SET - A

INDIAN SCHOOL SOHAR
PREBOARD EXAMINATION – II (2023 – 2024)
BIOLOGY (Subject Code-044)

Date: 10/01/2024 **Time: 3 hours**
Class: XII **Max. Marks: 70**

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) 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.

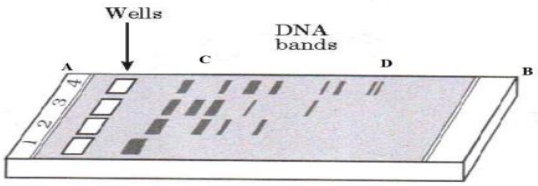
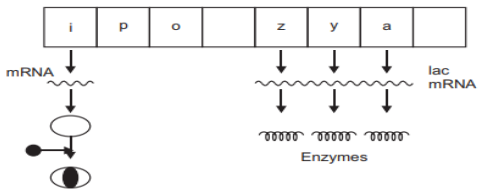
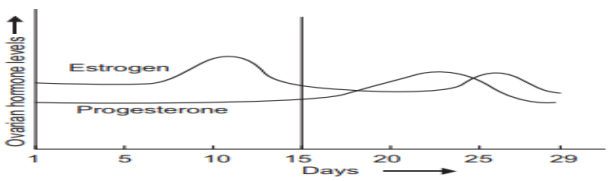
	SECTION A	
1.	A human ovum completes its second meiosis, (a) At the time of fertilisation. (b) When the sperm touches the zona pellucida. (c) When the sperm gains entry into the cytoplasm of the ovum. (d)When the acrosome of the sperm releases the enzymes on corona radiata.	**1**
2.	Many copepods live on the body surface of marine fish. This is an example of, a) Commensalism. b) Parasitism. c) Amensalism. d) Mutualism.	**1**
3.	At a particular locus, the frequency of alternative form of gene A is 0.6 and that of alternativeform of gene a is 0.4.What would be the frequency of homozygote recessive in a random mating population at equilibrium? a) 0.36 b) 0.16 c) 0.24 d) 0.48	**1**
4.	*Monascus purpureus* is a yeast (fungus), which is commercially used in the production of, a) Ethanol. b) Citric acid. c) Statins. d) Cyclosporin A.	**1**
5.	The DNA fragments on a gel stained with ethidium bromide, when viewed under UV radiation appear as, a) Yellow band. b) Bright orange band. c) Dark red bands. d) Bright blue bands.	**1**
6.	Interferons are proteins. In humans, they are secreted by, a) Thymus gland. b) B- lymphocytes. c) Virus infected cells. d) Bacteria infected cells.	**1**
7.	A diploid organism is heterozygous for 4 loci. How many types of gametes can be produced? a) 4 b) 8 c) 16 d) 32	**1**

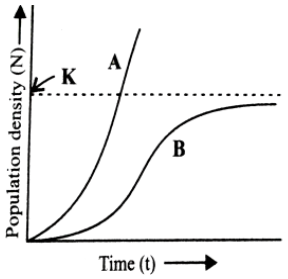
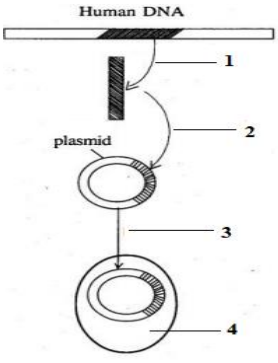
8.	The structure of a bilobed anther consists of, a) 2 thecae, 2 sporangia. b) 4 thecae, 4 sporangia. c) 4 thecae, 2 sporangia. d) 2 thecae, 4 sporangia.	**1**
9.	Golden rice is a transgenic plant or a GMO, where the introduced gene is meant for biosynthesis of, a) Vitamin B. b) Vitamin A c) Vitamin C. d) Omega -3	**1**
10.	The biomass available in plants for consumption by herbivores and decomposers is called, a) Gross primary productivity. b) Net primary productivity. c) Standing crop. d) Secondary productivity.	**1**
11.	A short piece of DNA, having 20 base pairs, was analysed to find the number of nucleotide bases in each of the polynucleotide strands. Some of the results are shown in the table.	**1**

	Number of nucleotide bases			
	Adenine	Cytosine	Guanine	Thymine
Strand I	4	4		
Strand II		5		

How many nucleotides containing Cytosine were present in strand 2?
a) 2. b) 4.
c) 5. d) 7.

