MP Board Class 12 Biology Question Paper with Solutions(Memory Based)

Time Allowed :3 Hours	**Maximum Marks :**70	**Total questions :**37

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Please check that this question paper contains 23 printed pages.
2. Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
3. Please check that this question paper contains 37 questions.
4. 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

1. What is the name of the method for detecting genetic disorders during pregnancy?

Correct Answer: Amniocentesis

Solution: Concept: Genetic disorders in a developing fetus can be detected using prenatal diagnostic techniques. These methods involve analyzing fetal cells or tissues to identify chromosomal abnormalities or inherited diseases. One of the most widely used procedures is amniocentesis.

Amniocentesis is a medical procedure in which a small amount of amniotic fluid is withdrawn from the amniotic sac surrounding the fetus. This fluid contains fetal cells that can be analyzed for:

- Chromosomal abnormalities (e.g., Down syndrome)
- Genetic disorders (e.g., thalassemia, sickle cell anemia)

- Certain metabolic disorders

Explanation: During pregnancy, usually between 15–20 weeks, a thin needle is inserted into the uterus under ultrasound guidance to collect amniotic fluid. The fetal cells present in this fluid are cultured and examined for genetic abnormalities.

Thus, the method used for detecting genetic disorders during pregnancy is **amniocentesis**.

Quick Tip

Amniocentesis = Prenatal genetic testing Remember: - Used during pregnancy - Detects chromosomal and genetic disorders - Involves testing amniotic fluid

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2. On which island group did Darwin observe finches?

Correct Answer: Galápagos Islands

Solution: Concept: Charles Darwin's observations during his voyage on the HMS Beagle played a key role in the development of the theory of evolution by natural selection. One of the most important observations was related to variations among finches found on different islands.

The Galápagos Islands are a group of volcanic islands located in the Pacific Ocean, off the coast of Ecuador. Darwin observed that finches on different islands had different types of beaks, each adapted to specific food sources such as seeds, insects, or cactus.

Explanation: Although the finches were similar in overall appearance, their beak shapes varied significantly. Darwin inferred that these birds had evolved from a common ancestor and adapted to different environments over time. This observation contributed greatly to the concept of adaptive radiation and natural selection.

Thus, the island group where Darwin observed finches was the **Galápagos Islands**.

Quick Tip

Darwin + Finches = Galápagos Islands Key idea: Different beaks $\rightarrow$ different adaptations $\rightarrow$ evolution by natural selection.

3. What is the full form of GEAC?

Correct Answer: Genetic Engineering Appraisal Committee

Solution: Concept: GEAC is a regulatory body in India that deals with the approval and monitoring of activities involving genetically modified organisms (GMOs). It plays an important role in ensuring biosafety and environmental protection.

The full form of GEAC is **Genetic Engineering Appraisal Committee**. It operates under the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India.

Explanation: The main functions of GEAC include:

- Approval of large-scale use of genetically engineered organisms
- Regulation of GM crops and products
- Ensuring biosafety in environmental release

Earlier, GEAC was known as the Genetic Engineering Approval Committee, but it was later renamed as the **Genetic Engineering Appraisal Committee**.

Quick Tip

GEAC = Genetic Engineering Appraisal Committee Think: India's main authority for regulating GM organisms.

4. The number of hydrogen bonds between adenine and thymine is _____.

Correct Answer: 2

Solution: Concept: DNA consists of two polynucleotide strands held together by hydrogen bonds between complementary nitrogenous bases. The pairing follows Chargaff's base pairing rule:

- Adenine (A) pairs with Thymine (T)
- Guanine (G) pairs with Cytosine (C)

Each base pair is stabilized by a specific number of hydrogen bonds, which contribute to the stability of the DNA double helix.

Explanation: Adenine and thymine form **two hydrogen bonds** between them. In contrast, guanine and cytosine form three hydrogen bonds, making the G–C pair more stable than the A–T pair.

Thus, the number of hydrogen bonds between adenine and thymine is **2**.

Quick Tip

A–T = 2 bonds, G–C = 3 bonds Remember: AT is weaker than GC due to fewer hydrogen bonds.

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5. Penicillin is obtained from a fungus named _____.

Correct Answer: Penicillium

Solution: Concept: Penicillin is one of the earliest discovered antibiotics and is produced naturally by certain fungi. Antibiotics are chemical substances produced by microorganisms that can kill or inhibit the growth of other microbes.

Explanation: Penicillin was discovered by Alexander Fleming in 1928. He observed that a mold growing on a bacterial culture inhibited bacterial growth. This mold was later identified as belonging to the genus **Penicillium**, especially *Penicillium notatum* and later *Penicillium chrysogenum* for large-scale production.

