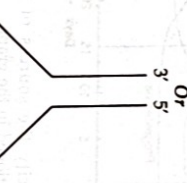


SECTION - E

Q.31. Nowadays gene therapy is an emerging technique used to treat genetic disorders that are caused by a non-functional gene. It works by delivering the "missing" gene's DNA to the cells of the body. For instance, in the genetic disorder cystic fibrosis, people lack function of a gene for a gene for a chloride channel produced in the lungs. In a recent gene therapy clinical trial, a copy of the functional gene was inserted into a circular DNA molecule called a plasmid and delivered to patients lung cells in spheres of membrane. In this example, biological components from different sources were combined to make a new product that helped preserve lung functional in cystic fibrosis patients.

Cell 1 : 3'-CATCATAGATGATC-5'
Cell 2 : 3'-CATATAGATGAACC-5'

- (a) What term is given to the stretch of DNA that codes for a polypeptide ?
- (b) Write the type of mutation in (i) cell 1 and (ii) cell 2, respectively.
- (c) (i) Write the mRNA transcribed by the mutated DNA in cell 1.
(ii) How many amino acids are coded by this mRNA ? Justify your answer.
- (d) Write the mRNA transcribed by the mutated DNA in cell 2.



- (a) Is gene therapy better than bone marrow transplant ?
- (b) What is gene therapy ?
- (c) Who is the father of gene therapy ?
- (d) What is the common form of gene therapy?

Given below is a list of some of the important products of DNA recombinant technology. Write application of each of following.

Recombinant product	Applications
1. Human Insulin (Humulin)	
2. Human growth hormone	
3. Calcitonin	
4. Vaccines	
5. Interferukins	

Q.32. A short stretch of DNA that codes for a polypeptide is give below :

3'-CATCATAGATGAACC-5'

In the different cells of an organism, two different types of errors have occurred during replication of DNA and sequences of bases in the DNA in the two cells are given below :

- (a) Identify the structure shown above.
 - (b) Redraw the structure as replication fork and label the parts.
 - (c) Write the source of energy for this replication and list the enzymes involved in this process.
 - (d) Mention the difference in the synthesis based on the polarity of two template strands. Briefly explain the events of fertilisation and implantation in an adult human female.
 - (e) Comment on the role of placenta as an endocrine gland.
- Or
- (a) Describe in sequence the process of microsporogenesis in angiosperms.
 - (b) Draw a labelled diagram of a mature dicot embryo.

SAMPLE QUESTION PAPER - 4

CLASS - 12
BIOLOGY

Maximum Marks : 70

Time Allowed : 3 hours

General Instructions : Same as in Sample Question Paper- 1

SECTION - A

- Q.1. Which method can be used for women that cannot produce ovum but can provide suitable environment ?
(a) IUD (b) GIFT
(c) IUI (d) ICSI
- Q.2. From the sexually transmitted diseases mentioned below, identify the one which does not specifically affect the sex organs.
(a) Syphilis (b) AIDS
(c) Gonorrhoea (d) Genital warts
- Q.3. Match the types of immunity listed in column I with the examples listed in column II. Choose the answer that gives the correct combination of alphabets of the two columns :

Column I	Column II
A. Natural active	(p) Immunity developed by heredity
B. Artificial passive	(q) From mother to foetus through placenta
C. Artificial active	(r) Injection of antiserum to travellers
D. Natural passive	(s) Fighting infections naturally induced by vaccination.
- Q.4. The RNA polymerase holoenzyme transcribes
(a) the promoter, structural gene and the terminator region.
(b) the promoter and the terminator region
(c) the structural gene only
(d) the theory of evolution supported by the experiment conducted by Louis Pasteur is
(a) Spontaneous generation theory
- Q.5. The theory of evolution supported by the experiment conducted by Louis Pasteur is
(a) Spontaneous generation theory
- Q.6. are used in detergent formulation and are helpful in removing oily stains from laundry.
(a) Lipases (b) Proteases
(c) Ligases (d) Pectinases
- Q.7. The disease chikungunya is transmitted by
(a) houseflies (b) Aedes mosquitoes
(c) cockroach (d) female Anopheles
- Q.8. Study the pedigree chart of a family showing the inheritance of myotonic dystrophy.
- Q.9. While isolating DNA from bacteria, which of the following enzymes is not used ?
(a) Lysozyme
(b) Ribonuclease
(c) Deoxyribonuclease
(d) Protease
- Q.10. Parasites that feed on the external surface of the host organism are called
(a) Ectoparasites
(b) Endoparasites
(c) Broodparasitism
(d) None of the above

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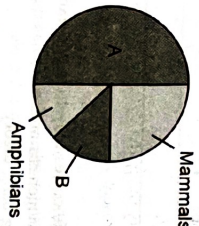
Link to Download : <https://bit.ly/42jzPB6>

Note : Solution of this paper will be available on 15th November 2023.

