Biology - 2017

General Instructions:

- This question paper consists of four Groups, i.e. A, B, C and D.

Section-A (Botany)

Group-A

(Multiple Choice/Objective Type Questions)

Choose the correct answer:

Q.1. Cross-pollination in maize plant takes place by means of

(a) Entomophily (b) Zoophily
(c) Melacophily (d) Anemophily

Ans. (d) Anemophily

Q.2. Flow of energy in ecosystem is

(a) unidirectional (b) bidirectional
(c) multiple directional (d) without direction.

Ans. (a) unidirectional

Q.3. The science which deals with the study of fruits is known as

(a) Pomology (b) Carpelology
(c) Horticulture (d) None of these.

Ans. (a) Pomology

Q.4. Who had coined the term 'Mutation'?

(a) Morgan (b) Hugo de Vries
(c) Alexander Flemming (d) Dixon and Jolly.

Ans. (b) Hugo de Vries

Q.5. The phenomenon in which a single gene controls two or more characters is known as

(a) Pleotropism (b) Atavism
(c) Pseudollelism (d) Polymorphism.

Ans. (d) Polymorphism.

Q.6. DNA molecule constructed by joining outside the cell, natural or synthetic segments of DNA molecule is capable of replication in living cell is

(a) Reciprocal DNA (b) Recombinant DNA
(c) Regenerated DNA (d) Y-DNA.

Ans. (b) Recombinant DNA

Q.7. Threatened plants and animals are conserved at special places other then their habitat which is known as

(a) In-situ conservation (b) Ex-situ conservation
(c) Cryopreservation (d) None of these.

Ans. (b) Ex-situ conservation

Q.8. In the ecosystem herbivores are

(a) Primary consumer (b) Secondary consumer
(c) Tertiary consumer (d) Autotrophs

Ans. (a) Primary consumer

Q.9. Which is greenhouse gas?

(a) H_2 (b) CH_4
(c) O_2 (d) NH_3

Ans. (b) CH_4

Q.10. In genetic engineering, the commonly used vector is

(a) Plastic DNA (b) Plasmid DNA
(c) Cosmid DNA (d) Chromatid DNA.

Ans. (b) Plasmid DNA

Group-B

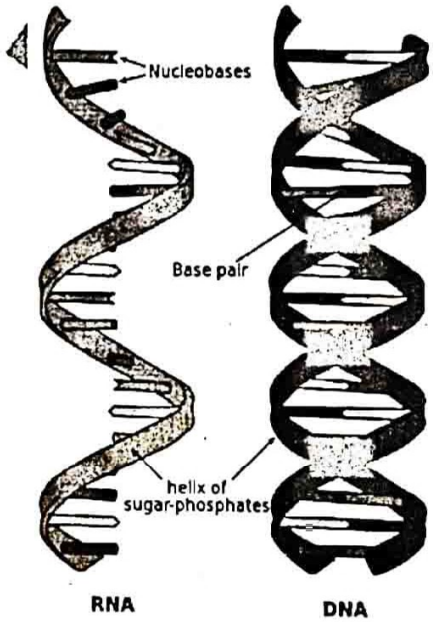
(Very Short Answer Type Questions)

Q.11. Describe the different types of nucleic acids and write the differences between them.

Ans. Types of nucleic acids are:

(i) DNA (ii) RNA

(i) DNA (Deoxyribonucleic acid) : It is the genetic meterial that codes for particular traits. All organism contain either DNA or RNA.



(ii) RNA (Ribonucleic acid) : It is another form of genatic material that is used within living organism. Both RNA and DNA are form nucliec acids.

	DNA	RNA
1.	It usually occurs inside nucleus and some cell organelles. (Mitrochondria and Chloroplast in plant)	Very little RNA occurs inside the nucleus. Most of it is found in the Cytoplasm.
2.	It is double stranded with exception of some viruses (e.g. $\phi \times 174$)	It is single stranded with exception of some viruses (Reovirus)
3.	DNA contains over a million nucleotides.	Depending on the type, RNA contains 70,12,000 nucleotides.
4.	The sugar portion of DNA 2-deoxyribose	The sugar portion of RNA is ribose.
5.	It replicates to form new DNA molecuels.	It cannot normally replicate itself.

