THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

Biology (044)

Class XII Session

2023-24

Time: 3 Hours **Max. Marks: 70**

General Instructions:

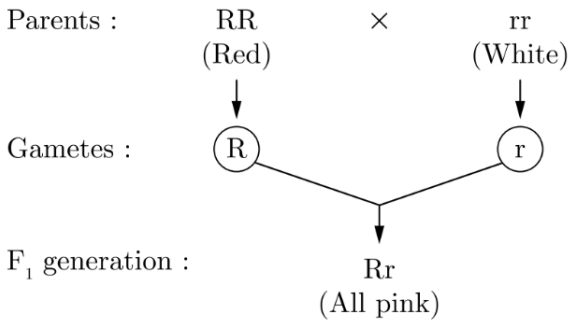
1.All questions are compulsory.
2.The question paper has five sections and 33 questions. All questions are compulsory.
3.Section—A has 16 questions of 1 mark each; Section—B has 5 questions of 2 marks each; Section—C has 7 questions of 3 marks each: Section—D has 2 case-based questions of 4 marks each;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

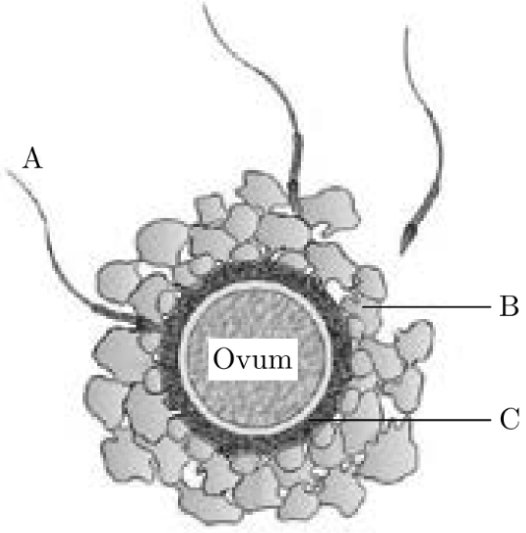
Marking scheme

Qn. No		
	SECTION A	
1	Which gas is more soluble in blood, oxygen or carbon dioxide? a. Oxygen b. Carbon dioxide c. They are equally soluble d. None of the above	1
2	Which of the following is not a property of the genetic code? (a) Non-overlapping (b) Ambiguous (c) Degeneracy	1

	(d) Universal	
3	Which of the following approaches does not give the defined action of contraceptive? (a)Hormonal contraceptives - Prevent/retard entry of sperms, prevent ovulation and fertilisation (b)Vasectomy - Prevents spermatogenesis (c)Barrier methods - Prevent physical meeting of ovum and sperms (d)Intrauterine devices - Increase phagocytosis of sperms, suppress sperm motility and fertilising capacity of sperms	1
4	Viral DNA, after being converted from viral RNA by X, is incorporated into the host genome to undergo replication. What is 'X' ? (a) DNA polymerase (b)Restriction endonuclease (c)RNA polymerase (d) Reverse transcriptase	1
5	In assisted reproductive technology, IVF involves transfer of (a) ovum into the fallopian tube (b) zygote into the fallopian tube (c) zygote into the uterus (d) embryo with 16 blastomeres into the fallopian tube.	1
6	During transcription, the site of DNA molecule at which RNA polymerase binds is called (a) promoter (b) regulator (c) receptor (d) enhancer	1
7	Write the name of enzymes that are used for isolation of DNA from bacterial and fungal cells respectively for r DNA technology.	1
8	Which of the following is not a water pollinated plant ? (a) Zostera (b) Vallisneria (c) Hydrilla (d) Cannabis	1
9	Acrosomal reaction of the sperm occurs due to (a) its contact with zona pellucida of the ova (b) reactions within the uterine environment of the female	1

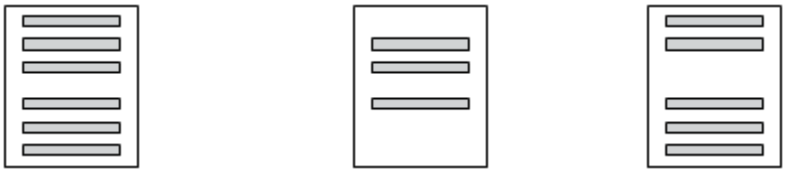
	(c) reactions within the epididymal environment of the male (d) androgens produced in the uterus.	
10	Transfer of pollen grains from the anther to the stigma of another flower of same plant is called (a) geitonogamy (b) autogamy (c) xenogamy (d) cross-pollination	1
11	In a dihybrid cross, if you get 9 : 3 : 3 : 1 ratio it denotes that (a) the alleles of two genes are interacting with each other (b) it is a multigenic inheritance (c) it is a case of multiple allelism (d) the alleles of two genes are segregating independently.	1
12	The outermost and innermost wall layers of microsporangium in an anther are respectively (a) endothecium and tapetum (b) epidermis and endodermis (c) epidermis and middle layer (d) epidermis and tapetum.	1
DIRECTION : Q. No. 13-16: Consist of two statements— Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:		
13	Assertion: Insects visit flowers to gather honey. Reason: Attraction to flowers prevents the insects from damaging other parts of the plant. (a) Both A and R are true and R is the correct explanation of A.	1

	(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.	
14	Assertion : Myometrium is an important component of uterus. Reason : Myometrium produces strong contractions during parturition. (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.	1
15	Given below is the monohybrid cross. It depicts the cross between the red flower and white flower colour in the Antirrhinum sp. Study this monohybrid cross and comment upon the appropriateness of the Assertion and Reason.  Assertion : It shows incomplete dominance. Reason : The F2 generation of Antirrhinum shows different phenotypic and genotypic ratios. (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.	1
16	Primary endosperm nucleus (PEN) is formed by the fusion of	1