Thus, penicillin is obtained from the fungus **Penicillium**.

Quick Tip

Penicillin → Penicillium Discovered by Alexander Fleming in 1928.

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6. Differentiate between microsporogenesis and megasporogenesis.

Correct Answer: Comparison given below.

Solution: Concept: In flowering plants, spore formation is an important part of sexual reproduction. It occurs through meiosis and produces haploid spores that develop into male and female gametophytes. There are two types:

- Microsporogenesis (formation of microspores)
- Megasporogenesis (formation of megaspores)

Explanation: The differences between microsporogenesis and megasporogenesis are as follows:

Feature	**Microsporogenesis**	**Megasporoge**
Definition	Formation of microspores (pollen grains)	Formation of megaspore
Site	Occurs in anther (pollen sac)	Occurs in ovule (r
Mother cell	Microspore mother cell (MMC)	Megaspore mother c
Number of functional spores	Usually all four microspores are functional	Typically only one megasp
Product formed	Male gametophyte (pollen grain)	Female gametophyte (

Thus, microsporogenesis leads to the formation of male spores, while megasporogenesis leads to the formation of female spores in flowering plants.

Quick Tip

Micro = Male (pollen), Mega = Female (ovule) Remember: Anther → Microsporogenesis Ovule → Megasporogenesis

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7. Why is the Amazon rainforest called the ”lungs of the earth”?

Correct Answer: Because it produces a large amount of oxygen and absorbs carbon dioxide through photosynthesis.

Solution: Concept: Forests play a crucial role in maintaining the balance of gases in the atmosphere. Through the process of photosynthesis, green plants absorb carbon dioxide and release oxygen, which is essential for the survival of living organisms.

Explanation: The Amazon rainforest is the largest tropical rainforest in the world and contains a vast number of trees and plants. Due to its dense vegetation, it carries out large-scale photosynthesis, which:

- Absorbs significant amounts of carbon dioxide
- Releases large quantities of oxygen into the atmosphere
- Helps regulate global climate and atmospheric balance

Because of this major role in oxygen production and carbon dioxide absorption, the Amazon rainforest is popularly referred to as the **"lungs of the earth"**.

Quick Tip

Amazon rainforest = Earth's lungs Reason: Massive photosynthesis $\rightarrow$ absorbs CO_2 and releases O_2.

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8. Define oncogenes and name one disease caused by their activation.

Correct Answer: Oncogenes are mutated or overactive genes that can cause cancer; example disease: cancer (e.g., leukemia).

Solution: Concept: Oncogenes are genes that have the potential to cause cancer. They originate from normal cellular genes called proto-oncogenes, which regulate cell growth and division under normal conditions.

Explanation: When proto-oncogenes undergo mutations or become overexpressed, they are converted into oncogenes. These activated oncogenes lead to:

- Uncontrolled cell division
- Loss of normal growth regulation
- Formation of tumors

The abnormal activity of oncogenes is a major factor in the development of cancers. One disease caused by activation of oncogenes is **cancer**, for example **leukemia**.

Thus, oncogenes are cancer-causing genes, and their activation can lead to diseases such as leukemia.

Quick Tip

Proto-oncogene $\rightarrow$ **Mutation** $\rightarrow$ **Oncogene** $\rightarrow$ **Cancer** Example disease: Leukemia.

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9. Double-helix structure of DNA as proposed by Watson and Crick.

Correct Answer: Description of the Watson–Crick model of DNA.

Solution: Concept: In 1953, James Watson and Francis Crick proposed the double-helix model of DNA, which explains the molecular structure and mechanism of genetic inheritance. Their model was based on X-ray diffraction data (notably by Rosalind Franklin) and Chargaff's base pairing rules.

Explanation: According to the Watson–Crick model, the important features of the DNA double helix are:

- DNA consists of two long polynucleotide strands coiled around each other to form a right-handed double helix.
- Each strand is made of repeating units called nucleotides, consisting of:
  - A deoxyribose sugar
  - A phosphate group
  - A nitrogenous base
- The two strands run in opposite directions (antiparallel), i.e., one 5' $\rightarrow$ 3' and the other 3' $\rightarrow$ 5'.
- The sugar-phosphate backbone forms the outer framework, while nitrogenous bases project inward.
- Complementary base pairing occurs:
  - Adenine pairs with thymine via two hydrogen bonds

  - Guanine pairs with cytosine via three hydrogen bonds

- The helix has a uniform diameter of about 2 nm and one complete turn every 3.4 nm (approximately 10 base pairs per turn).

This model explained how genetic information is stored and replicated, making it a cornerstone of molecular biology.

Quick Tip

Watson–Crick Model Key Points: Double helix, antiparallel strands, complementary base pairing (A–T, G–C).
