BUDHA DAL PUBLIC SCHOOL, PATIALA

Pre Board Examination (10 January 2025)

Class XII (Science)

Subject - Biology

(Set - A)

Time: 3hrs. M.M. 70

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has five sections and 33 questions. All questions are compulsory

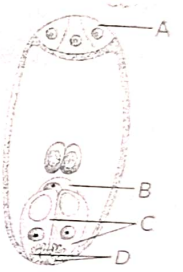
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.

(iv) 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.



	A	B	C	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

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.

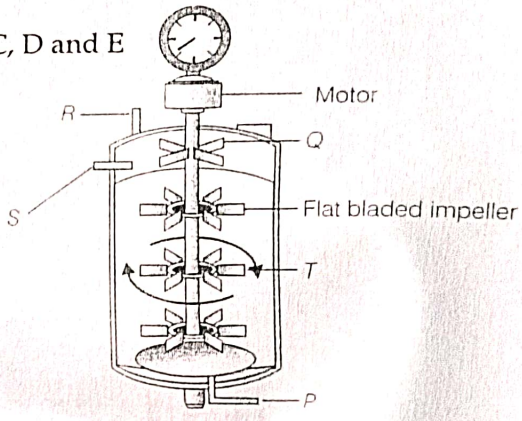
Organism	Trophic level	Food Chain
Eagle	A	Grazing
Earthworm	Primary consumer	B
Frog	C	Grazing

	A	B	C
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



	P	Q	R	S	T
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

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.

13. **Assertion :** Introns do not appear in mature or processed RNA.
Reason : Introns are interrupted by exons.

14. **Assertion :** Cannabinoids effects the nervous system of the body.
Reason : Cannabinoids are the chemicals which interact with cannabinoid receptors present in the brain.

15. **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.

16. **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

The cell division involved in gamete formation is not of the same type in different organisms. Justify.

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?

How can retrovirouses be used efficiently in biotechnology experiments inspite of their disease causing ability?

What does 'Red' indicates in the IUCN Red list 2004?

21. 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 oocytes 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 below and identify (A), (B), (C) and (D)

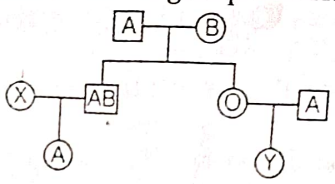
Amino Acids	Phe	Val
DNA code in gene	AAA	CAC
Codon in mRNA	(A)	(B)
Anticodon in tRNA	(C)	(D)

b) A polypeptide consists of 14 different amino acids.

i) How many base pairs must be there in the processed mRNA that codes for this polypeptide?

ii) How many 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.

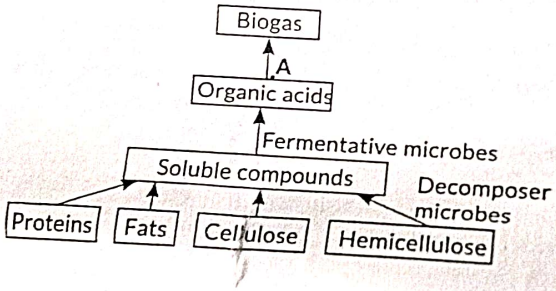
Q27. Describe the roles of (i) high temperature, (ii) primers and (iii) bacterium. Thermus aquaticus in carrying the process of polymerase chain reaction.

Q28. 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:

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:

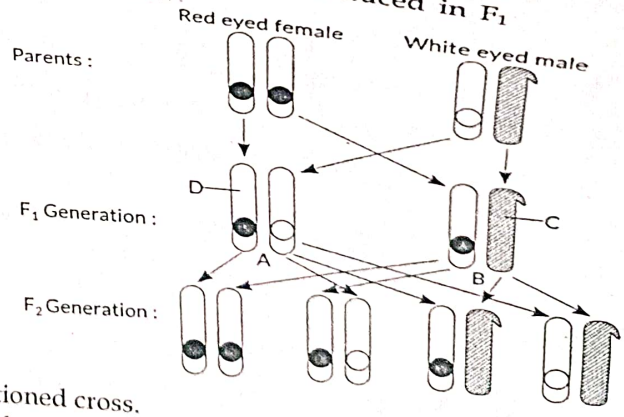


a) With reference to the given flow chart, explain why there is a need of A?
b) What would happen if A is not added in the procedure?
c) Where does A can be found apart from the biogas production?