Q.12. ..... bacteria converts the ammonia into nitrite and ..... bacteria converts the nitrite into nitrate. (Nitrosomonas/Nitrobacter)

Ans. Nitrosomonas, Nitrobacter.

Q.13. Define extinct and endangered species.

Ans. **Extinct Species :** It is a species of organism that can no longer be found in the wild or in captivity. Ex : Dodo

End angered : A plant or animal species existing in such small numbers that it is in danger of become extinct, especially such a species placed in jeopardy as a result of human activity.

Ex : Giant Panda.

Group-C
(Short Answer Type Questions)

Q.14. (a) The relationship where one organism is benefitted while the other is neither benefitted nor harmed is referred as ..... .

(b) Association of two species in which both are benefitted is called as ..... .

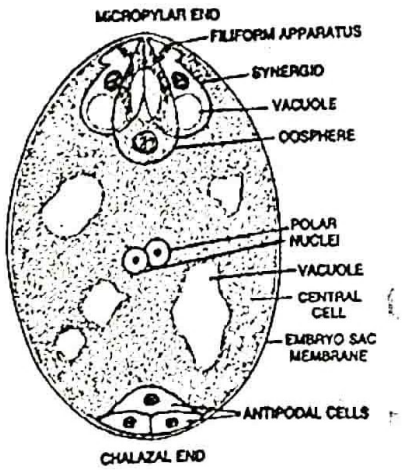
(c) Aggregation of individuals of specimen is called ..... .

Ans. (a) Commensalism (b) Mutualism

(c) Species

Q.15. Write the name of component cells of an embryo sac.

Ans.



Q.16. Give a brief account of any three types of any three of Bio-diversity.

Ans. Types of biodiversity:

1. Genetic Diversity : Genetic diversity is the variety present at the level of genes. Genes, made of DNA, are the building blocks that determine how an organism will develop and what its traits and abilities will be. This level of diversity can differes by alleles, by entire genes, or by units larger than genes such as Chromosomal structure.

2. Species Diversity : Biodiversity studies typically focus on species. They do not because species diversity is more important than the other two types, but because species diversity is easier to work with. Species are relatively easy to identify by eye in the field, whereas genatic diversity requires laboratories, time and resources to identify and ecosystem diversity needs many complex measurements to be taken over a long period of time.

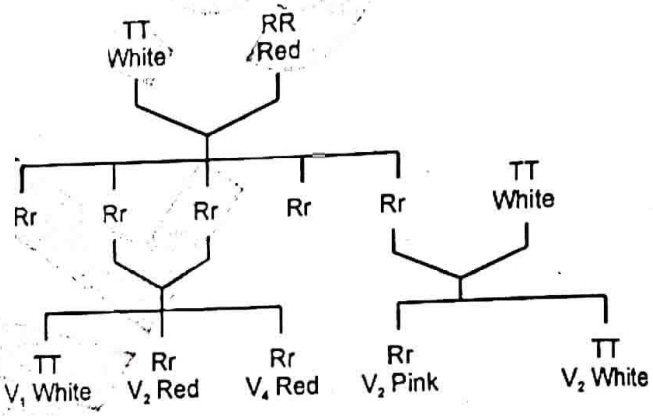
3. Ecosystem Diversity : Ecosystem - Level theory deals with species distritution and community patterns, the role and function of key species and combines species function and interactions. The term "ecosystem" here represents all levels greater than species, association, communities, ecosystem and the like. Different names are used far this level and it is sometimes divied into several different levels; such as community and ecosystem levels; all these levels are included in this overview.

Group-D
(Long Answer Type Questions)

Q.17. How will you differentiate between complete dominance and incomplete dominance? Explain them with example.

Ans. **Incomplete Dominance :** Carrens discovered incomplete dominance. It is the phenomenon where dominant alleles do not completely express itself. This phenomenon was first studied in flower colour of Mirabilis jalapa or Four O' clock plant. In this plant, red flowers are incompletely dominant over white flowers, the heterozygotes being pink.

Parental (P) generation



- Effect of one of the two alleles is more conspicuous.
- It produces a fine mixture of the expression of two alleles.
- The effect in hybrid is intermediate of the two alleles.
- The expressed pheonmenon is new. It has no allele of its own.
- The incompletely dominant alleles has quantitative effect.

