Biology - 2014

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 Question)

Q.1. A flower consisting of both androecium and gynoecium is called
(a) incomplete (b) perfect
(c) complete (d) monochlamydeae.
Ans. (b) perfect

Q.2. The edible part of coconut is
(a) epicarp (b) mesocarp
(c) endocarp (d) endosperm.
Ans. (d) endosperm.

Q.3. Insect pollinated flowers are known as
(a) entomophily (b) ornithophily
(c) anemophily (d) hydrophily.
Ans. (a) entomophily

Q.4. The edible part of apple is
(a) endoscarp (b) mesocarp
(c) endosperm (d) thalamus.
Ans. (d) thalamus.

Q.5. Which one is the female gametophyte?
(a) Embryo (b) Egg
(c) Embryo sac (d) Antipodal cells.
Ans. (c) Embryo sac

Q.6. The mole percentage of adanine in a double stranded DNA is 30. What will be the mole percentage of cytosine in the DNA?
(a) 10 (b) 20 (c) 30 (d) 60.
Ans. (b) 20

Q.7. Which of the following is not an air pollutant?
(a) CO (b) CO_2 (c) CFC (d) Aerosol.
Ans. (c) CFC

Q.8. Drawin's theory is based on
(a) natural selection (b) acquired character
(c) mutation (d) struggle of existence.
Ans. (a) natural selection

Q.9. Which enzyme cuts DNA at specific sites?
(a) DNA polymerase (b) Taq- polymerase
(c) Topoisomerase
(d) Restriction endonuclease.
Ans. (d) Restriction endonuclease

Q.10. Which alga is used in single cell protein (SCP)?
(a) Nostoc (b) Gelidium
(c) Diatom (d) Spirulina.
Ans. (d) Spirulina

Group B (Very Short Answer Type Question)

Q.11. The chromosomal ploidy status of a zygote is (a) ..... and that of endosperm is (b).....
Ans. The choromosomal ploidy status of a zygote is (a) diploid (2n) and that of endosperm is (b) triploid (3n).

Q.12. Which two shows parallelism in evolution?
(a) Root and insect (b) Fruit and insect
(c) Flower and insect (d) Leaf and insect.
Ans. (d) Leaf and insect.

Q.13. The anaerobic breakdown of carbohydrate is called (a) ..... (fermentation / putrefaction) and that of protein is called (b) ..... (fermentation / putrefaction).
Ans. The anaerobic breakdown of carbohydrate is called (a) fermentation and that of protein is called (b) putrefaction.

Group C (Short Answer Type Question)

Q.14. Select the correct match in code of 1, 2, 3 with (a), (b) and (c):

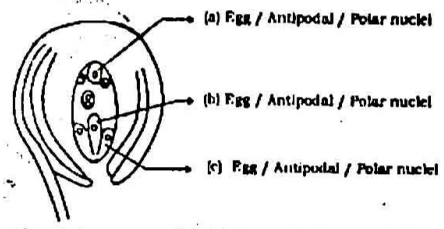
1.	Renewable source of energy	(a) Solar radiation
2.	Ultimate source of energy	(b) Coal and petroleum
3.	Fossil fuel	(c) Wood and charcoal.

Code:	1	2	3
(i)	b	c	a
(ii)	c	a	b
(iii)	a	b	c

Ans. (ii) c a b

Q.15. Which of the varieties of wheat was used as the source for breeding of 'Sarbati Sonora' variety of wheat? Who developed this variety?
Ans. Sonora 64 wheat was used as the source for breeding of 'Sarbati Sonora' variety of wheat. Prof. M.S. Swaminathan developed this variety.

Q.16. Choose and label the diagram with appropriate term from he option given:



Ans. (a) Antipodal (b) Egg (c) Antipodal (Synergids)

Group D (Long Answer Type Question)

Q.17. Match column A with column B in the code given:
Column A
1. Somatic hybridization 2. Litchi
3. Statin 4. Sporopollenin
5. Coconut

Column B
(i) Aril
(ii) Blood cholesterol lowering agent
(iii) Pomato (iv) Endosdperm
(v) Pollen grain.

