

# Success Files



CBSE Board Exam with 8 Sample Papers

## Chapter-wise

Past 6 yrs.  
questions

Practice  
Exercises

Value, Exemplar,  
HOTS questions



3rd Edition

**12**  
Class

# BIOLOGY

Quick Revision Material for Practical Exams

**12  
Class**



Success Files

# BIOLOGY

CBSE Board Exam with 8 SAMPLE PAPERS

## CHAPTER-WISE

Past years questions

Practice Exercise

Value, Exemplar, HOTS questions

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**Quick Revision Material for Practical Exams**

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# **ontents**

- |                        |             |
|------------------------|-------------|
| • All India Board-2015 | AI-1 – AI-8 |
| • Delhi Board-2015     | DB-1 – DB-8 |

1. Reproduction in Organisms	1-10
2. Sexual Reproduction in Flowering Plants	11-32
3. Human Reproduction	33-52
4. Reproductive Health	53-64
5. Heredity and Variation	65-86
6. Molecular Basis of Inheritance	87-106
7. Evolution	107-122
8. Health and Disease	123-140
9. Strategies for Enhancement in Food Production	141-154
10. Microbes in Human Welfare	155-166
11. Biotechnology: Principles and Processes	167-184
12. Biotechnology and its Applications	185-196
13. Organisms and Environment	197-212
14. Ecosystem	213-226
15. Biodiversity and Its Conservation	227-238
16. Environmental Issue	239-250

# SAMPLE PAPERS

**SAMPLE PAPER - 1**

**SP-1 – SP-2**

**SAMPLE PAPER - 2**

**SP-3 – SP-4**

**SAMPLE PAPER - 3**

**SP-5 – SP-6**

**SAMPLE PAPER - 4**

**SP-7 – SP-8**

**SAMPLE PAPER - 5**

**SP-9 – SP-10**

**SAMPLE PAPER - 6**

**SP-11 – SP-12**

**SAMPLE PAPER - 7**

**SP-13 – SP-14**

**SAMPLE PAPER - 8**

**SP-15 – SP-17**

**SOLUTION**

**SP-18 – SP-56**

**Quick Revision Material for Practical  
with Explanation to NCERT Questions**

**B-1 – B-15**

# All India Board – 2015

## GENERAL INSTRUCTIONS

- (i) All questions are compulsory.
- (ii) Please check that this Question Paper contains 26 questions.
- (iii) Marks for each question are indicated against it.
- (iv) Question 1 to 6 in **Section-A** are Very Short Answer Type Questions carrying 1 mark each.
- (v) Question 7 to 19 in **Section-B** are Long Answer I Type Questions carrying 4 marks each.
- (vi) Question 20 to 26 in **Section-C** are Long Answer II Type Questions carrying 6 marks each.
- (vii) Please write down the serial number of the Question before attempting it.

### Section - A

1. How many chromosomes do drones of honeybee possess ? Name the type of cell division involved in the production of sperms by them.
2. What is a cistron ?
3. Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible ?
4. Why do children cured by enzyme-replacement therapy for adenosine deaminase deficiency need periodic treatment ?
5. List two advantages of the use of unleaded petrol in automobiles as fuel.
6. Why do moss plants produce very large number of male gametes ? Provide one reason. What are these gametes called ?

### Section - B

7. Select the homologous structures from the combinations given below :
  - (i) Forelimbs of whales and bats
  - (ii) Tuber of potato and sweet potato
  - (iii) Eyes of octopus and mammals
  - (iv) Thorns of *Bougainvillea* and tendrils of *Cucurbita*
8. (a) State the kind of evolution they represent.  
(b) Why are the plants raised through micropropagation termed as somaclones ?  
(c) Mention two advantages of this technique.
9. Explain the different steps involved during primary treatment phase of sewage.
10. What is mutualism ? Mention any two examples where the organisms involved are commercially exploited in agriculture.

### OR

List any four techniques where the principle of *ex-situ* conservation of biodiversity has been employed.