Co-Dominance : When the heterozygote exhibits a mixture of phenotypic characters of both homozygotes.

In shorthorn cattle, alleles for red and white coat colour occur. Crosses between red (r_1r_1) and white (r_2r_2) coat. A close examination of hairs of roan animals reveals that the coat is made up of a mixture of red hairs and white hairs. Here co-dominance occurs, rather than intermediate dominance.

- Effect of both the alleles are qually conspicuous.
- There is no mixing of the effect of the two alleles.
- Both the alleles produce their effect independently. Ex I^A and I^B, Hb^S and Hb^A.
- The expressed phenotype is combination of two phenotypes and their alleles.
- A quantitative effect is absent.

Or

Q. Describe the inheritance pattern of blood groups in human beings.

Ans. Blood groups are inherited from our parents in the same way as other genetic traits (eg. eye colour). ABO and Rhesus are the most well known among the blood group systems.

ABO inheritance patterns : The ABO blood group system is determined by the ABO gene, which is found on chromosome 9. The four ABO blood groups, A, B, AB and O, arise from inheriting one or more of the alternative forms of this gene (or alleles) namely A_1 B or O.

Genetic conbination of ABO Blood groups

Blood groups	A
Possible genes	AA or AO
Blood group	B
Possible gene	BB or BO
Blood group	AB
Possible genes	AB
Blood group	O
Possible	O

The A and B alleles are dominant so both A and B antigenes will be expressed on the red cells whenever either allele is present. O alleles do not produce either A or B antigens, thus are sometimes called 'silent' alleles.

ABO inheritance Patterns.

Parental blood groups	O and O
Child's blood groups	O
Parental blood groups	O and A
Child's blood groups	O and A
Parental blood groups	O and B
Child's blood groups	O or B
Parental blood groups	O and AB
Child's blood gruops	A or B
Parental blood groups	A and A
Child's blood gruop	A or O
Parental blood groups	A and B
Child's blood gruop	O or A or B or AB
Parental blood groups	A and AB
Child's blood gruop	A or B or AB
Parental blood groups	B and B
Child's blood gruop	O or B
Parental blood groups	B and AB
Child's blood gruop	B or A or AB
Parental blood groups	AB and AB
Child's blood gruop	A or B or AB

Rh inheritance patterns : The Rh blood group system is attributable to two genes, RHD and RHCE, which are located on chromosome 1.

Rh positivity or Rh negativity is distinguished by testing for the RhD antigen, the expression of which depends upon whether an RHD gene has been inherited from one or both parents.

The RHD gene is dominant so a person is considered to be RhD positive whenever this gene is present, even through the gene may have only been inherited from one parent. Conversely a person will be RhD negative if no RhD gene is inherited.

Parental Rh type	Positive and Positive
Child's Rh type	Positive or Negative
Parental Rh type	Positive and Negative
Child's Rh type	Positive or Negative
Parental Rh type	Negative and Negative
Child's Rh type	Negative

Q.18. What is genetically modified plant? How are genetically modified plants useful?

Ans. Genetically modified crops (GMCs, GM crops, or biotech crops) are plants used in agriculture, the DNA of which has been modified using geneti engineering techniques. In most cases, the aim is to introduce a new trait to the plant which does not occur naturally in the species. Examples in food crops include resistance to certain pests, disease, or environmental conditions, reduction of spoilage, or resistance to chemical treatments (eg. resistance to a herbicide), or improving the nutrient profile of the crop. Examples in non-food crops include production of pharmaceutical agents, biofuels, and other industrially useful goods, as well as for bioremediation. So far, plants have been genetically modified essentially to achieve resistance to herbicides, or to pathogens (mainly insects, or viruses), but resistance to abiotic stresses (such as cold, heat, drought, or salt) is also being studied genetically modified (GM) plants with improved nutritional qualities have more recently been developed, such as plants containing higher proportions of unsaturated fatty acids (omega-3 and omega-6) in their oil (to present cardiovascular diseases), or containing beta-carotene as in the golden rice (to present Vitamin A deficiency). Possible risks for human health (such as the production of allergenic proteins), or fair the environment (such as the appreance of superweeds as a result from gene flow).

