

Punjab Board Class 12 Biology Question Paper

Time Allowed :3 Hour	Maximum Marks :70	Total Questions :19
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General Instructions

Read the following instructions very carefully and strictly follow them:

- Answers to this Paper must be written on the paper provided separately.
- You will not be allowed to write during the first 15 minutes
- This time is to be spent in reading the question paper.
- The time given at the head of this Paper is the time allowed for writing the answers,
- The paper has four Sections.
- Section A is compulsory - All questions in Section A must be answered.
- You must attempt one question from each of the Sections B, C and D and one other question from any Section of your choice.

1. (i) What causes the inactive form of Bt toxin (Protoxin) to get converted into its active form in the body of an insect?

- (A) Temperature of the gut
- (B) Enzymes present in saliva
- (C) Alkaline pH of the gut
- (D) There is no specific reason

1. (ii) Two species competing for the same resource can avoid competition by choosing different habits. This phenomenon is called _____ and was supported by _____.

- (A) Competitive exclusion, Gause
- (B) Competitive exclusion, MacArthur
- (C) Resource partitioning, Gause
- (D) Resource partitioning, MacArthur

1. (iii) The flow of energy through lower to higher trophic levels in an ecosystem is:

- (A) always unidirectional.
- (B) sometimes unidirectional and sometimes bidirectional.
- (C) always bidirectional.

(D) cannot be determined with certainty.

1. (iv) Meenu visited Mahendra Chaudhary Zoological Park (Chhatbir Zoo) as part of her environmental studies school tour. She observed several animals such as tigers, rhinoceroses and lions being maintained and bred in enclosures. This is an example of which type of conservation?

- (A) In situ conservation
 - (B) Ex situ conservation
 - (C) On-site conservation
 - (D) Natural habitat conservation
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1. (v) Geitonogamy involves transfer of pollen grains:

- (A) from anther to stigma of the same flower.
 - (B) from anther to stigma of another flower on the same plant.
 - (C) from anther to stigma of a flower on a different plant of the same species.
 - (D) between flowers of different species.
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1. (vi) The testes in humans are located outside the abdominal cavity within a pouch called the scrotum. This positioning helps in:

- (A) avoiding compression by internal organs.
 - (B) maintaining a temperature slightly lower than the body temperature for sperm formation.
 - (C) protecting the testes from physical injury during movement.
 - (D) helping in the storage of urine before excretion.
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1. (vii) Diaphragms are contraceptive devices used by females. Which of the following statement is correct about diaphragm?

- (A) They are introduced into the uterus to prevent implantation.
 - (B) They are placed to cover the cervical region and act as a physical barrier for sperm entry.
 - (C) They act as spermicidal agents.
 - (D) They prevent ovulation by hormonal regulation.
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1. (viii) A pure tall (TT) plant is crossed with a pure dwarf (tt) plant to produce F₁ offspring. The F₁ offspring are then self-crossed. What is the ratio of true-breeding tall (TT) to true-breeding dwarf (tt) plants in the F₂ generation?

- (A) 1 : 1
- (B) 1 : 2 : 1

- (C) 1 : 3
 - (D) 3 : 1
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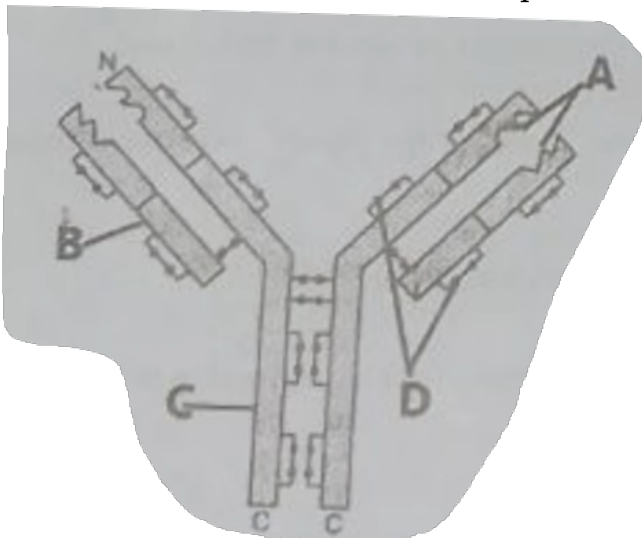
1. (ix) In *E. coli*, the lac operon gets switched on when:

- (A) lactose is present and it binds to the repressor.
 - (B) repressor binds to operator.
 - (C) RNA polymerase binds to the operator.
 - (D) lactose is absent.
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1. (xi) Darwin observed different types of beaks in finches adapted to different feeding habits on the Galapagos Islands. This diversity provides evidence for:

