



GUESS QUESTION PAPER

CLASS: XII

SUB: BIOLOGY (044)

Date:

Marks: 70

Time: 3 Hours

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory.
- (iii) Section-A has 16 questions of 1 mark each; Section-B has 5 questions of 2 marks each; Section- C has 7 questions of 3 marks each; Section- D has 2 case-based questions of 4 marks each; and Section-E has 3 questions of 5 marks each.
- (iv) 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.
- (v) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION A

Q. No Select & write the most appropriate option out of the four options given for each of questions 1-16.

1 At which part of fallopian tube the fertilization takes place :-
(a) Ampulla (b) Infundibulum (c) Isthmus (d) at any part it may occur

2 Match the following column:

Column I		Column II	
A	AUG	1	Stop codon
B	RNA with introns and exons	2	Transfer of aminoacids from cytoplasam to ribosome
C	tRNA	3	Methionine
D	UAA	4	hnRNA

Select the correct matching option:

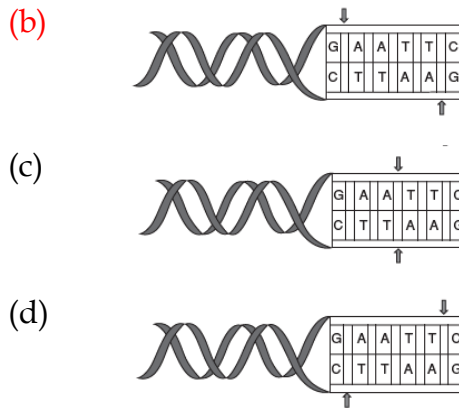
	A	B	C	D
(a)	4	1	2	3
(b)	2	3	4	1
(c)	1	3	4	2
(d)	3	4	2	1

3 A certain patient is suspected to be suffering from acquired immuno deficiency syndrome. Which diagnostic technique will you recommend for its detection?

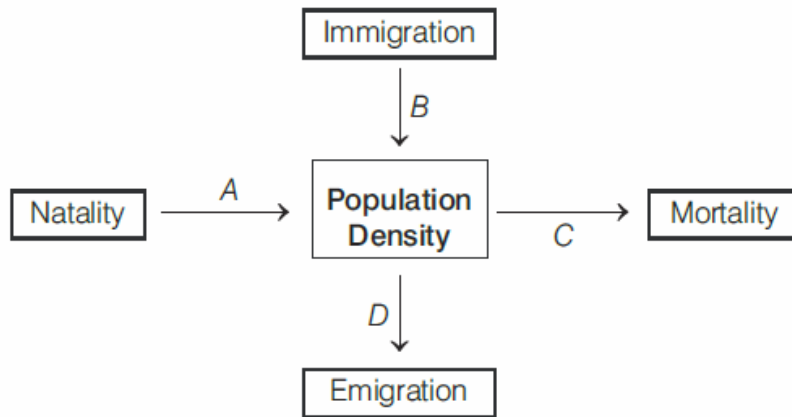
- (a) MRI (b) Ultrasound (c) WIDAL (d) ELISA

4 Which diagram correctly represents the cutting of both strands of DNA by EcoRI?





5 Study the figure and identify A, B, C & D. Increase + ve & Decrease -ve



(a) A-Increase, B-Decrease, C-Increase, D-Decrease.

(b) A-Decrease, B-Increase, C-Decrease, D-Increase

(c) A-Increase, B-Increase, C-Decrease, D-Decrease.

(d) A-Decrease, B-Decrease, C-Increase, D-Increase.