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 F_1 were allowed to self fertilise and offsprings produced in F_1 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?

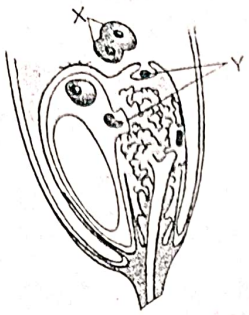
OR

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?

in a family. Answer the

Section – E

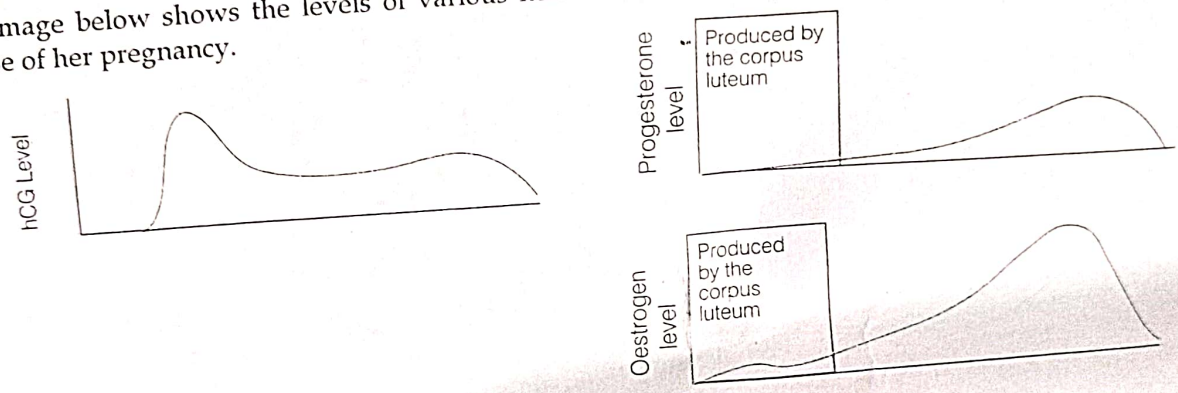
Refer to the given figure and answer the following questions:



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.

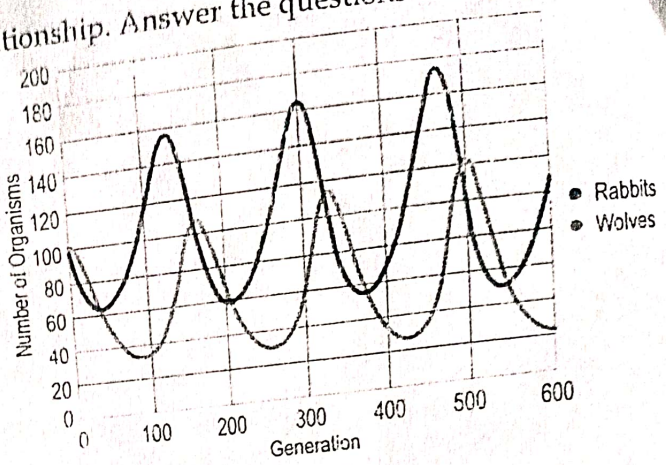
Q33. a) What is a trophic level in an ecosystem? What is 'standing crop' with reference to it?

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.

BUDHA DAL PUBLIC SCHOOL, PATIALA
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Class XII (Science)
Subject - Biology
(Set - B)

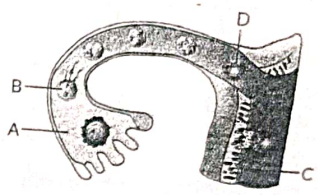
Time: 3hrs. M.M. 70

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) 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 A, B, C and D in the given figure.