11. State what is apomixis. Comment on its significance. How can it be commercially used ?
12. During a monohybrid cross involving a tall pea plant with a dwarf pea plant, the offspring populations were tall and dwarf in equal ratio. Work out a cross to show how it is possible.
13. Explain the significance of satellite DNA in DNA fingerprinting technique.

14. What does the following equation represent ? Explain

$$p^2 + 2pq + q^2 = 1$$

15. A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.
  - (a) Write what did the doctor inject into the patient's body.
  - (b) How do you think this injection would protect the patient against the disease ?
  - (c) Name the disease against which this injection was given and the kind of immunity it provides.
16. Enumerate any six essentials of good, effective Dairy Farm Management Practices.
17. State the medicinal value and the bioactive molecules produced by *Streptococcus*, *Monascus* and *Trichoderma*.

### OR

What are methanogens ? How do they help to generate biogas ?

18. Rearrange the following in the current sequences to accomplish an important biotechnological reaction :
  - (a) *In vitro* synthesis of region of DNA of interest
  - (b) Chemically synthesised oligonucleotides
  - (c) Enzyme DNA-polymerase
  - (d) Complementary region of DNA
  - (e) Genomic DNA template
  - (f) Nucleotides provided
  - (g) Primers
  - (h) Thermostable DNA-polymerase (from *Thermus aquaticus*)
  - (i) Denaturation of ds-DNA
19. Describe any three potential applications of genetically modified plants.

### Section - C

20. How did an American Company, Eli Lilly use the knowledge of r-DNA technology to produce human insulin ?
21. How do snails, seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavourable for their survival ?
22. With the help of a flow chart, show the phenomenon of biomagnification of DDT in an aquatic food chain.

23. Your school has been selected by the Department of Education to organize and host an interschool seminar on "Reproductive Health-Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing."

Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

24. (a) Plan an experiment and prepare a flow chart of the steps that you would follow to ensure that the seeds are formed only from the desired sets of pollen grains. Name the type of experiment that you carried out.  
(b) Write the importance of such experiments.

**OR**

Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

25. (a) Why are thalassemia and haemophilia categorized as Mendelian disorders? Write the symptoms of these

diseases. Explain their pattern of inheritance in humans.

- (b) Write the genotypes of the normal parents producing a haemophilic son.

**OR**

How do m-RNA, t-RNA and ribosomes help in the process of translation?

26. (a) List the different attributes that a population has and not an individual organism.  
(b) What is population density? Explain any three different ways the population density can be measured, with the help of an example each.

**OR**

"It is often said that the pyramid of energy is always upright. On the other hand, the pyramid of biomass can be both upright and inverted." Explain with the help of examples and sketches.