12.	Periodic abstinence is a natural method of contraception; it relies on the fact that, (a) Ovulation occurs around the 14th day of the menstrual cycle. (b) The ovum remains alive for about two days only. (c) The sperms remain alive for about two days only. (d) It improves the health of the ovary.	**1**
	Following questions consist of two statements -Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below: (a) Both assertion and reason are true and reason is the correct explanation of assertion. (b) Both assertion and reason are true and reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Assertion is False but reason is true	
13.	Assertion: During DNA replication, there is continuous synthesis of DNA on one of the template strands and discontinuous synthesis on the other template strand. Reason : DNA-dependent DNA polymerase can polymerise the nucleotides only in 5'-3' direction.	**1**
14.	Assertion: Synthetic oligonucleotide polymers are used during annealing in a PCR. Reason : The primers bind to the double-stranded DNA at their complementary regions.	**1**
15.	Assertion: The tropical regions have a greater biological diversity. Reason : The tropical regions have remained relatively undisturbed in their environmental conditions and got a long evolutionary time for species diversification.	**1**
16.	Assertion: Placenta acts as a temporary endocrine tissue during pregnancy. Reason : Placenta secretes hormones like hCG, hPL, estrogens and progesterone.	**1**
	SECTION B	
17.	It is sometimes observed that the F_1 progeny has a phenotype that does not resemble either of the two parents and has an intermediate phenotype. Explain by taking a suitable example and working out the cross up to F_2 progeny.	**2**
18.	Some microbes act as very good bio fertilizers. Explain with the help of two examples.	**2**
19.	Ecological pyramids give important information about the ecological system, but do have some limitations. List any two limitations of ecological pyramids.	**2**

20.	Study the diagram given and answer the following questions;  a) Why DNA fragments in band 'D' moved farther away in comparison to those in band 'C'? b) Which Is the anode end, A or B? c) How are the separated DNA fragments visualised?	**2**
21.	Name and explain two physical barriers that provide innate immunity in humans. **OR** What are allergens? How do they cause inflammatory response inside the human body?	**2**
	SECTION C	
22.	Answer the following questions with reference to 'opioids', the commonly abused drug: a) Where in our body are the specific opioid receptors found? b) What is heroin chemically known as? c) Write the scientific name of the plant from which opioids are extracted.	**3**
23.	Name and describe any three Evil Quartets.	**3**
24.	Name two hormones that are constituents of contraceptive pills. Why do they have high and effective contraceptive value? Name a commonly prescribed non-steroidal oral pill.	**3**
25.	a) Write the scientific name of the nematode that infests the tobacco plants and the part that it infects. b) How is *Agrobacterium* used to protect tobacco plants from this attack?	**3**
26.	(a) Do all pollen grains remain viable for the same length of time? Support your answer with two suitable examples. (b) How are pollen grains stored in pollen banks? State the purpose of storing pollen grains in these banks. **OR** Trace the development of male gametophyte from microspore mother cell in the microsporangium in flowering plants and explain the formation of male gametes from it.	**3**
27.	How does the process of natural selection affect Hardy-Weinberg Equilibrium? Explain. List the other four factors that disturb the equilibrium.	**3**
28.	Predation is usually referred to as a detrimental association. State any three positive roles that a predator plays in an ecosystem.	**3**
	SECTION D	
29.	Study the figure and answer the following questions: a) How does the repressor molecule get inactivated? b) When does the transcription of lac mRNA stop? c) Name the enzyme transcribed by the gene **z** and **a.**  	**4**
30.	a) Read the graph given below and correlate the uterine events that take place according to the hormonal level on,  i) 6-15 days. ii) 16-25 days.	**4**

	iii) 26-28 days (if the ovum is not fertilized). b) Specify the sources of the hormones mentioned in the graph.	
	SECTION E	
31.	Study the population growth curve given below and answer the questions that follow: a) Identify 'A' and 'B' shown in the graph. b) When and why do such curves occur in a population? c) In the absence of predators which one of the two curves would appropriately depict the prey population? d) Name the parallel dotted line above it. Mention its significance.  **OR** Explain the defence mechanisms evolved in preys to avoid overpopulation of their predators.	**5**
32.	Sometimes, a single gene product may produce more than one effect. Explain this phenomenon taking the example of pea seeds. **OR** Given below is a stretch of DNA showing the coding strand of a structural gene of a transcription unit? **5'--ATG ACC GTA TTT TCT GTA GTG CCC GTA CTT CAG GCA TAA—3'** a) Write the corresponding template strand and the mRNA strand that will be transcribed, along with its polarity. b) If GUA of the transcribed mRNA is an intron, depict the sequence involved in the formation of mRNA /the mature processed hnRNA strand. i) In a bacterium ii) In humans c) Upon translation, how many amino acids will the resulting polypeptide have? Justify.	**5**
33.	Why are restriction endonucleases so called? Explain their role as 'molecular scissors' in recombinant DNA technology. **OR** Observe the following diagram and answer the questions that follow:  a) Name the particular technique in Biotechnology, whose steps are shown in the figure? b) Name the steps 1 to 4 marked in the figure? c) Name the enzymes involved in step 1 and 2? d) Why are plasmids used in this process? e) Give an example where a human gene product is obtained from transgenic bacteria? **********	**5**