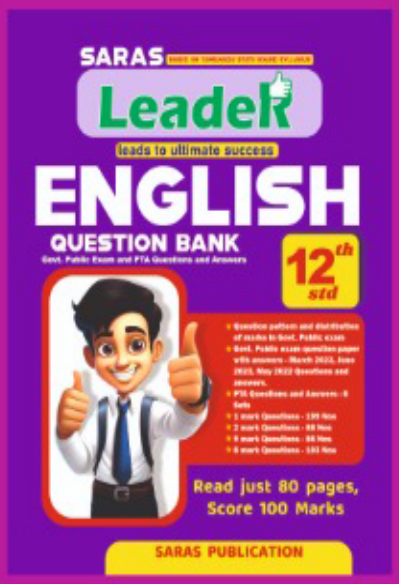
36. Discuss the various types of innate immunity and their functioning mechanisms. **(PTA-6)**

* ***Natural resistance*** to ***infection.***
* An individual possesses it from ***birth.***
* They are effective against a ***wide range*** of ***infectious agents.***
* Innate immunity is of the ***following types:***

1. Anatomical barriers - Skin, Mucus membrane
2. Physiological barriers - Temperature, Low pH, Chemical mediators
3. Phagocytic barriers - Monocytes, Neutrophils, Macrophages
4. Inflammatory barriers - Serotonin, Histamine, Prostaglandins







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