Q11. Which one occupies more than one trophic level in a pond ecosystem.

- (a) Zooplankton
- (b) Phytoplankton
- (c) Fish
- (d) Frog

Q12. Given is a pie diagram that represents the proportionate number species of major groups of invertebrates. Identify the groups A & B.



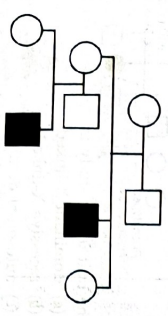
- (a) A - Reptiles, B - Birds
- (b) A - Fish, B - Birds
- (c) A - Birds, B - Fish
- (d) A - Birds, B - Reptiles

Question No. 13 to 16 consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

SECTION - B

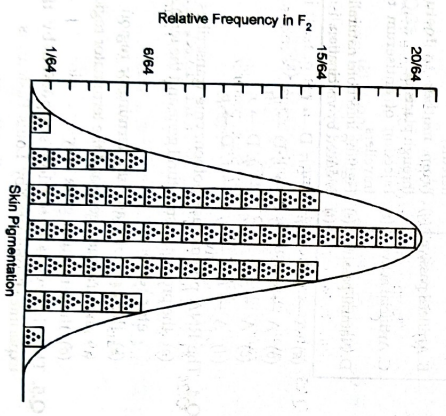
Q17. What is corpus luteum ? Under what conditions it undergoes degeneration.

Q18. Observe the pedigree chart and answer the following questions :



- (a) Identify whether the trait is sex-linked or autosomal.
- (b) Give an example of a disease in human beings which shows such a pattern of inheritance.

Q19. The traits studied by Mendel showed two distinct alternate forms, called contrasting traits/characters. But, there are many heritable characters, which are not so distinct in their occurrence, but are spread across a gradient. Such traits are controlled by more than one gene



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(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.

Q13. Assertion : Pollen tube is attracted to embryo sac.
Reason : Synergids secrete chemicals through their filiform apparatus.

Q14. Assertion : On true breeding lines, Mendel conducted cross pollination experiments.
Reason : For several generations, true breed line have stable trait inheritance.

Q15. Assertion : Intercropping checks the population of insects.
Reason : Plant pests can be controlled biologically by their natural parasites and pathogens.

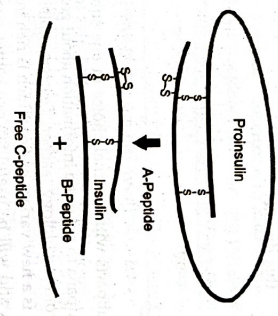
Q16. Assertion : Predation is an interspecific interaction with a feeding strategy.
Reason : Predators and their prey maintain fairly stable population through time and rarely one population become abundant or scarce.

Answer the following questions :

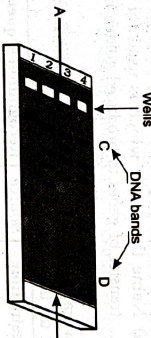
(a) How many genes are involved in the trait shown in the graph and how many phenotypes have appeared ?

(b) How does polygenic inheritance differ from pleiotropy ?

Q20. See the figure and answer the questions given below:



Q22. Study the given diagram and answer the following questions:



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

Q23. (ii) Identify the anode end in the diagram.
(iii) How are these DNA fragments present in a male gametophyte of angiosperms ? Mention the function of each of them.

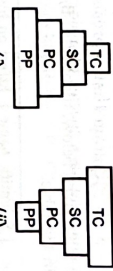
(a) Germ pore (b) Sporopollenin

Q24. According to the Human Genome Project, almost 99.9% nucleotide bases are exactly the same in all humans.

Answer the following questions based on the above information :
(i) Do you think the discrimination of people on the basis of colour, creed, caste, religion is correct ? Why ?

SECTION - C

(i) How many polypeptide chains are present in proinsulin.
(ii) How the maturation of proinsulin to insulin takes place ?

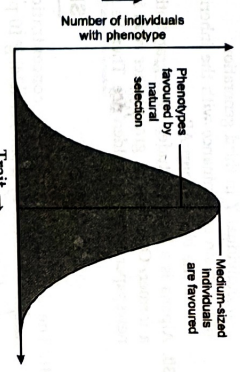


Identify the given pyramid (i) and (ii), what does it represent ?

(a) What is an ecological pyramid ?
(b) Which chromosomes has most genes on it ?