	A	B	C	D
a)	Infundibulum	Fertilisation	Myometrium	Morula
b)	Infundibulum	Fertilisation	Edometrium	Blastocyst
c)	Isthmus	Fertilisation	Myometrium	Blastocyst
d)	Ishmus	Fertilisation	Endometrium	Morula

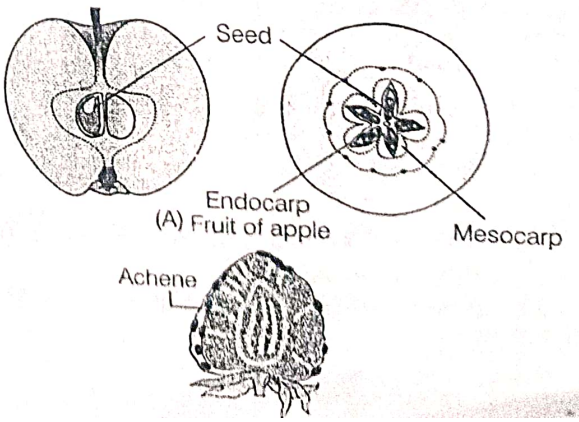
Q2. Match the terms in column I with their description in column II and select the correct option

Column I	Column II
A) Dominance	i) Many genes govern a single character
B) Co-dominance	ii) In a heterozygous organism only one allele expresses itself
C) Pleiotropy	iii) In a heterozygous organism both alleles express themselves fully
D) Polygenic inheritance	iv) A single gene influences many characters

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

Q3. In Antirrhinum (Snapdragon), a red flower was crossed with a white flower and in F_1 generation all pink flowers were obtained. When pink flowers were selfed, the F_2 generation showed white, red and pink flowers. Choose the incorrect statement from the following:
a) Law of segregation does not apply in this experiment.
b) This experiment does not follow the principle of dominance.
c) Pink colour in F_1 is due to incomplete dominance.
d) Ratio of F_2 is 1 (red) : 2(pink): 1 (white)

Q4. Observe the diagram and select the correct statement regarding the below fruit
a) Both are parthenocarpic fruits which develop without fertilization
b) Both are true fruits which develop only from the ovary
c) Both are false fruits in which thalamus also contributes to fruit formation
d) A is false fruit and B is true fruit



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. Anti venom injection contains preformed antibodies while polio drops that ar administered into the body contains

a) harvested antibodies
b) gamma globulin
c) attenuated pathogens
d) activated pathogens

Q7. Match the Column I with Column II and select the correct option.

Column I	Column II
P) Statins	1. Yeast
Q) Ethanol	2. Blood cholesterol lowering agent
R) Dung	3. Insect-resistance plant
S) Bt-cotton	4. Biogas

	P	Q	R	S
a)	1	4	2	3
b)	3	4	1	2
c)	2	3	4	1
d)	2	1	4	3

Q8. Biolistic method makes use of microparticles coated with DNA bombarded at cells to be transformed. These particle are made up of

a) Zinc or tungsten b) silicon or gold c) tungsten or gold d) selenium or platinum

Q9. A student doing research studied the population of rat in barn and found that the average mortality was 250, average mortality was 240, immigration as 20 and emigration 30. According to you what will be the net overall increase in the population?

a) 16 b) 05 c) zero d) 10

Q10. Match the following columns:

Column I	Column II
P) Competition	1. Favourable relationship between two species, but not obligatory
Q) Antagonism	2. Relationship between two organisms in which both are benefitted
R) Mutualism	3. Harmful co-action between two species
S) Proto cooperation	4. Rivalry between two or more organisms for same resource.

a) P-1, Q-2, R-3, S-4 b) P-4, Q-3, R-2, S-1 c) P-4, Q-2, R-1, S-3 d) P-1, Q-2, R-4, S-3

Q11. Which of the following is the correct sequence of events in the origin of life?