Or

Q. What is an ecological pyramid? Describe the pyramid of number of organisms.

Ans. An ecological pyramid is a graphical model that illustrates the glow of energy through different forms of life in an ecosystem. The bottom level illustrates species which acts as a producers, harnessing energy from abiotic sources. Each subsquent level illustrates a level of consumer, each of which receives energy by consuming the group below it.

Ecological pyramids are shaped as such to represent the decrease in energy in that occurs at each increasing level of an ecosystem.

Pyramid of numbers : The no. of organism in a food chain can be represented graphically in a pyramid. Each bar represents the no. of individuals at each tropic level (feeding level) in a food chain.

Section-B (Zoology)
Group-A

Choose the correct answer:

Q.1. Kaziranga National Park is famour for

(a) Tiger (b) Musk deer
(c) Elephant (d) Rhinoceros.

Ans. (d) Rhinoceros

Q.2. Minamata disease is due to pollution of water by

(a) Oil (b) Fluoride
(c) Mercury (d) Aresnic.

Ans. (c) Mercury

Q.3. Crossing over takes place during which of the following stages?

(a) Diplotene (b) Pachytene
(c) Leptotene (d) Diakinesis.

Ans. (a) Diplotene

Q.4. Which pyramid is always upright?

(a) Pyramid of number (b) Pyramid of biomass
(c) Pyramid of energy (d) None of these.

Ans. (c) Pyramid of energy

Q.5. Darwin's theory is based on

(a) natural selection (b) acquired character
(c) mutation (d) none of these.

Ans. (a) natural selection

Q.6. Which of the following micro-organisms manufactures genetically engineered insulin?

(a) Penicillium (b) Rhizopus
(c) E.coli (d) Pseudomonas.

Ans. (c) E.coli

Q.7. Which is a greenhouse gas?

(a) H_2 (hydrogen) (b) O_2 (oxygen)
(c) NH_3 (ammonia) (d) CH_4 (methane).

Ans. (d) CH_4 (methane)

Q.8. A cross between hybrid and recessive parent is called

(a) Back cross (b) Test cross
(c) Monohybrid cross (d) Dihybrid cross

Ans. (b) Test cross

Q.9. Complete linkage is observed in

(a) Drosophila (b) Snake
(c) Bird (d) Man.

Ans. (a) Drosophila

Q.10. Stroma is present in

(a) Testis (b) Ovary
(c) Uterus (d) Epididymis.

Ans. (b) Ovary

Group-B

Answer the following questions:

Q.11. What are transgenic animals?

Ans. Transgenic animals are animals (most commonly mice) that have had a foreign gene deliberately inserted into their genome. Such animals are most commonly created by the micro-injection of DNA into the pronuclei of a fertilised egg which is subsequently implanted into the oviduct of a preudopregnant surrogate mother. This results in the recipient animal giving birth to genetically modified offspring. The progency are them bred with other transgenic offspring to establish a transgenic line.

Q.12. Name two secondary pollutants.

Ans. Secondary pollutant include ozone, which is formed when hydrocarbons (HC) and nitrogen oxides (NOx) combine in the presence of sunlight; NO_2, which is formed as NO combines with oxygen in the air and acid rain, which is formed when sulfur dioxide or nitrogen oxides react with water.

Examples of secondary pollutants:

(a) Ozone (b) Smog
(c) Landfills (d) Chlorofluocarbons
(e) Acid Rain

Q.13. What is immune system?

Ans. The immune system is a network of cells, tissues and organs that work together to defend the body against attacks by "foreign" invaders. These are primarily microbes - Tiny organisms such as bacteria, parasites and fungi that can cause infections.

Group-C

Answer the following questions:

Q.14. What is Bio-gas?

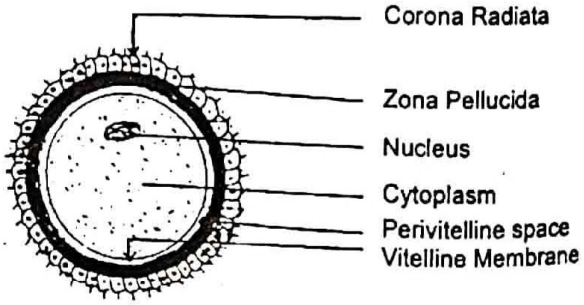
Ans. Biogas is produced through the breakdown of organic matter in the absence of oxygen, which is referred to as anaerobic digestion. The whole process works like a big concrete stomach would. Organic materials like manure, food scraps, crop residue, or waste water sludge (known as feedstock) are fed into the digester, where it's heated to 38-40 degress celsius (temperature of a cow's stomach) and stirred for 30-60 days, slowly producing a combination of methane, carbon dioxide and other gases (known as biogas). The biogas can them be used for power generation, heating and cooling needs or piped into the natural gas grid.