# SOLUTIONS

1. Drones are male honey bees. They are haploid and possess 16 chromosomes.  
Drones of honey bees donate 16 chromosomes (one pair) to the progeny, thus, mitosis is the cell division that is involved in the production of sperms by drones.
2. Cistron is that segment of DNA which specifies synthesis of a polypeptide.
3. After attacking the host cell, retrovirus enters into macrophages (as in case of HIV) where RNA genome of the virus replicates to form viral DNA with the help of enzyme reverse transcriptase. This viral DNA gets incorporated into the host cell's DNA and directs the infected cells to produce more viruses. The macrophages continue to produce virus and works as a HIV factory. Hence, the infected host cell possesses viral DNA.
4. The introduction of genetically engineered lymphocytes into an ADA deficiency patient is not a permanent cure because, the genetically engineered lymphocytes die after some days. Hence, the patient requires periodic infusion of genetically engineered lymphocytes, so the cure is not permanent.
5. Following are the two advantages of using unleaded petrol as fuel in automobiles :  
The use of unleaded petrol in vehicles fitted with catalytic converters help in reducing emission of poisonous gases. As unleaded petrol does not emit harmful compounds, it helps in preventing health diseases like bronchitis, asthma and lung diseases.
6. Mosses are bryophytes and they need water for fertilisation. They lay their flagellated male gametes that swim across the water to reach the female gamete. During this process, many of the male gametes are destroyed or lost. Thus, moss plants produce very large number of male gametes so that even if some of the gametes get destroyed, the remaining can fertilise the female gamete.  
These male gametes are called antherozoids.
7. (a) Homologous organs are the organs having similar structural plan and origin but performing different functions.  
From the given options, following are homologous structures :  
Forelimbs of whales and bats are similar in structure but perform different functions of swimming and flying, respectively.  
Thorns of *Bougainvillea* and tendrils of *Cucurbita* are both modifications of a stem arising from axillary bud but perform different functions of protection and climbing, respectively.
- (b) The evolution represented by homologous organs or structures is divergent evolution as they have common origin but have diverged (became dissimilar) with evolution due to adaptations to different needs.
8. (a) The plants obtained by micropropagation are called somaclones because they are genetically identical plants developed from any part of a plant by tissue culture.
- (b) The advantages of micropropagation are as follows:
  - (i) It helps in the propagation of a large number of plants in a short span of time.
  - (ii) Healthy plant can be recovered from diseased plant by meristem culture because meristem are free of viruses in diseased plant.
9. (a) It is a physical process of removal of small and large particles through filtration and sedimentation.
- (b) The first step is to remove the floating objects (like polythene bags) by letting the sewage to pass through wire mesh screens of sequential smaller pore sizes.
- (c) Sewage is then passed into the grit chamber, where grit is sedimented.
- (d) Sewage is then allowed to pass into the settling tank, where the suspended materials settle down to form primary sludge.
- (e) Effluent is then taken for the secondary treatment.
10. Mutualism is an interaction between two organisms of different species where both the partners are benefitted but cannot live separately.  
Examples of the organisms involved that are commercially exploited in agriculture are as follows:
  - (i) **Commercial exploitation of *Rhizobium* in agriculture:**  
Continuous growth of crops leads to the nutrient deficiency in soil. Farmers, then grow leguminous crops containing *Rhizobium* in its roots to replenish the lost nutrients (especially nitrogen) in the soil.
  - (ii) **Commercial exploitation of Mycorrhiza in agriculture:**  
Mycorrhiza is an association of the soil fungus with the roots of higher plants. Farmers use Mycorrhiza commercially in agriculture as it improves the soil quality and reduces soil erosion by improving plant rooting capacity. The fungal hyphae spread into the root tissues and help the plants to optimally use the soil's water and minerals.  
Thus, to increase the yield of plants and to replenish the soil nutrients. Mycorrhiza is commercially exploited in agriculture.

**OR**

Four techniques where the principle of *ex-situ* conservation of biodiversity has been employed are as follows:

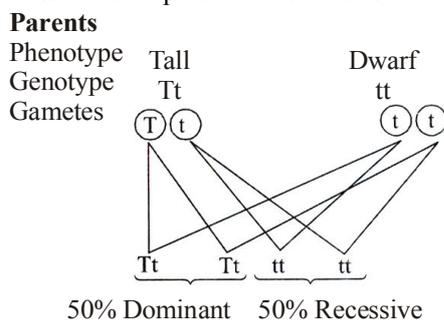
- Botanical gardens, zoological parks and arboreta are the conventional methods of *ex-situ* conservation.
- Cryopreservation is a method of conservation by storage of materials at ultra low temperatures for a very long period; gametes of threatened species can be preserved in viable and fertile condition for long periods using this technique.
- Plants are propagated using tissue culture methods (micropropagation).
- Seeds of many different genetic strains of commercially important plants are kept viable for long periods in seed banks.

11. **Apomixis:** It is a form of asexual reproduction that mimics sexual reproduction, and seeds are produced without fertilisation. It is called apomixis or agamospermy, e.g., Grasses.

**Significance :** Diploid egg cell is formed without reduction division and develops into embryo without fertilisation eg. *Asteraceae* and Grasses.

