

**PRACTICE Paper 4 (2020-21) Class 12
Biology**

Maximum Marks: 70

Time Allowed: 3 hours

General Instructions:

- *All questions are compulsory.*
- *The question paper has four sections: Section A, Section B, Section C, and Section D. There are 33 questions in the question paper.*
- *Section-A has 14 questions of 1 mark each and 02 case-based questions. Section-B has 9*
- *questions of 2 marks each. Section-C has 5 questions of 3 marks each and Section-D has 3 questions of 5 marks each.*
- *There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives **in** such questions.*
- *Wherever necessary, neat and properly labelled diagrams should be drawn.*

Section A

1. The spermatogenesis starts at the age of puberty. When is oogenesis initiated and completed in a human female?
2. A diploid organism is heterozygous for 4 loci, how many types of gametes can be produced?
3. Name an oral pill used as a contraceptive by human females. Explain, how does it prevent pregnancy?
4. By giving example, suggest how we can estimate the population size of any species is determined without counting them.
5. Name the type of cross that would help to find the genotype of a pea plant bearing inflated pea pod.
6. Write the scientific name of the organism that Morgan used for his experiment. Name the phenomenon/law of genetics he deduced.
7. Name any two physiological barriers which provide innate immunity.
8. Name the genes that control cotton bollworm and corn borer respectively.

9. Give reason for selecting the polymerase enzyme obtained from *Thermus aquaticus* only while using PCR.

10. Name the type of interaction present between

- a. A barnacle and a whale
- b. Sea anemone and clownfish

11. Assertion: Genetic code is universal.

Reason: Genetic code is same for all organisms.

- a. The assertion is a true statement, but the reason is false.
- b. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
- c. both assertion and reason are true, but the reason is not the correct explanation of the assertion.
- d. Both assertion and reason are false.

OR

Assertion: The cross between red and white flower bearing snapdragon plants results in a pink coloured flower.

Reason: Incomplete dominance of red/white flower results in pink coloured flower.

- a. Both assertion and reason are correct.
- b. The assertion is correct, but the reason is incorrect
- c. The assertion is incorrect, but the reason is correct.
- d. Both assertion and reason are incorrect.

12. **Assertion:** The symptoms of AIDS are (i) infectious diseases (ii) extreme and unexplained tiredness

Reason: This period may vary from a few months to many years up to 10 years.

- a. Both assertion and reason are correct.
- b. The assertion is correct, but the reason is incorrect
- c. Both assertion and reason are incorrect
- d. The reason is correct but does not explain the assertion

13. **Assertion:** Genetic map up of an organism or individual lies in the DNA sequence.

Reason: If two individual differs, then their DNA sequence should also

be different.

- a. Both assertion and reason are correct
- b. The assertion is correct but the reason is incorrect
- c. Both assertion and reason are incorrect
- d. Both assertion and reason are incorrect.

14. **Assertion:** The pattern of species diversity on earth is not uniformly distributed.

Reason: Species variation is generally lowest in the tropics and increases towards the poles.

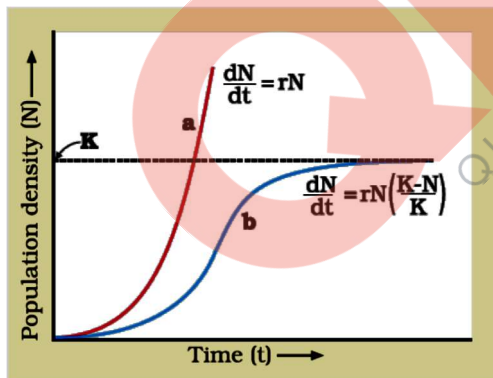
- a. Both assertion and reason are correct.
- b. The assertion is correct but the reason is incorrect.
- c. Both assertion and reason are incorrect.
- d. The assertion is incorrect but the reason is correct.

15. **Read the following and answer any four questions:**

The size of a population for any species is not a static parameter. It keeps changing in time, depending on various factors including food availability, predation pressure and stressful weather. The changes in population density give an idea of what is happening to the population whether it is flourishing or declining. The density of a population in each habitat during a given period fluctuates due to changes in four basic processes, two of which contribute an increase in population density and two to a decrease. Under normal conditions, births and deaths are the most important factors influencing population density. Ideally, when resources in the habitat are unlimited, each species can realize fully its innate potential to grow in number, as Darwin observed while developing his theory of natural selection. Then the population grows exponentially or geometrically.