	(a) 2 polar nuclei + 1 synergid cell nucleus (b) 1 polar nucleus + 1 antipodal cell nucleus + 1 synergid cell nucleus (c) 2 polar nuclei + 1 male gamete nucleus (d) 2 antipodal cell nuclei + 1 male gamete nucleus.	
Section—B		
17	Why is Taq polymerase preferred in PCR? Mention the source of this enzyme?	2
18	Name the stage of the human embryo that gets implanted in the uterus and draw its labelled diagram.	2
19	Why is the process of fertilisation in a flowering plant referred to as double fertilisation?	2
20	Distinguish between heterochromatin and euchromatin. Which of the two is transcriptionally active?	2
21	Given below is the diagram of a human ovum surrounded by a few sperms. Study the diagram and answer the following questions:  (a) Identify 'B' and 'C' Mention the role of 'C'. (b) Mention what helps the entry of sperm into the ovum. (c) Name the specific region in the female reproductive system where the event represented in the diagram takes place.	2
Section—C		

22	Explain mechanism of sex-determination in birds.	3
23	Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree? Give reasons in support of your answer.	3
24	Draw a schematic sketch of pBR322 plasmid and label the following in it : a) Any two restriction sites b) Ori and ROP genes c) An antibiotic resistant gene	3
25	Where does triple fusion take place in a flowering plant? Why is it so called ? Mention its significance ?	3
26	What is the cause of discontinuous synthesis of DNA on one of the parental strands of DNA? What happens to these short stretches of synthesised DNA?	3
27	(i)A couple with blood group A and B, respectively have a child with blood group O. Work out a cross to show how it is possible and the probable blood groups that can be expected in their other offspring. (ii) Explain the genetic basis of blood groups in human population	3
28	A haemophilic father can never pass the gene for haemophilia to his son. Explain.	3
	Section—D	
29	Question 1:Read the following and answer any four questions from (i) to (iv) given below: Since DNA is a hydrophilic molecule, it cannot pass through cell membranes. Why? In order to force bacteria to take up the plasmid, the bacterial cells must first be made 'competent' to take up DNA. This is done by treating them with a specific concentration of a divalent cation, such as calcium, which increases the efficiency with which DNA enters the bacterium through pores in its cell wall. Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 420C (heat shock), and then putting them back on ice. This enables the bacteria to take up the recombinant DNA. This is not the only way to introduce alien DNA into host cells. In a method known as micro-injection, recombinant DNA is directly injected into the nucleus of an animal cell. In another method, suitable for plants, cells are bombarded with high velocity micro-particles of gold or tungsten coated with DNA in a method known as biolistics or gene gun. And the last method uses 'disarmed pathogen' vectors, which when allowed to infect the cell, transfer the recombinant DNA into the host. Now that we have learnt about the tools for constructing recombinant DNA, let us discuss the processes facilitating recombinant DNA technology.	4

	Que. 1) In …… method, recombinant DNA is transferred into the host to infect the cell. (a) Restriction method (b) Gene Gun (c) Biolistics (d) Disarmed pathogen Que. 2) Biolistics or Gene gum method is suitable for …….. (a) Reptiles (b) Plants (c) Birds (d) Insects Que. 3) Calcium cation increases efficiency of …….. for the bacterium entry. (a) Cell (b) DNA (c) RNA (d) Ribosome Que. 4) Why the DNA cannot pass through cell membrane?	
30	Read the following and answer any four questions from (i) to (iv) given below: The DNA, which is transferred from one organism into another by joining it with the vehicle DNA is called passenger or foreign DNA. Generally three types of passenger DNAs are used. These are complementary DNA (cDNA), synthetic DNA (sDNA) and random DNA. Complementary DNA (cDNA) is synthesized on RNA template (usually mRNA) with the help of reverse transcriptase. Synthetic DNA (sDNA) is synthesized on DNA template or without a template. Random DNA are small fragments formed by breaking a chromosome of an organism in the p.resence of restriction endonucleases. (i) Reverse transcriptase enzyme was discovered by (a) Temin and Baltimore (b) Cohen and Boyer (c) Arber and Nathan (d) Paul Berg. (ii) During cDNA formation, what would happen if DNA formed by reverse transcriptase is not treated with the alkali? (a) cDNA will not be digested (b) mRNA will not be digested	4

	(c) Hydrogen bonds will not form between base pairs (d) mRNA will not be formed. (iii) Enzyme that helps in the formation of double stranded cDNA is (a) DNA synthetase (b) ligase (c) DNA polymerase (d) helicase. (iv) DNA polymerase can be obtained form (a) retrovirus (b) Agrobacterium (c) tobacco mosaic virus (d) Thermus aquaticus	
	Section—E	
31	Blood samples from a crime scene were collected and DNA analysis for the same was done. Given below are the marker profiles collected at the crime scene of the victim and a suspect.  **Crime scene** **Victim** **Suspect** (a)What will you conclude on the basis of the above observation? (b)Discuss how this technique helps in determining that the blood samples picked up from the crime scene belong to a single person or two different persons. (c)How can the maternal and paternal identity disputes be sorted out using the technique used above?	5
32	(i) Explain the process of spermatogenesis in humans. (ii) Draw a human sperm and label acrosome and middle piece. Mention their functions.	5
33	a) Mention any four strategies adopted by flowering plants to prevent self pollination.Explain? (b) Why is geitonogamy also referred to as genetical autogamy ?	5

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