**Commercial applications of apomixis :**

- By apomixis, hybrid varieties of seeds can be produced, which will provide higher and better yield.
  - Apomixis prevents the loss of specific characteristics in the hybrid plants.
  - Apomixis is a cost-effective method of producing seeds.
12. The asked scenario is possible only when the tall pea plant is heterozygous and dwarf (small) pea plant is homozygous. This cross can be represented as follows :



The ratio will be 50% dominant and 50% recessive in case of hybrid or heterozygous individual.

13. Short nucleotide repeats in the DNA are very specific in each individual and vary in number from person to person but are inherited. These are called the '**Variable Number Tandem Repeats**' (VNTRs). These are also called "minisatellites".

**Role of VNTR in DNA fingerprinting :** DNA fingerprinting technique for identifying individuals generally using repeated sequences in the human genome that produces a pattern of bands that is unique for every individuals. Each individual inherits these repeats from his/her parents which are used as genetic markers in a personal identity test. For example, a child might inherit a chromosome with six tandem repeats from the mother and the same tandem repeated four times in the homologous chromosome inherited from the father. The half of VNTR alleles of the child resemble that of the mother and half that of the father.

14. Hardy weinberg's principle states that allele frequencies are stable and is constant from generation to generation. The gene pool remains a constant called **genetic equilibrium**. Sum total of all the allele frequencies is one. Suppose there are two alleles 'A' and 'a' in a population. Their frequencies are  $p$  and  $q$ , respectively. The frequency of AA individual in a population is  $P^2$ . It can be explained that the probability that an allele A with a frequency of  $p$  appear on both the chromosomes of a diploid individual is simply the product of the probabilities, i.e.,  $p^2$ . In the same way, the frequency aa is  $q^2$  and for Aa is  $pq$ .

$$p^2 + 2pq + q^2 = k$$

where,  $p^2$  represents frequency of homozygous dominant genotype,

$2pq$  represents the frequency of the heterozygous genotype and represents the frequency of homozygous recessive.

15. (a) In the patient's body, the doctor has injected antiserum containing preformed antibodies against the causative organism or toxin produced by it.
- (b) The solution injected by the doctor had antibodies; hence, the injection would protect the patient against the disease and provide him humoral immunity.
- (c) The disease against which this injection was given is tetanus caused by *Clostridium tetani*, which usually exists in environment as spores and may again access to the body through wound.
- The kind of immunity that the injection containing antiserum provides is passive immunity as preformed antibodies are used because fast action is required in this emergency case.

16. Six important ways of good and effective dairy farm management practices are as follows:

- Identification of improved cattle breeds is an important condition of cattle management. Hybrid cattle breeds are essential for the improved productivity. Therefore, it is necessary that hybrid cattle breeds should have a mixture of various desirable genes such as high milk yield and resistance to disease.
- Cattle should be fed in scientific manner with healthy and nutritious food consisting of roughage, fibre concentrates and high levels of proteins and other nutrients.
- They should be housed well and kept in ventilated roofs to prevent them from heat, cold and rain.
- Animals should be kept in disease-free conditions. Regular bath and brushing should be ensured to control disease. Visit of a veterinary doctor is necessary on regular basis.
- The procedure of milking should be hygienic; emphasis should be given to storage and transportation of milk, so that the quality of milk is not affected.
- Regular inspection of dairy farms should be done by appointed officials to ensure that all the instructions are being strictly followed.

17. *Streptococcus* : The genetically modified *Streptococcus* produce the enzyme streptokinase which is used as clot-buster for removing clots from blood vessels of patients who have undergone myocardial infarction leading to heart attack.

*Monascus* : it produces statins that help in lowering blood cholesterol levels.

*Trichoderma* : It produces cyclosporin A that is used as an immunosuppressive agent in organ transplantation.

**OR**

Methanogens are anaerobic bacteria growing on cellulosic material and produce large amount of methane along with  $\text{CO}_2$  and  $\text{H}_2$  gas.

These bacteria are commonly found in the anaerobic sludge during sewage treatment. Examples are: *Methanobacterium*, *Methanococcus*.