- i. Which of the following would necessarily decrease the density of a population in a given habitat?
 - a. Natality > mortality
 - b. Immigration > emigration
 - c. Mortality
 - d. Natality
- ii. Which of the following factors has a negative effect on the population growth rate?
 - a. Emigration

- b. Immigration
 - c. Natality
 - d. none of these
- iii Which of the following factors influence population density under normal conditions?
- a. Deaths
 - b. Immigration
 - c. Emigration
 - d. Both (a) and (c)
- iv. Which of the following equations correctly represents the exponential population growth curve?
- a. $\frac{dN}{dt} = rN$
 - b. $\frac{dN}{dt} = rN \frac{(K-N)}{K}$
 - c. $N_t = N_0 e^{rt}$
 - d. Both (a) and (c)
- v. In the given population growth curve K represent?



- a. Population density at time 't'
 - b. Intrinsic rate of natural increase
 - c. Carrying capacity
 - d. none of these
- 16. Read the following and answer any four questions:**

Pollination is the transfer of pollen grain (shed from the anther) to the stigma of a pistil. Flowering plants have evolved an amazing array of adaptations to achieve pollination. There are three different kinds of pollination. Pollination within the same flower i.e. self-pollination. Some plants produce

two types of flower chasmogamous and cleistogamous another kind of pollination is the transfer of pollen grain from the anther to the stigma of the same plant or anther to the stigma of different plants. Various agents are used in pollination. Pollination is carried out by water, wind, and animal.

- i. Pollination which is achieved with in the same flower is termed as:
 - a. Autogamy
 - b. Xenogamy
 - c. Geitonogamy
 - d. None of these
- ii. The abiotic agent of pollination is:
 - a. wind
 - b. water
 - c. animal
 - d. Both (a) and (b)
- iii. Which of the following feature should be present for wind pollinator
 - a. Non-sticky and light pollen grain
 - b. The long stalk of flower
 - c. Colourful flower
 - d. None of these
- iv. Wind pollination is common in:
 - a. *Vallisneria*
 - b. *Hydrilla*
 - c. Grasses
 - d. *Zostera*

v. **Assertion** • Cleistogamous flower are invariably autogamous has no chance of cross pollen landing on the stigma.

Reason • Cleistogamous flower produces assured seed set only in the presence of pollinators.

- i Both Assertion and Reason are true, and Reason is the correct explanation of the Assertion
- ii Both Assertion and Reason are true, but Reason is not the correct explanation of the Assertion
- iii The Assertion is true, but the Reason is false
- iv Both the statements are false

Section B

17. What are the two factors which have raised life expectancy in developing countries?
18. Sex determination is based on particular chromosomes in both birds and humans. State two points of difference between their mechanisms of sex determination.
19. Write the functions/role of
 - i C-peptide in the insulin gene
 - ii Double-stranded RNA in tobacco plant w.r.t. RNAi
20. Name the disorder for which the first clinical gene therapy was conducted.

OR

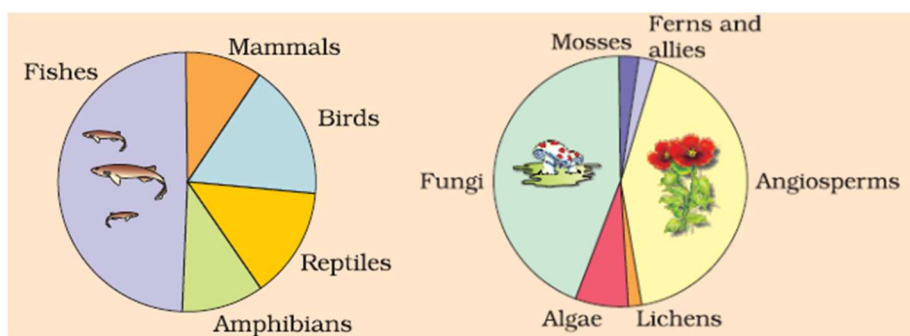
How is milk obtained from 'Rosie' beneficial for a newborn rather than feeding him with the milk of a normal cow if the mother's milk is unavailable?