I) Formation of protobionts
II) Synthesis of organic monomers
III) Synthesis of organic polymers
IV) Formation of DNA-based genetic systems

a) I, II, III, IV b) I, III, II, IV c) II, III, I, IV d) II, III, IV, I

Q12. Which of the following phenomena significantly contributes to speciation?

P) Natural selection Q) Genetic drift R) Gene flow S) Geographic isolation T) Stabilising selection

a) Only Q and S b) Only R and T c) Only P, Q and S d) Only Q, R and T

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.

Assertion : Pollen grains are well preserved as fossils.
Reason : Sporopollenin is one of the most resistant organic material and protects the pollen grain.

Q14. Assertion : Repeated use of drugs, increases the tolerance level of receptors in our body.
Reason : Addiction occurs as receptors respond only to higher doses of drugs.

Q15. Assertion : Ti-plasmid obtained from Agrobacterium tumefaciens is effectively used as a vector for gene transfer in plant cells.
Reason : The part of Ti-plasmid transferred into the DNA of plant cells is called T-DNA.

Q16. Assertion : In an aquatic ecosystem, GFC is the major conduit for energy flow.
Reason : DFC may be connected with GFC at same levels.

Section – B

Q17. After a brief medical examination, a healthy couple came to know that both of them are unable to produce functional gametes and should look for an 'ART' (Assisted Reproductive Technique). Name the 'ART' and the procedures involved that you can suggest to them to help them bear a child.

Q18. The base sequence in given pairs of DNA are
a) ATGCCGGCTAGGC b) ATTTTAGCGAAT
Which of the following pair will unwind first on heating? Give reason.

OR

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. Give reasons for the following:
a) Proteases are added during isolation of DNA for genetic engineering.
b) Single cloning site is preferred in a vector.

Q20. Why do temperate regions show a lower value of primary productivity as compared to tropical regions? Give two reasons.

Q21. Name and mention the events that occur in the cells when HIV gets into blood after gaining entry into the human body.

Section – C

Q22. A farmer sowed tomatoes (plants with both sexes in the same flower) and bittergourd (plants with both sexes in different flowers on the same plant) on his farmland.
a) To ensure cross-pollination, what should the farmer do in each of the cases?
b) If the male flowers from the tomato plant are removed and pollen is dusted, can the flower grow into a fruit? Why or why not?

Q23. Polyspermy is an extremely rare condition in which an ovum is fertilized by more than one sperm.
a) How many chromosomes will a zygote contain if 2 sperms fertilized an ovum?
b) How is polyspermy prevented in humns?

Q24. a) Study the table given below and identify (A), (B), (C) and (D)

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 processed mRNA that codes for this polypeptide?

ii) How many different types of tRNA are needed for the synthesis of this polypeptide?

OR

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?

Q25. ACHOO syndrome is characterized by uncontrollable sneezing in response to the sudden exposure to bright light, typically intense sunlight. It is inherited as an autosomal dominant condition.
a) Draw a Punnett grid to determine the probability of producing an unaffected child by a heterozygous father and an unaffected mother.
b) Depict the inheritance using a pedigree.

Q26. A patient admitted in ICU was diagnosed to have suffered from myocardial infarction. Name two bioactive agents and their mode of action that can improve this condition.

Q27. Bacterial cells offer certain advantages over plant or animal cells that make them an easy choice for t production of many recombinant molecules. State three such advantages.

Q28. 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?