6 The percentage of crossing over will be more if

(a) Linked genes are located far apart from each other

(b) Linked genes are located close to each other

(c) Genes are not linked

(d) Genes are located in a different cell

7 In RNAi, genes are silenced using:

(a) ssDNA (b) dsDNA (c) dsRNA (d) ssRNA

8 A gene locus has two alleles A, a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?

(a) 0.16 (AA); 0.24 (Aa); 0.36 (aa) (b) 0.16 (AA); 0.48 (Aa); 0.36 (aa)

(c) 0.16 (AA); 0.36 (Aa); 0.48 (aa) (d) 0.36 (AA); 0.48 (Aa); 0.16 (aa)

9 Which one of the following represents a palindromic sequence in DNA?

(a) 5'-CCAATG-3'

(b) 5'-CATTAG-3'

3'-GAATCC-5'

3'-GATAAC-5'

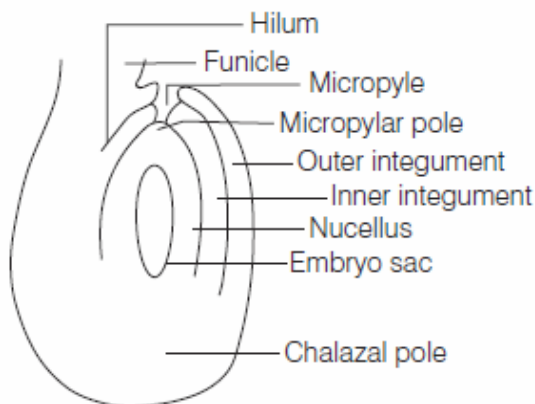
(c) 5'-GATACC-3'

(d) 5'-GAATTC-3'

3'-CCTAAG-5'

3'-CTTAAG-5'

- 10 In DNA fingerprinting, the hybridized strands are detected by
 (a) Radiometry (b) Radioscopy (c) **Autoradiography** (d) Scintillation counter
- 11 In the figure of the anatropous ovule given below, choose the correct option for the characteristic distribution of cells within the typical embryo sac.



	Number of cells at chalazal end	Number of cells at micropylar end	Number of nuclei left in central cell
(a)	3	2	3
(b)	3	3	2
(c)	2	3	3
(d)	2	2	4

- 12 DNA dependent DNA polymerase catalyses polymerization in _____ direction only (in terms of newly synthesized strands).
 (a) 5 → 3 (b) 3' → 5' (c) **5' → 3'** (d) 3 → 5

Q. no 13 to 16 are Assertion - Reasoning based questions.

These consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

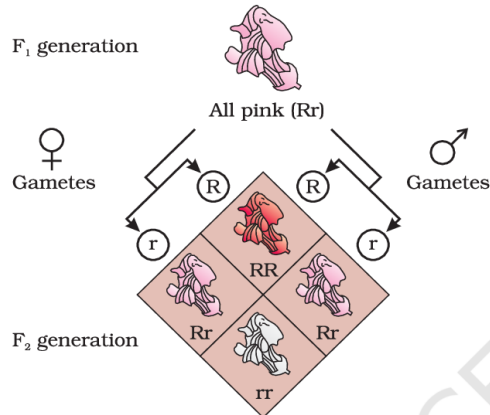
- (A) Both A and R are true and R is the correct explanation of A.
 (B) Both A and R are true and R is not the correct explanation of A.
 (C) A is true but R is false.
 (D) A is False but R is true.

- 13 Assertion (A): A pollen grain can withstand harsh conditions.
 Reason (R): The exine of pollen grains is made up of sporopollenin which is resistant to high temperatures, strong acids or alkali as well as enzymatic degradation.
- 14 Assertion (A): Species with low genetic variability are generally at greater risk of extinction than the species with more genetic variability
 Reason (B): In situ conservation refers to the conservation of endangered species in their natural habitat

15 Assertion (A): In paddy fields *Anabaena*, *Nostoc* and *Oscillatoria* etc. serve as an important biofertilizers.

Reason (R): Cyanobacteria are autotrophic microbes which can fix atmospheric nitrogen.

16 *Antirrhinum* is the generic name of the snapdragon. The Snapdragon flower is also called the dragon flower because it resembles the face of a dragon. The snapdragon flower has two flower colours, red (RR) and white (rr). When cross-pollination occurs between red and white flowers, here the genotype ratios were exactly as we would expect in any mendelian monohybrid cross, but the phenotype ratios had changed from the 3:1 dominant: recessive ratio.



Assertion (A): It is a phenotypic and genotypic ratio of 1:2:1 in the F2 generation.