Code:

	1	2	3	4	5
(a)	(i)	(ii)	(iii)	(iv)	(v)
(b)	(iii)	(i)	(iv)	(ii)	(v)
(c)	(iii)	(i)	(ii)	(iv)	(v)
(d)	(iii)	(i)	(ii)	(v)	(iv)
(e)	(ii)	(i)	(iii)	(iv)	(v)

Ans. (d) (iii) (i) (ii) (v) (iv)

OR, Match column A with B from the code given:
Column A
1. Primase
2. Ligase
3. RNA polymerase
4. Okazaki fragments
5. Helicase

Column B

(i) Separation of DNA strands
(ii) RNA primer
(iii) Transcription of RNA
(iv) Join broken pieces of DNA
(v) Broken pieces of DNA strands.

Code:

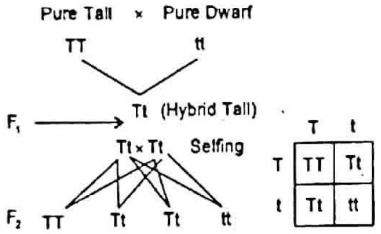
	1	2	3	4	5
(a)	(i)	(ii)	(iii)	(iv)	(v)
(b)	(ii)	(iv)	(iii)	(v)	(i)
(c)	(ii)	(iv)	(v)	(iii)	(i)
(d)	(ii)	(iv)	(iii)	(i)	(v)
(e)	(ii)	(iv)	(v)	(i)	(iii)

Ans. (b) (ii) (iv) (iii) (v) (i)

Q.18. Explain Mendel's monohybrid cross. Mention the phenotype and genotype ratios obtained.

Ans. Mendel's monohybrid cross-

Mendel first studied the inheritance of a single character at a time. A cross between two parents in which inheritance of only one pair of contrasting characters is studied is called monohybrid cross. In one such experiment Mendel considered size of the stem. The experiment is outlined below.



F_1 generation: He cross pollinated a pure tall pea plant and a pure dwarf pea plant. All these plants were found to be tall. They constituted the F_1 generation.

F_2 Generation: The F_1 plants were pollinated among themselves (called selting). The result was - plants constituted the F_2 generation. The F_2 plants were found to contain both tall and dwarf individuals. They were in the ratio of three tall to one dwarf.

Mendel observed that the tall and dwarf plants behaved differently. The dwarf plants bred tree is they produced dwarf. Plants on self pollination. Of the tall plants only one third plants bred true and were, thus, pure for tallness. The other two third plants behaved like the plants of F_1 generation giving rise to tall & dwarf plants in the ratio of 3:1. This indicate that they had the trait for dwarfness also, is they were hybrids.

The phenotype ratio- the vissible expression of the hereditary constitution possessed by an organism.

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The phenotype ratio in Monohybrid cross- 3 : 1. where 3-Tall plant, 1-dwarf plant. The Genotype ratio- Genetic expression of an organism.

The Genotype ratio in Monohybrid cross- 1 : 2 : 1.

where: 1- Pure tall
2- hybrid tall
1- Pure dwarf.

Or, Differentiate between self and cross pollination. Mention two contrivances of each.

Ans. Differentiate between self and cross pollination.

Sl.	Self Pollination	Cross Pollination
1.	Self pollination is the transfer of pollen grains from the anther of a flower to the stigma of either the same or genetically similar flower.	Cross pollination is the transfer of pollen grains from the anther of a flower to the stigma of genetically different flower.
2.	Self pollination can occur in cleistogamous flowers.	Cross pollination can occur in chasmogamous flowers.
3.	External pollinating agency is not required. (Except in case of geitonogamy)	External pollinating agency (such as wind, water birds, insects, animals etc.) is required.
4.	Self pollinating plants do not produce variability among offsprings.	Cross pollinating plants produce offsprings having variations among themselves.