- (A) intraspecific competition.
 - (B) interspecific competition.
 - (C) origin of species by natural selection.
 - (D) origin of species by mutation.
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1. (xi) Identify the parts labelled A, B, C and D in the diagram of an antibody molecule and select the correct option:



- (A) A – Light chains, B – Heavy chains, C – Antigen-binding sites, D – Disulphide bonds
 - (B) A – Disulphide bonds, B – Antigen-binding sites, C – Heavy chains, D – Light chains
 - (C) A – Antigen-binding sites, B – Light chains, C – Heavy chains, D – Disulphide bonds
 - (D) A – Antigen-binding sites, B – Disulphide bonds, C – Light chains, D – Heavy chains
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1. (xii) The enzyme Taq polymerase used in PCR has been isolated from the bacterium:

- (A) *Agrobacterium tumefaciens*
 - (B) *Thermus aquaticus*
 - (C) *Streptomyces albus*
 - (D) *Escherichia coli*
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1. (xiii) Alexander Fleming, Ernst Chain and Howard Florey were awarded the Nobel Prize in 1945 for the discovery of _____.

1. (xiv) The sequence of base pairs in a double-stranded DNA or RNA molecule that reads the same forwards and backwards on each strand is called _____ nucleotide sequence.

1. (xv) The process of release of ovum from the mature follicle is called _____.

1. (xvi) _____ test is performed to confirm typhoid.

1. (xvii) *Saccharomyces cerevisiae* is used in the production of alcohol and bread.

1. (xviii) The Amazon rainforest is known as the “lungs of the planet” because it produces a large amount of carbon dioxide.

1. (xix) Surgical methods of contraception prevent gamete formation.

1. (xx) Cocaine is obtained from the leaves of the *Erythroxylum coca* and acts as a stimulant on the central nervous system.

2. Samina saw her mother adding a little curd to warm milk at night. She asked why she was doing this. She replied that the curd acts as an inoculum to convert milk into curd.

- (a) Name the bacterium responsible.
- (b) Explain how adding a small amount of curd (inoculum) helps in making the entire milk turn into curd?

3. What is biolistic method for introducing alien DNA into a host cell?

OR

Why is restriction endonuclease called a “Molecular Scissor”? Explain its role in biotechnology.

4. Bt toxin is produced by bacteria *Bacillus thuringiensis* but it does not kill the bacteria itself. Why is it so?

5. Define food chain. Construct a grazing food chain using any 5 of the following: Grass, Earthworm, Snake, Vulture, Frog, Grasshopper, Decaying plant matter.

OR

Explain why the introduction of an alien species reduces the biodiversity of an area. Support your answer with an example.

6. Draw a well-labelled diagram of a longitudinal section of a flower showing all its parts.

7. State the role of oxytocin in parturition.

8. In case of an infertile couple, the male has very low sperm count but the female has normal functioning reproductive system. Suggest and explain the Assisted Reproductive Technology (ART) useful to this couple.

OR

In our society, women are often blamed for giving birth to daughters. Explain scientifically why this belief is incorrect.

9. A man with blood group A marries a woman with blood group B. They have two children, one with blood group AB and the other with blood group O. Work out a genetic cross to show how this is possible.

OR

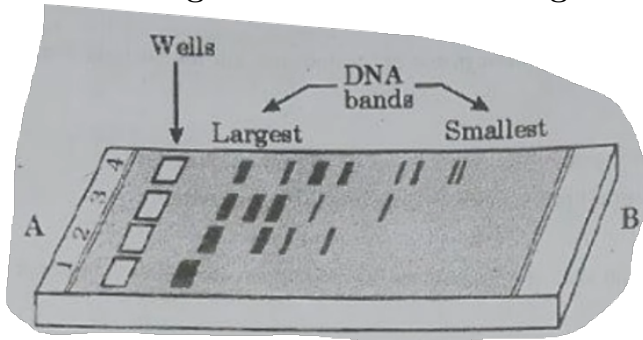
A normal male marries a female carrier for colour blindness. Show the type of progeny formed with help of Punnett square.

10. Classify the following pairs as analogous or homologous organs:

- Wings of butterflies and birds
- Thorns of bougainvillea and tendrils of cucurbita
- Forelimbs of whale, bat, cheetah and human
- Sweet potato and potato

11. Write any two points of difference between innate and acquired immunity.

12. The diagram below shows an agarose gel electrophoresis setup:



- (a) Label the positive (+) and negative (-) terminals.
- (b) What type of charge is carried by DNA molecules and how does this property help in their separation?
- (c) Name the method used to isolate the separated DNA fragments from the gel.