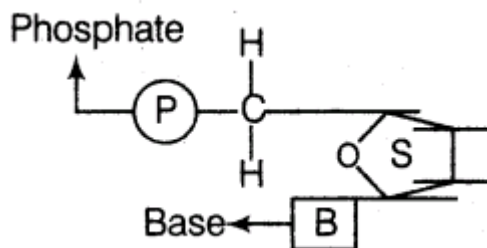
Reason (R): Red allele is completely dominant over the white allele.

SECTION B

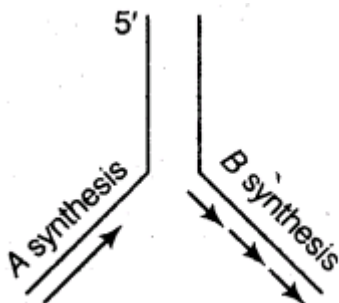
17 (a) From where do the parturition signals arise-mother or the foetus? Mention the main hormone involved in parturition.

(b) Give the names and functions of the hormones involved in the process of spermatogenesis. Write the names of the endocrine glands from where they are released.

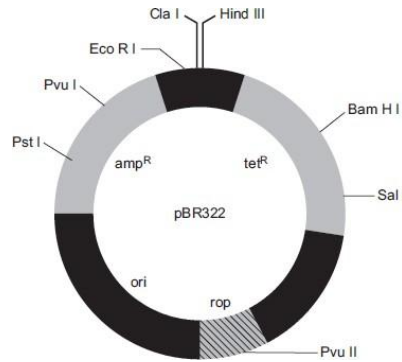
18 (a) Mention the carbon positions to which nitrogenous base and the phosphate molecule are respectively linked in the nucleotide given below.



(b) Name the type of synthesis A and B occurring in the replication fork of DNA as shown below.



- 19 (a) A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air, identify the condition. Name the cells responsible for such reactions. What precautions should be taken to avoid such reactions?
 (b) What is meant by metastasis?
- 20 (a) Name the organism in which the vector shown in inserted to get the copies of the desired gene.
 (b) Mention the area labeled in the vector responsible for controlling the copy number of the inserted gene. What is its other role?
 (c) Name and explain the role of a selectable marker in the vector shown.



- (d) State the role of rop gene.
- 21 (a) Apart from being a part of the food chain, predators play other important roles. Mention any two such roles supported by examples.
 (b) Differentiate between *in situ* and *ex-situ* approaches for the conservation of biodiversity.

OR

- (a) Draw the pyramid of biomass in a sea and a forest. Explain by giving a reason, why are the two pyramids different.
 (b) The pyramid of energy is always upright. Why?

SECTION C

- 22 (a) How can the scientific understanding of the menstrual cycle of human females help as a contraceptive measure?
 (b) Differentiate between spermatogenesis and oogenesis.
 (c) Mention what helps the entry of sperm into the ovum and write changes occurring in the ovum during the process.

OR

- (a) Suggest and explain the assisted reproductive techniques which will help a couple to have children, where the female had a blockage in the fallopian tube and the male partner had a low sperm count.
 (b) Why are seeds of some grasses called apomictic? Explain.
 (c) Why is fertilization in angiosperm termed double fertilization?
- 23 (a) Explain pleiotropy and polygenic inheritance with the help of an example.
 (b) How did Hershey and Chase establish that DNA is transferred from virus to bacteria?
- 24 (a) Organic farmers prefer biological control of diseases and pests to the use of chemicals for

the same purpose. Justify. Give an example of a bacterium, a fungus and an insect that are used as biocontrol agents.

(b) Given below is a list of six microorganisms. State their usefulness to humans.