The two contrivances of self pollination-
(a) Homogamy (b) Cleistogamy
The two contrivances of cross pollination-
(a) Unisexuality (b) Self Sterility

Section - B (Zoology)

Group-A

Choose the correct answer:

Q.1. Theory of Inheritance of Acquired Characters was proposed by
(a) Darwin (b) Lamarck
(c) Mendel (d) Wallace.
Ans. (b) Lamarck

Q.2. Study of cancer is known as
(a) Parasitology (b) Ascariasis
(c) Oncology (d) Amoebiasis.
Ans. (c) Oncology

Q.3. Total number of chromosomes in fertilized eggs of human beings is
(a) 46 (b) 8 (c) 23 (d) 16.
Ans. (a) 46

Q.4. Which of the following natural resources is non-renewable?
(a) Wildlife (b) Water
(c) Coal (d) Forest.
Ans. (c) Coal

Q.5. Crossing-over occurs between
(a) centrioles (b) centromeres
(c) non-sister chromatids (d) sister chromatids.
Ans. (c) non-sister chromatids

Q.6. Sertoli cells are present in
(a) testes (b) kidney (c) ovary (d) liver.
Ans. (a) testes

Q.7. World Environment Day is observed on
(a) 21st March (b) 7th April
(c) 5th June (d) 11th July.
Ans. (c) 5th June

Q.8. Elephantiasis is caused by
(a) Ascaris lumbricoides (b) Entamoeba histolytica
(c) Wuchereria bancrofti (d) Plasmodium vivax.
Ans. (c) Wuchereria bancrofti

Q.9. Translation is the formation of
(a) mRNA (b) hormones
(c) proteins (d) tRNA.
Ans. (c) proteins

Q.10. Homologous organs are similar in
(a) function (b) origin
(c) size (d) length.
Ans. (b) origin

Group-B

Answer the following questions:

Q.11. Write the technical term used for male and female gametogenesis.

Ans. The technical term used for-
male gametogenesis - Spermatogenesis
female gametogenesis - oogenesis.

Q.12. Give two examples of connecting link and write the names of groups between which they are connecting link.

Ans. Two examples of connecting link and the names of groups between which they are connecting link are
(i) Tachyglossus-reptiles and mammals.
(ii) Archaeopteryx - Aves and reptiles.

Q.13. How many types of blood groups are found in human beings? Which blood group is called universal donor?

Ans. There are 4 types of blood groups. They are A, B, AB and O. Blood group O is universal donor.

Group-C

Answer the following questions:

Q.14. What is male heterogamety? Give two examples of male heterogamety.

Ans. Male heterogamety- Those organisms which contain heteromorphic sex chromosomes (XY) produce two types of gametes named with X and with Y, and which contain two types of gametes, (X & Y) are male heterogamety.

eg., human male and male fruitfly.

Q.15. Match column A with column B:

Column A	Column B
1. Testes	(i) 1972 (amended on 1991)
2. Progesterone	(ii) 1988
3. Wildlife Protection Act	(iii) Spermatid
4. National Forest Policy	(iv) Ovary
5. Darwin	(v) Ecosystem.
6. Food web	(vi) Evolution.

Ans.

Column A	Column B
1. Testes	(iii) Spermatid
2. Progesterone	(iv) Ovary
3. Wildlife Protection Act	(i) 1972 (amended an 1991)
4. National Forest policy	(ii) 1988
5. Darwin	(vi) Evolution
6. Food web.	(v) Ecosystem.

Q.16. Fill in the blanks with suitable words provided in the brackets to complete the ecological process:
In ecosystem important steps involved in the process of decomposition are ..... , leaching, ... , humification and ..... .
(catabolism, mineralisation, fragmentation)

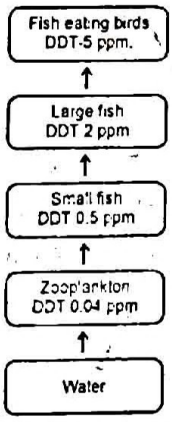
Ans. In ecosystem important steps involved in the process of decomposition are fragmentation, leaching, catabolism, humification and mineralisation.

Group-D

Answer the following questions:

Q.17. What is biomagnification? Explain biomagnification with suitable examples and illustrations.

Ans. Biomagnification - It is also called Bio amplification. It is the process in which concentration of toxic substances go on increasing successively in higher trophic levels of food chain so that the top carnivore-accumulates highest concentration of toxic substance. The most suitable example of biomagnification is DDT.
River water may have a very low concentration of DDT, but the carnivorous fish in that river may contain high concentration of DDT and be unfit for eating by man or birds. DDT is insoluble in water but soluble in fats. Therefore it is not excreted with urine but is stored with fat in the body. Due to low efficient transfer of energy from one trophic level to other cherbivore eats more DDT polluted vegetables. Similarly carnivore eats many herbivores. A predator store much quantity of DDT with his pray continuously. DDT interferes the egg-shell formation in many birds. The shells remain their and breaks by bird's weight during incubation.
when man eats DDT contaminated food, it may cause minamate disease.