21. Discuss the role of enzyme DNA ligase in DNA replication.
22. How are bacteria forced to take up foreign DNA during genetic engineering? Which bacteria is used for engineering them?

OR

During gel electrophoresis, DNA is not visible. How can a genetic engineer see and isolate desired DNA during this process?

23. In the biosphere, immense biological diversity exists at all levels of biological organization. Explain the level of biodiversity if we are studying
 - a. Coral reefs
 - b. Rice varieties in the Indian subcontinent



24. Compare the given pie charts and answer the following questions

- a. Arrange the organisms according to their proportion of their diversity
Angiosperms, fishes, reptiles, mosses, fungi, birds
- b. What will happen if all fungus is eliminated from our ecosystem?
25. How more solar energy and glaciation helped biodiversity to flourish in tropical regions?

Section C

26. If a true-breeding homozygous pea plant with yellow seed and axial flowers as dominant characters are crossed with a recessive homozygous pea plant with green seeds and terminal flowers, then what would be the:
- (a) Genotypes of the two parents
(b) Phenotypes and genotypes of the F₁ offspring
(c) Phenotypic distribution ratio in F₂ population
27. Now, the sequencing of total genomes is getting less expensive day by the day. Soon it may be affordable for a common man to get his genome sequenced.
- a. How this can lead to problems related to ethics?
b. Which method was used earlier to deduce human genome sequence using the blind approach?
c. What do you understand by sequence annotation?
28. For an organ transplant, it is an advantage to have an identical twin. Why? Give reason for your answer. What type of problems a person can face if an organ transplant is not done in identical twins?
29. The given figure is of a DNA strand which codes for a protein.



- a. Will this whole gene be transcribed?
b. Name the shaded and unshaded portions of this gene.
c. How is the expression of this gene different from that of prokaryote?
30. Draw a diagram of a mature embryo sac of an angiosperm and label the following parts in it:

- I. Filiform apparatus
- II. Synergids
- III. Central cell
- IV. Egg cell
- V. Polar nuclei
- VI. Antipodals

Or

- a. Write the fate of egg cell and polar nuclei after fertilisation.
- b. Give reason, why endosperm is formed after fertilization in angiosperms, unlike gymnosperms.
- c. What will be the ploidy of a tapetal cell and endosperm in angiosperms?

Section D

31. i. How is 'oogenesis' markedly different from 'spermatogenesis' since foetal development till puberty in humans?
- ii. Draw a sectional view of the human ovary and label the parts which
- a. helps in maintain pregnancy
 - b. characterised by a fluid-filled cavity
 - c. in which primary oocyte is present

OR

The events of the menstrual cycle are represented below. Answer the question in light of the given flow chart

Follicular phase (6th to 15th day) → Luteal phase (16th to 28th day) →
menstrual phase (1st to 5th day) → follicular phase repeats and so on

- a. what will be the level of FSH, LH and progesterone on day 6th, 14th, and 27th day (low/high)
 - b. In which of the above-mentioned phases does the egg is present in the fallopian tube?
 - c. Why is there no menstruation upon fertilization?
32. The development of bioreactors is required to produced large quantities of products.

- a. Give optimum growth conditions used in bioreactors.
- b. Draw a well labelled diagram of simple stirred-tank bioreactor.
- c. How does a simple stirred tank bioreactor differ from sparged stirred tank bioreactor?

OR

Identify the following palindromic sequence

G	(1)	A	T	?	(2)
C	(3)	T	A	(4)	?

- a. What will be there in position 1, 2, 3, and 4
- b. Why is it recommended to use the same restriction enzyme for cutting vector and foreign DNA?
- c. What will happen if we use different restriction enzymes for cutting vector and foreign DNA?
- d. Name the restriction enzyme which recognises the above given palindromic sequence.

33. Answer the following questions

- a. What will happen if a freshwater fish from an aquarium is released in seawater?
- b. What is the reason for high haemoglobin content in people living in Himalayan regions?
- c. Why small animals are not found in polar regions?

OR

How is primary effluent treated in a sewage treatment plant before it can safely be released into rivers or streams?