BUDHA DAL PUBLIC SCHOOL, PATIALA Pre Board Examination (10 January 2025)

Class XII (Science) Subject - Biology (Set - A)

Time: 3hrs.

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 labeled diagrams should be drawn.

Section – A

Q1. Identify the parts labelled as A, B, C and D in the given figure and select the correct option.

	Α	В	С	D
a)	Synergids	Antipodals	Egg	Filiform apparatus
b)	Antipodals	Egg	Sunergids	Filiform apparatus
c)	Antipodals	Synergids	Filiform apparatus	Egg
d)	Polar nuclei	Antipodals	Filiform apparatus	Egg

Q2.

Match the column I with column II and select the correct option from the given codes.

Column I	Column II
a) Operator site	i) Binding site for RNA Polymerase
b) Promoter site	ii) Binding site for repressor molecule
c) Regulator gene	iii) Codes for protein/ enzyme
d) Structural gene	iv) Codes for repressor molecule

a) A – (ii), B – (i), C – (iii), D – (iv)	b) A - (ii), B - (i), C - (iv), D - (iii)
c) A - (iv), B - (iii), C - (i), D - (ii)	d) A - (ii), B - (iii), C - (i), D - (iv)

- **Q3.** 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
- Q4. In a dihybrid corss, 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 multigenic inheritance
 - c) it is a case of multiple allelism
 - d) the alleles of two genes are segregating independently
- **Q5.** Transplantation of tissues/organs to save certain patients often fails due to rejection of such tissues/organs by the patient. Which type of immune response is responsible for such rejections?
 - a) Auto-immune response
 - b) Humoral immune response
 - c) Physiological immune response
 - d) Cell-mediated immune response
- Q6. Statin, a blood-cholesterol lowering agent, is commercially obtained from
 - a) Trichoderma polysporum
 - b) Acetobacter aceti
 - c) Clostridium butylicum

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- d) Monascus purpureus
- **Q7.** The most important human activity, leading to the extinction of wildlife, is
 - a) Pollution of air and water
 - b) Hunting for valuable wildlife products
 - c) Introduction of alien species
 - d) Alteration and destruction of the natural habitats.

Q8. Select the option that correctly identifies A, B and C in the given table.

Organism	Trophic level	Food Chain
Eagle	А	Grazing
Earthworm	Primary consumer	В
Frog	С	Grazing

	А	В	С
a)	Top carnivore	Detritus	Secondary consumer
b)	Top carnivore	Detritus	Primary consumer
c)	Secondary consumer	Grazing	Secondary consumer
d)	Scavanger	Grazing	Producer

Q9. Using a DNA template, how many new DNA molecules would be generated after 10 cyles of amplification in PCR?

a) 512 b) 1024 c) 2048 d) 256

Q10. Refer the below diagram of simple-stirred tank bioreactor. Identify A, B, C, D and E

	Р	Q	R	S	Т
a)	Sterile air	Foam breaker	Acid/base for pH control	Steam for sterilisation	Culture broth
b)	Foam breaker	Stem for sterilisation	Culture broth	Acid/base for pH control	Sterile air
c)	Culture broth	Foam breaker	Sterile air	Steam for sterilisation	Acid/base for pH control
d)	Foam breaker	Steam for sterilisation	Acid/base for pH control	Sterile air	Culture broth

Q11. Select the incorrect match from the following:

Human karyotype Character

- a) 45 + XX Broad palm with characteristic palm crease
- b) 44 + XXY Overal feminine development
- c) 44 + XO Sterile females as overies are rudimentary
- d) 44 + XY Normal male
- **Q12.** An Australian mole is actually a marsupial rather than a placental mammal like the North American or European mole. The two animals are similar in appearance because
 - a) there are practically no placental mammals in Australia
 - b) the selection process on both were similar
 - c) they have undergone a long period of coevolution
 - d) marsupials and placental mammals are closely related
 - e)

Each of the following questions (Q.No. 13 to Q.No 16) consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:

- a) Both Assertion (A) and Reason (R) true and Reason (R) is the correct explanation of Assertion (A).
- b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
- c) Assertion (A) is true but Reason (R) is false.
- d) Assertion (A) is false but Reason (R) is true.
- Q13. Assertion : Introns do not appear in mature or processed RNA. Reason : Introns are interrupted by exons.
- Q14. Assertion : Cannabinoids effects the nervous system of the body. Reason : Cannabinoids are the chemicals which interact with cannabinoid receptors present in the brain.
- **Q15. Assertion :** RNA interference (RNAi) is used to protect plants against nematode infestation. **Reason :** RNAi method involves silencing of a specific mRNA by a complementary ds RNA molecule that binds to and prevents translation of mRNA.
- **Q16.** Assertion : In barrier methods, ovum and sperms are prevented from meeting physically.

Reason : Barrier methods can be used during intercourse to prevent the entry of ejactulated semen into the reproductive tract of the female.

Section – B

- Q17. The cell division involved in gamete formation is not of the same type in different organisms. Justify.
- Q18. a) During DNA replication, why is it that the entire molecule does not open in one go?
 - b) What are the two functions that the monomers (dNTPs) play?
- **Q19.** How can retrovirouses be used efficiently in biotechnology experiments inspite of their disease causing ability?
- Q20. What does 'Red' indicates in the IUCN Red list 2004?
- **Q21.** a) Write the scientific names of the two species of filarial worms causing filariasis.
 - b) How do they affect the body of infected person(s)?
 - c) How does the disease spread?