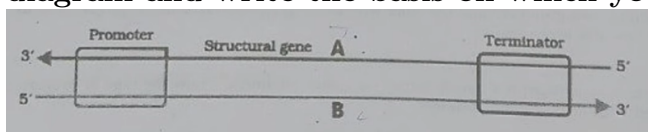
OR

What is gene therapy? Illustrate using the example of adenosine deaminase (ADA) deficiency.

11. Name the type of interaction seen in each of the following examples:

- (a) *Cuscuta* growing on a hedge plant
- (b) Mycorrhizae living on the roots of higher plants
- (c) An orchid growing on the branch of a mango tree

14. Given diagram is of transcription unit. Identify the strands A and B in this diagram and write the basis on which you identified them.



OR

Why is Human Genome Project called a mega project?

15. After industrialisation in England, the population of melanised moths (dark-coloured) increased while that of white-winged moths decreased.

- State the reason behind this change.
 - Explain this change in terms of natural selection.
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16. Name the causing agent of malaria. Also write down its symptoms and modes of transmission.

17. Read the paragraph carefully and answer the following questions:

Passage:

A constant input of solar energy is the basic requirement for any ecosystem to function and sustain. Primary production is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis. It is expressed in terms of weight (gm^{-2}) or energy (kcal m^{-2}). The rate of biomass production is called productivity. It is expressed in terms of $\text{gm}^{-2} \text{yr}^{-1}$ or $(\text{kcal m}^{-2}) \text{yr}^{-1}$ to compare the productivity of different ecosystems. It can be divided into gross primary productivity (GPP) and net primary productivity (NPP). Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis. A considerable amount of GPP is utilised by plants in respiration. Gross primary productivity minus respiration losses (R), is the net primary productivity (NPP). Net primary productivity is the available biomass for the consumption to heterotrophs (herbivores and decomposers). Secondary productivity is defined as the rate of formation of new organic matter by consumers. Primary productivity depends on the plant species inhabiting a particular area. It also depends on a variety of environmental factors, availability of nutrients and photosynthetic capacity of plants. Therefore, it varies in different types of ecosystems.

- Name the factors that influence the primary productivity of an ecosystem.
- Suppose the GPP of a grassland ecosystem is $2000 \text{ kcal m}^{-2} \text{yr}^{-1}$ and NPP is $1200 \text{ kcal m}^{-2} \text{yr}^{-1}$. Calculate the respiratory loss (R).

- (c) Why is all the primary productivity not available to herbivores for consumption?
- (d) Differentiate between GPP and NPP.

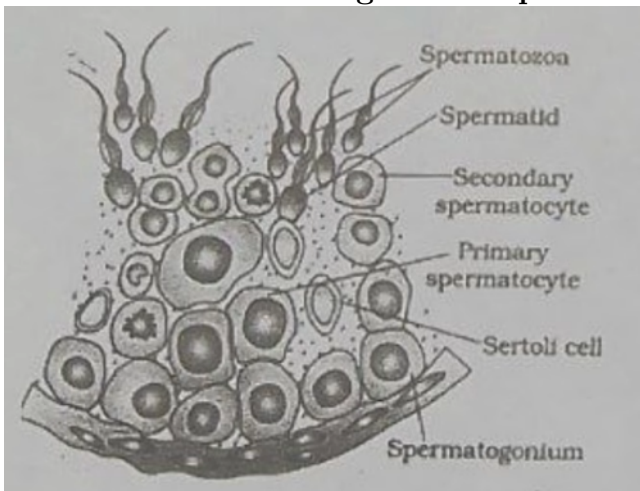
OR

Define biodiversity. Describe the three important components of biodiversity with suitable examples.

- 18. (a) What is meant by monosporic development of the female gametophyte?
- (b) Draw a diagram of a mature embryo sac and label any four parts.

OR

Given below is the diagram of a part of seminiferous tubule of human testis:



- (a) Name the cells that undergo spermiogenesis.
 - (b) Name the type of cell division responsible for generation of primary spermatocyte.
 - (c) Differentiate between spermiogenesis and spermiation.
 - (d) How many sperms will be produced from 50 primary spermatocytes?
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19. Answer the following:

- (a) Based on the karyotype, what chromosomal disorder is detected?
- (b) Write its cause.
- (c) Write the symptoms of the disorder.

OR

Frederick Griffith performed an experiment on *Streptococcus pneumoniae* to study inheritance.

- (a) Describe the experimental setup.

- (b) What were his major observations when he injected mice with different strains?
 - (c) What conclusion did Griffith draw from this experiment?
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