(ii) What percentage of the human genome codes for proteins ?
(iii) Write Hardy-Weinberg principle.

(ii) Explain the three different ways the natural selection can affect the frequency of a heritable trait in a population shown in the graph given below.



Q26. (a) Draw a sectional view of seminiferous tubule of a human. Label the following cells in the seminiferous tubule :
(i) Cells that divide by mitosis to increase their number.
(ii) Cells that undergo meiosis I.
(iii) Cells that undergo meiosis II.
(iv) Cells that help in the process of spermiogenesis.

(b) Mention the role of Leydig cells.

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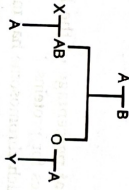
- Q27. (a) Highlight the role of thymus as a lymphoid organ.
 (b) Name the cells that are released from the above mentioned gland. Mention how they help in immunity.
 Or

Study the table given below. Identify A, B, C, D, E and F in the table.

Name of the Drug	Scientific name of Source Plant	Effect on human organ/system
Opioids 'C'	'A'	'B'
Cocaine 'E'	<i>Cannabis sativa</i>	'D'
		'F'

SECTION - D

- Q29. Study the given pedigree chart showing the pattern of blood group inheritance in a Family.



- (i) Give the genotype of the following :
 Parents
 Or

- The individual X in second generation.
 (ii) State the possible blood groups of the individual Y in third generation.
 (iii) Explain codominance with the inheritance of the blood group AB.

Q30. Alpina is a biology student, her grandfather is a farmer. One day her grandfather read in the newspaper about the golden rice. Then he asked

- Q28. Since the origin of life on Earth, there were five episodes of mass extinction of species.
 (i) How is the 'Sixth Extinction' presently in progress, different from the previous episodes?
 (ii) Who is mainly responsible for the 'Sixth Extinction'?

- (iii) List any four points that can help overcome this disaster?

Alpina to get more information about golden rice from her biology teacher. Teacher explained that it is a new variety of rice which is rich in vitamin A and will be useful for rice eating people.
 Now answer the following questions :

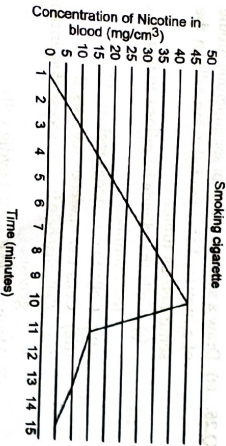
- (a) What is golden rice?
 (b) Who discovered golden rice?
 (c) What is the importance of golden rice?
 (d) Name the vector which is used for the transfer of genes to produced golden rice.
 Or

Few gaps have been left in the following table. Fill up the gaps.

Restriction Enzyme	Source	Recognition sequence and site of cleavage
Bam HI		
EcoRI		
Hind II		

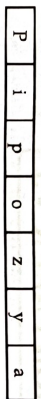
SECTION - E

- Q31. The data below shows the concentration of nicotine smoked by a smoker taking 10 puffs/minute.



- (a) With reference to the above graph explain the concentration of nicotine in blood at 10 minutes.
 (b) How will this affect the concentration of carbon monoxide and haemoglobin oxygen at 10 minutes?
 (c) How does cigarette smoking result in high blood pressure and increase in heart rate?
 Or
 (d) How does cigarette smoking result in lung cancer and emphysema?

- Q32. Observe the representation of genes involved in the *lac* operon given below.



- (a) Identify the region where the repressor protein will attach normally.
 (b) Under certain conditions repressor is unable to attach at this site. Explain.
 (c) If repressor fails to attach to the said site what products will be formed by z, y and a?
 Or
 (d) Analyze why this kind of regulation is called negative regulation.

Following are the results of a dihybrid cross between a homozygous dominant red-eyed normal winged female *drosophila* and recessive purple eyed, vestigial winged, homozygous male. The F₁ female is test crossed with homozygous recessive male.

Phenotype	Progeny	Observed	Expected if complete linkage	Expected if independent assortment
Parental types	(a) Red-eyed, normal wing (b) Purple eyed vestigial wing	1339 1195	1420 1420	710 710
Recombinant types	(a) Red-eyed, vestigial wing (b) Purple eyed normal wing	152 152	zero zero	710 710

- (i) What phenomenon is exhibited from the above results?
 (ii) What is dihybrid test cross?
 (iii) What is dihybrid test cross ratio?
 (iv) What is the percentage of recombinant types? What does it signify?
 (v) What is the percentage of parental types?
 (vi) What are the changes that occur in ovaries and uterus in human female during the reproductive cycle.
 Or

Explain development of a mature embryo from this embryo sac.



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