(i) Nucleopolyhedrovirus

(ii) *Saccharomyces cerevisiae*

(iii) *Monascus purpureus*

(iv) *Trichoderma polysporum*

(iv) *Penicillium notatum*

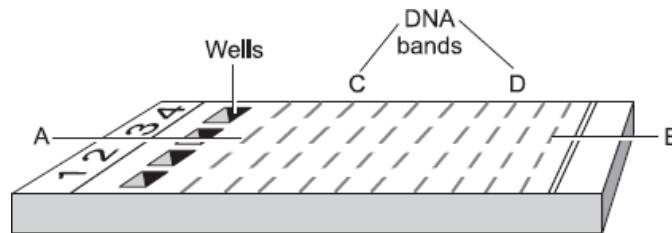
(v) *Propionibacterium sharmanii*

25 (a) Diagrammatically explain the process which will help to amplify DNA obtained from the blood droplets obtained from the crime scene so that DNA fingerprinting could be done.

(b) PCR requires very high-temperature conditions where most of the enzymes get denatured.

How was this problem resolved in a PCR?

(c) Study the diagram given below and answer the questions that follow:



(i) Why have DNA fragments in band 'D' moved farther away in comparison to those in band 'C'?

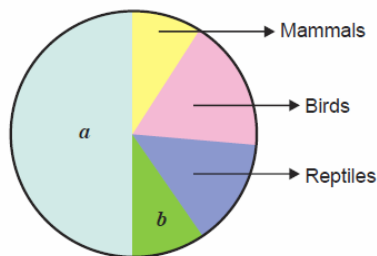
(ii) Identify the anode end in the diagram.

26 (a) Define decomposition and describe the process and products of decomposition.

(b) List the factors which affect the decomposition rate.

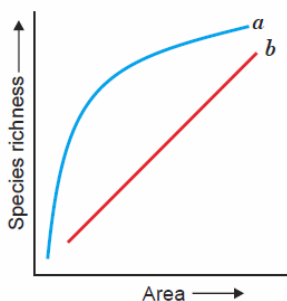
OR

(a) Name the unlabelled areas 'a' and 'b' of the pie chart representing the biodiversity of vertebrates showing the proportionate number of species of major taxa.

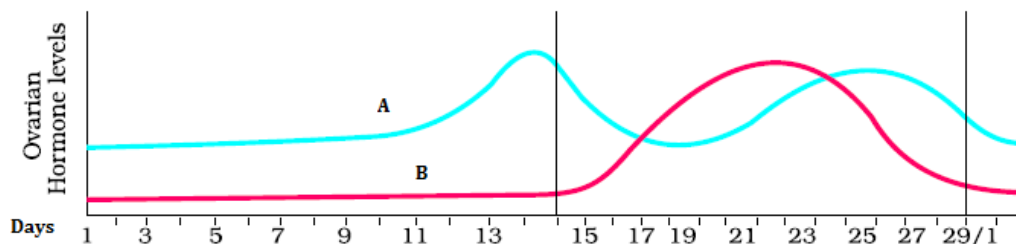


(b) Why are sacred groves highly protected?

(c) The given graph shows the species-area relationship. Write the equation of the curve 'a' and explain.



- 27 The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle:



- Identify 'A' and 'B'.
 - Specify the source of the hormone marked in the diagram.
 - Reason out why A peaks before B.
 - Compare the role of A and B.
 - Under which condition will the level of B continue to remain high on the 28th day?
- 28 (a) With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generations?
- (b) What is adaptive radiation? When adaptive radiation is referred to as convergent evolution? Give an example.

SECTION D

Q. no 29 and 30 are case-based questions. Each question has subparts with internal choice in one subpart.

- 29 *Eichhornia crassipes* (commonly known as water hyacinth) is an aquatic plant, native to the Amazon basin. It was introduced to the water bodies of India and other South- East Asian countries for industrial use of its fibres in making bags and footwear, as a substrate for biogas production and for its ability to uptake heavy metals from the water bodies. However, *Eichhornia* has been named the 'terror of Bengal' due to its prolific, invasive growth.

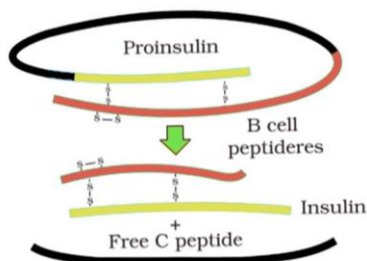


- What do you understand by 'alien species invasion' in the context of ecology?
- Give one example of invasive terrestrial weed and aquatic organisms which were alien species to India?
- How does water hyacinth affect the aquatic ecosystem as an alien species?