Biomagnification of DDT is an aquatic food chain.

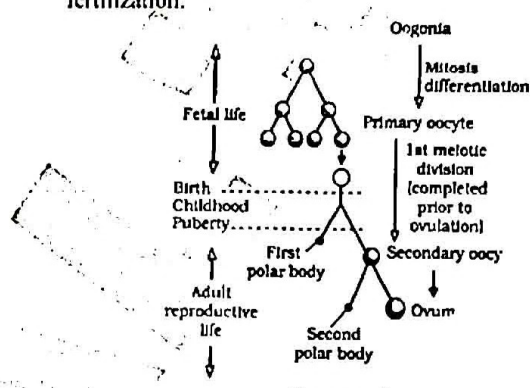
Or, Describe the process of oogenesis with suitable diagram.

Ans. The process of formation of a mature female gamete (ovum) is called oogenesis. Oogenesis takes place in the ovaries.
Oogenesis consists of three phases-
(i) Multiplication phase (ii) Growth phase
(iii) Maturation phase.

(i) **Multiplication phase-** During development of foetus, certain cells in germinal epithelium of the ovary are larger than others and also have larger nuclei. These cells divide mitotically, producing undifferentiated a couple of million egg. mother cells called oogonia in the ovary. The oogonia are diploid (2n, 46 chromosomes) in humans. The oogonia divides mitotically and project into the stroma later becomes egg. nest.
One cell in the egg nest grows and becomes the primary oocyte. The primary oocyte remains at prophase of neiosis. I untill just before ovulation in an adult female. This is the first resting period.

(ii) **Growth phase-** This phase of the pr. oocyte is very long. It may extend over many years. The oogonia grows into a large pr. oocyte by taking food from the surrounding follocle cells. Its cytoplasm increases and nucleus enlarges after puberty.

(iii) **Maturation phase-** Like a primary spermatocyte, each primry oocyte also divide meiotically or by maturation division & is small while the other is almost as large as the primary oocyte itself. Large cell is called secondary oocyte. It receives almost entire cytoplasm of the primary oocyte. In human beings, ova is released from the ovary in the secondary oocyte stage. The maturation of secondary oocyte is completed in the mother's oviduct usually after the sperm has entered the see. oocyte for fertilization.



Oogenesis

Q.18. (a) Mention three observations on which Darwin based his theory of Natural Selection.
(b) Describe natural selection in Darwin finches.
OR
What is genetic engineering? List various steps involved in genetic engineering technology.

Ans. (a) Three observations on which Darwin based his theory of Natural selection-
(i) Rapid multiplication.
(ii) Limited environmental resources such as food and space.
(iii) Struggle for existence.

(b) **Darwin finches-** Darwin studied the environmental conditions and fauna and flora of Galapago Islands of the west coast of South America. He found very variable environmental conditions in different islands which he declared as a "living laboratory of evolution." He observed in diff. islands about 20-22 related varieties of birds of the family Geopiziden differing from each other mainly in shape and size of the beak, and in plumbage colour. These birds are now called Darwin's finches. A related bird species was then observed by hun in the South American mainland also. He therefore concluded that the mainland bird was the original species. Its members migrated to diff. Galapago Island Darwin himself classified these finches into 13 new species under five genera including the original genus Geospiza.

OR

Genetic Engineering- It is the manipulation of human genes. It refers to artificial synthesis, isolation, modification, combination, addition and repair of the genetic material (DNA) to alter the phenotypic characters of the organism according.
Steps involved in genetic engineering-
(i) Isolation of Genetic material (DNA)
(ii) Culting of DNA at specific location.
(iii) Amplification of Gene of Interest using PCR.
(iv) Insertion of Recombinant DNA into the Host cell.
(v) Obtaining the Foreign Gene Product.
(vi) Down stream Processing.