Section – C

- Q22. "Continued self-pollination results in inbreeding depression."
 - a) Mention one impact of inbreeding depression on the upcoming generations in farmland.
 - b) State one way in which cross-pollination helps in avoiding inbreeding depression.
- **Q23.** Meiotic arrest is a phenomenon noticed during oogenesis in human females where occytes are arrested in the primary oocytes stage.
 - a) What is the chromosomal count of these primary oocytes?
 - b) How are these primary oocyes converted to ovum?
- Q24. Given a reason why
 - a) The absence of RNA polymerase III can interfere with the translation of nuclear genes?
 - b) Defining a gene present in DNA is complicated, particularly in eukaryotes?
 - c) In bacteria, translation and transcription happen almost simultaneously?

		OR	
a) Study the table given	n below and id	entify (A), (B), (C) and (E))
Amino Acids	Phe	Val	
DNA code in gene	AAA	CAC	
Codon in mRNA	(A)	(B)	
Anticodon in tRNA	(C)	(D)	

b) A polypeptide consists of 14 different amino acids.

- i) How many base pairs must be there in the processes mRNA that codes for this polypeptide?
- ii) How m any different types of TRNA are needed for the synthesis of this polypeptide?

- **Q25.** Study the given pedigree chart showing the pattern of blood group inheritance in a family. Answer the questions that follows:
 - a) Give the genotype of the following:
 - (i) Parents (ii) The individual 'X' in second generation
 - b) State the possible blood groups of the individual 'Y' in third generation.
 - c) How does the inheritance of this blood group explain codominance?
- **Q26.** Certain specific bacterial spores are mixed in water and sprayed over Brassica crop to control butterfly caterpillars.

Name this bacterium and its mode of action on the butterfly caterpillars.

- **Q27.** Describe the roles of (i) high temperature, (ii) primers and (iii) bacterium. Thermus aquaticus in carrying the process of polymerase chain reaction.
 - a) State what is primary productivity and mention its units?
 - b) Some ecologists observed that primary productivity of a place in Rajasthan was low as compared to a particular place in Kerala. Explain why?

Section – D

Case Based Questions:

Q28.

Q29. Villagers in a place near chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the flow chart given below which shows the different components of biogas plant and answer the questions that follows:

- a) With reference to the given flow chart, explain why there is a need of A?
- b) What would happen if A is not added in the procedure?
- c) Where does A can be found apart from the biogas production?

OR

- c) What is the significance of biogas produced by A?
- **Q30.** In Drosophila, crossing was performed between red eyed female and white eyed male where red eye is dominant over white eye. Offspring of F₁ were allowed to self fertilise and offsprings produced in F₁ generation are shown. Study the given cross and answer the questions that follow:

a) What kind of inheritance is shown in the given the figure? **OR**

Identify A, B, C and D from the given figure.

- b) State the significance of this inheritance in the above mentioned cross.
- c) What would happen in the given cross if the parents phenotype be reversed i.e., white eyed female and red eyed male respectively?

Section – E

Q31. Refer to the given figure and answer the following questions:

- a) Identify the given figure and labelled parts X and Y.
- b) Write the role of X and Y.
- c) Draw labelled prior stage of the given figure.
- d) Why is fertilization in an angiosperm referred to as double fertilization? Mention the ploidy of the cells involved.

OR

The image below shows the levels of various hormones measured in a human female throughout the course of her pregnancy.

Based on the image, answer the following questions:

- a) In which week of pregnancy does the corpus luteum degenerate?
- b) Which hormone peaks around the time in (i)? Name the organ that secretes it.
- c) Name three hormones from the above image that are secreted by the ovary.
- d) Which hormone level rises near the end of pregnancy? Mention its role.
- e) Of the hormones secreted only during pregnancy

i) Which one has low levels in early weeks of pregnancy?

ii) Which one starts declining 15 weeks before parturition?

- **Q32.** DNA fingerprinting is a technique of determining nucleotide sequences of certain areas of DNA which are unique to each individual. Each person has a unique DNA fingerprint. A DNA fingerprint is the same for every cell, tissue and organ of a person. It cannot be changed by any known treatment. The ideal way to distinguish an individual from other people would be his or her entire genomic sequence.
 - a) Name the type of DNA that forms the basics of DNA fingerprinting and mention two features of this DNA.
 - b) Write the steps carried out n the process of DNA fingerprinting technique and mention its applications.

OR

- a) Differentiate between repetitive and satellite DNA.
- b) How can satellite DNA be isolated? Explain.
- c) List two forensic applications of DNA fingerprinting.

- a) What is a trophic level in an ecosystem? What is 'standing crop' with reference to it?
 - b) Explain the role of the 'first trophic level' in an ecosystem.
 - c) How is the detritus food chain connected with the grazing food chain in a natural ecosystem?

OR

Show below is a graph representing the predator-prey relationship. Answer the questions that follows:

- a) Give one evidence that the ecosystem is stable.
- b) What will be effect of migration of rabbits on the population of volves and why?
- c) Name and describe one adaptation that helps preys escape predation.
- d) In a hypothetical scenario, all wolves vanish from the ecosystem.
 - i) What will be the consequence on the vegetation present in the ecosystem and why?
 - ii) It is found that the population of rabbits does not increase dramatically. State the ecological phenomenon responsible for keeping the population of rabbits in check.

Q33.