Methanogens are the bacteria found in cattle dung (gobar) and in anaerobic sludge during sewage treatment. They grow anaerobically on cellulosic material and produce a large amount of methane (main constituent of biogas) along with  $\text{CO}_2$  and  $\text{H}_2$ . Thus, methanogens are used in biogas production.

18. The given steps refer to the steps involved in the polymerase chain reaction:

- (b) Chemically synthesised oligonucleotides
- (f) Nucleotides provided
- (h) Thermostable DNA-polymerase (from *Thermus aquaticus*)
- (i) Denaturation of ds-DNA
- (g) Primers
- (e) Genomic DNA template
- (c) Enzyme DNA-polymerase
- (d) Complementary region of DNA
- (a) *In vitro* synthesis of region of DNA of interest

19. Three potential applications of genetically modified (GM) plants are as follows:

- (i) **Pest resistance:** Crop losses from insects pests can be incredible, resulting in financial loss for farmers and starvation in developing countries. Growing GM foods such as BT corn, Bt cotton etc. can help eliminate the application of chemical pesticides & reduce the cost of bringing a crop to market.
- (ii) **Disease resistance:** There are many viruses, fungi & bacteria which cause plant diseases. Plant biologists are working to create plants with genetically engineered resistance to these diseases.
- (iii) **Cold tolerance:** Unexpected frost can destroy sensitive seedlings. An antifreeze gene from cold water fish has been introduced into plants such as tobacco and potato.

20. Insulin hormone is released as a pro-hormone, which consists of three peptide chains; A, B and C. This pro-hormone insulin is converted to mature insulin by removal of C peptide.

The American company, Eli Lilly, used the knowledge of r-DNA technology as follows:

- (i) DNA sequences corresponding to the two polypeptide, A and B of insulin are synthesised *in vitro*.
- (ii) They are introduced into plasmid DNA of *E. coli*.
- (iii) This bacterium is cloned under suitable conditions.
- (iv) The transgene is expressed in the form of polypeptides-A and B, secreted into the medium.
- (v) They are extracted and combined by creating disulphide bridge to form human insulin.

21. Snails adapt to unfavourable conditions by producing epiphragm during hibernation that covers the opening of its shell and thus prevent desiccation.

Seeds adapt to unfavourable conditions by getting into the state of dormancy.

Bears adapt to unfavourable conditions by hibernation and reducing their body metabolic activities by 75%.

Zooplanktons adapt to unfavourable conditions by entering into diapause (stage of suspended development).

Fungi adapt to unfavourable conditions by reducing their metabolic rate and forming thick-walled spores.

Bacteria adapt to unfavourable conditions by forming endospores.

22. Biomagnification is the phenomenon through which DDT enters trophic levels of food chain in an ecosystem. It becomes accumulated in birds and cannot be metabolised or excreted out. This high level of DDT disturbs calcium metabolism in birds causing thinning of egg shells and their premature breaking eventually causing decline in bird population.

Fish eating birds (DDT 5ppm)

↑

Large fish (DDT 2ppm)

↑

Small fish (DDT 0.5 ppm)

↑

Zooplankton (DDT 0.04 ppm)

↑

Water (DDT 0.003ppb)

23. Reproductive health is the total well-being in all aspects of reproduction. It includes the physical, emotional, behavioural and social well-being of an individual. Therefore, there is an urgent need to educate and discuss topics related to the reproductive health.

Following are the topics about reproductive health that should be discussed with the students:

Sexually transmitted diseases, such as AIDS and Gonorrhoea, are transferred from one individual to another through sexual contact. Therefore, making the students aware about these diseases will help to prevent their spread. Lack of knowledge about the reproductive status may lead to unwanted pregnancies. Hence, it is necessary to create awareness among people, especially the youth.

Learning about one's sexuality at a proper age may help the students to know about the different changes happening in their body; thereby, leading to a better mental and physical state of health.

Counselling and creating awareness about reproductive health also help to curb the problems of infertility, birth control, mortality, etc.

24. (a) To obtain seeds formed only from the desired sets of pollen grains one can opt for artificial hybridisation. Following are the steps involved :

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