Q.15. What is the difference between homologous and analogous organs?

Ans.

	Homologous Organs	Analogous Organs
(i)	They differ morphologiecally	The show superficial resemblance.
(ii)	They have similar internal structure	Their internal structure is quite different.
(iii)	They develop in related organisms.	They developed in unrelated organisms.
(iv)	Stages in the development are similar.	Stages in the development are different.
(v)	They perform different functions.	They have similar functions.
(vi)	They have similar developmental pattern.	They have dissimilar developmental pattern.
(vii)	Homologous organ show adaptive radiation (divergent evolution).	Analogous organs show convergent evolution.

Q.16. Label the diagram given below:



अंडा की बनावट
Structure of an ovum

Group-D

Answer the following questions:

Q.17. Match the following from Column A with Column B:

Column A	Column B
(a) DNA	(i) Consumer
(b) Acid rain	(ii) Testis
(c) Producer	(iii) Nucleotide
(d) Grosshopper	(iv) SO_2
(e) Sertoli cell	(v) Plant

Ans.

Column A	Column B
(a) DNA	(i) Nucleotide
(b) Acid rain	(ii) SO_2
(c) Producer	(iii) Consumer
(d) Grosshopper	(iv) Plant
(e) Sertoli cell	(v) Testis

Or

Q. What do you mean by a recombinant DNA technique? List various steps involved in this technology.

Ans. Recombinant DNA technology : A series of procedures that are used to join together (recombine) DNA segments. A recombinant DNA molecule is constructed from segments of two or more different DNA molecules. Under cerain conditions, a recombinant DNA molecule can enter a cel and replicate there, either on its own or after it has been integrated into a chromosome.

Steps involved in this technology :

Step-1 : Identification and isolation of gene of interest.

Step-2 : Joining of this gene into a suitable vector (construction of recombinant DNA)

Step-3 : Introduction of this vector into a suitable organism.

Step-4 : Selection of transformed recombinant cells with gene of interest.

Step-5 : Multiplication or expression of the gene of interest.

Q.18. What is bio-magnification? Explain it by giving one example.

Ans. Increase in concentration of a pollutant from one link in a food chain to another. Biomagnification is the bioaccumulation of a substance up the food chain by transfer of residues of the substance in smaller organisms that are food for larger organism in the chain. It generally refers to the sequence of processes that results in higher concentrations in organisms at higher levels in the food chain (at higher trophic levels). These processes result in an organism having higher concentration of a substance than is present in the organism's food. Biomagnification can result in higher concentrations of the substance than would be expected if water were the only exposure mechanism. Accumulation of a substance only through contact with water is known as bioconcentration. For example, spraying a marsh to control mosquitoes will cause trace amounts of DDT to accumulate in the cells of microscopic aquatic organisms, the plankton in the marsh. In feeding on the plankton, filter-feeders, like clams and some fish, harvest DDT as well as food.

Or

Q. Describe Mendel's law of segregation by giving suitable example.

Ans. The principles that govren heredity were discovered by a monk named gregor Mendel in the 1860's. One of these principles, now called Mendel's law of segregation, states that allele pairs separate or segregate during gamete formation, and randomly unite at fertilization.

There are four main concepts related to this principle. They are as follows:

- A gene can exist in more than one form or allele.
- Organisms inherit two alleles for each trait.
- When sex cells are produced (by meiosis), allele pairs seprate leaving each cell with a single allele for each trait.
- When the two alleles of a pair are different, one is dominant and the other is recessive.

Examples : The gene for seed colour in pea plants exists in two forms. There is one form or allele for yellow seed color (y) and another for green seed color (y). In this example, the allele for yellow seed color is dominant and the allele for green seed color is recessive.

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