Case Based Questions: **Section – D**

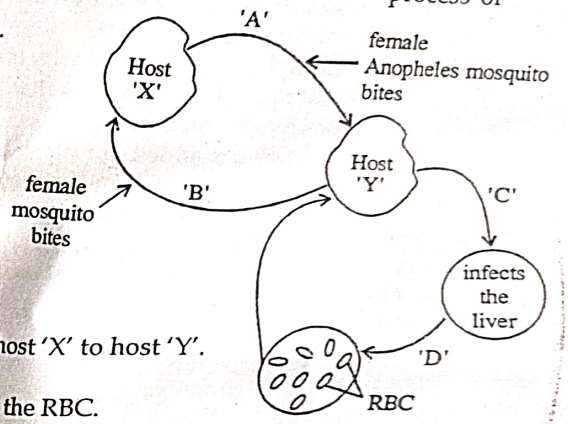
Q29. A population at Hardy-Weinberg equilibrium has two alleles for fur colour, red and black. Assume black is dominant to red fur colour of the animal in the population, 16 percent of the animals have red fur. **Based on the following situation answer the questions that follows:**

a) State the Hardy-Weinberg principle.
b) What percentage of the alleles in the population code for black fur?
c) What are the factors affecting the Hardy-Weinberg equilibrium in a population

OR

c) How does all the factors of Hardy-Weinberg equilibrium actually contributes to the process of evolution.

Q30. The diagram shows the life cycle of a pathogenic protozonan.



a) Name the parasitic stage that is being transferred from host 'X' to host 'Y'.
b) Write the changes the parasite undergoes in the liver.
c) Write the changes the parasite undergoes when it enters the RBC.
d) (i) Trace the changes the parasite undergoes when the host 'X' takes its blood meal from infected host 'X'.

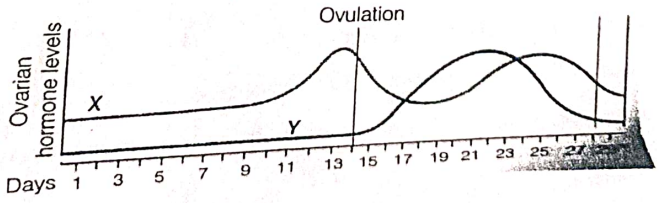
OR

(ii) At which stage during the life cycle of the pathogen does the host 'Y' experience the symptoms of the disease? Name the disease and the toxic substance responsible for these symptoms.

Section – E

Q31. Study the graph given below related with menstrual cycle in females.

a) Identify ovarian hormones X and Y mentioned in the graph and specify their source.



b) Correlate and describe the uterine events that take place according to the ovarian hormone levels X and Y mentioned in the graph on
(i) 6 – 15 days (ii) 16 – 25 days (iii) 26 – 28 days (when ovum is not fertilised)

OR

The embryo sac represents the female gametophyte in a flowering plant.

a) What are the constituents of the egg apparatus in the embryo sac?
b) What is the ploidy of the cells of the egg apparatus?

c) The formation of the embryo sac involves mitotic divisions that are "Free nuclear" till the 8-celled stage. What does the term "Free nuclear" mean?

d) The filiform apparatus at the micropylar end forms an important part of the embryo sac. What is the importance of the filiform apparatus?

e) Draw a well labelled diagram of it.

Q32. Stability, as one of the properties of genetic material, was very evident in one for the very early experiments in genetics. Name the scientist and describe his experiment. State the conclusion he arrived at.

OR

Protein synthesis requires the services of all three types of RNAs, namely t-RNA, mRNA and r-RNA. Explain the role of each of them during the process of protein synthesis in prokaryotes.

Q33. Give a reason why

a) Secondary productivity of herbivores is lower than primary productivity?

b) The ocean is not a productive ecosystem?

c) Given below is the approximate percentage content of cellulose, hemicelluloses and lignin composition of the same mass of dried grass and coconut husks.

	Cellulose	Hemicellulose	Ligning
Dried grass	40%	40%	20%
Coconut husks	25%	20%	50%

a) Considering ambient climatic conditions, which of these will take longer to decompose and why?

b) If these materials are found in marshy soils, would overall decomposition be faster? Justify?

OR

a) Compare, giving reasons, the J-shaped and S-shaped models of population growth of a species.

b) Explain "fitness of a species" as mentioned by Darwin.