OR

(a) What is the Earth's 'sixth mass extinction'? List a few measures which can help to overcome this disaster.

- 30 Insulin in the human body is secreted by the pancreas as pro-insulin. The schematic polypeptide structure of pro-insulin is given below. This insulin needs to undergo processing before it becomes functional in the body.



(a) State the change the pro-insulin undergoes at the time of processing to become functional.

(b) Name the technique the American company Eli Lilly used for the commercial production of human insulin.

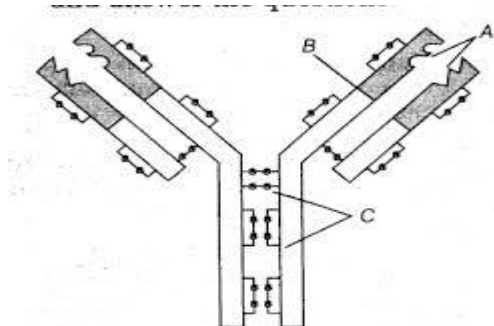
(c) Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patients?

OR

Would the insulin isolated from other animals be just as effective as that secreted by the human body itself and would it not elicit an immune response in the human body? Whether insulin can be orally administered to diabetic people or not. Why?

SECTION E

- 31 (a) Identify the molecule and name A, B and C in the figure.



(b) Breast feeding to new born, especially initial days after delivery is highly recommended. Why?

(d) Why are cancer patients often given α -interferon as part of the treatment?

OR

(a) What is BOD? What does it mean if a water sample has more BOD?

(b) "Microbes play a dual role when used for sewage treatment as they not only help to retrieve usable water but also generate fuel". Explain.

- 32 Explain, how lac operon in *E. coli* operates.

(a) in the absence of an inducer. (b) in the presence of an inducer. Also, draw a model of the lac operon in *E. coli*.

(b) A low level of expression of the lac operon occurs all the time. Can you explain the logic behind this phenomenon?

(c) In the medium where *E. coli* was growing, lactose was added, which induced the lac operon. Then, why does the lac operon shut down sometime after the addition of lactose in the medium?

OR

(a) What is aminoacylation? State its significance.

(b) Differentiate between the genetic codes given below:

(i) Unambiguous and Universal. (ii) Degenerate and Initiator

(c) Answer the following questions based on Meselson and Stahl's experiment:

(i) Why did the scientists use $^{15}\text{NH}_4\text{Cl}$ and $^{14}\text{NH}_4\text{Cl}$ as sources of nitrogen in the culture medium for growing *E. coli*?

(ii) Name the molecule(s) that ^{15}N got incorporated into.

(iii) How did they distinguish between ^{15}N labelled molecules from ^{14}N ones?

(iv) Mention the significance of taking the *E. coli* samples at definite time intervals for observations.

(v) Write the observations made by them from the samples taken at the end of 20 minutes and 40 minutes respectively.

33 (a) Name and explain the surgical method advised to human males and females as a means of birth control. Mention its one advantage and one disadvantage.

(b) In our society women are often blamed for giving birth to daughters. Can you explain why this is not correct?

(c) Why does corpus luteum secrete a large amount of progesterone during the luteal/secretory phase of the menstrual cycle?

(d) Mention the fate of the corpus luteum and its effect on the uterus in absence of fertilisation of the ovum in a human female.

(e) When and where are primary oocytes formed in a human female? Trace the development of these oocytes till ovulation (in the menstrual cycle). How do gonadotropins influence this developmental process?

OR

(a) Why do the toxic insecticidal proteins secreted by *Bacillus thuringiensis* kill the insect and not the bacteria itself?

(b) Name the specific type of gene that is incorporated in a cotton plant to protect the plant against cotton boll worm infestation.

(c) Suggest any two possible treatments that can be given to a patient exhibiting adenosine deaminase deficiency.

(d) Describe the process of megasporogenesis up to fully developed embryo sac formation in an angiosperm.

