SAMPLE PAPER

CLASS 12

BIOLOGY

Set - 1

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. Which of the following is the most widely accepted method of contraception in India at present?
   (a) Cervical caps
   (b) Tubectomy
   (c) Diaphragms
   (d) Intra uterine devices

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

	Column I		**Column II**
A.	Fertilisation	(i)	Morula
B.	Cleavage	(ii)	Vagina
C.	Blastocyst	(iii)	Ampulla of oviduct
D.	Parturition	(iv)	Uterine wall

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

3. Which one of the following codons codes for the same information as UGC?
   (a) UGU
   (b) UGA
   (c) UAG
   (d) UGG

4. The Hardy-Weinberg principle cannot operate if

   (a) the population is very large

   (b) frequent mutations occur in the population

   (c) the population has no chance of interaction with other populations

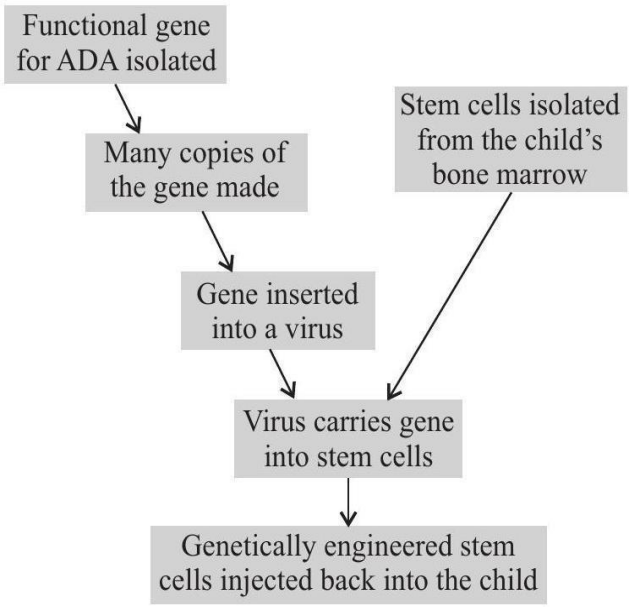
   (d) free interbreeding occurs among all members of the population.

5. In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells, then it leads to
   (a) autoimmune disease
   (b) active immunity
   (c) allergic response
   (d) graft rejection.

6. Select the correct option regarding a disease with its causal organism where haemozoin is released by the repture of RBCs.
   (a) Amoebiasis, Plasmodium vivax
   (b) Malaria, Rhinovirus
   (c) Malaria, Plasmodium falciparum
   (d) Pneumonia, Haemophilus influenzae

7. Which among these are produced by distillation of fermented broth?
   (i) Whisky
   (ii) Wine
   (iii) Beer
   (iv) Rum
   (v) Brandy
   (a) (ii) and (iii) only
   (b) (i) and (ii) only
   (c) (iii) and (v) only
   (d) (i), (iv) and (v) only

8. Children with Severe Combined Immunodeficiency Disorder (SCID) cannot produce many types of white blood cells that fight infections. This is because they do not have the functional gene to make the enzyme Adenosine Deaminase (ADA). Some children with SCID have been treated with stem cells as shown in the given flow chart.



Why are stem cells used in this treatment?

(a) Stem cells are capable of dividing for long periods to generate replacements for cells that are unable to produce ADA.

(b) The stem cells used here belong to the child and there will be no triggering of immune response.

(c) Stem cells are unspecialised and can differentiate to specialised cell types such as white blood cells to fight infection.

(d) All of these

9. When an exotic species was introduced in an area, what may be the most probable effect?

A. The population of native species may decrease to very low level due to invasive alien species.

B. Introduced species may achieve highest population density due to lack of predation.

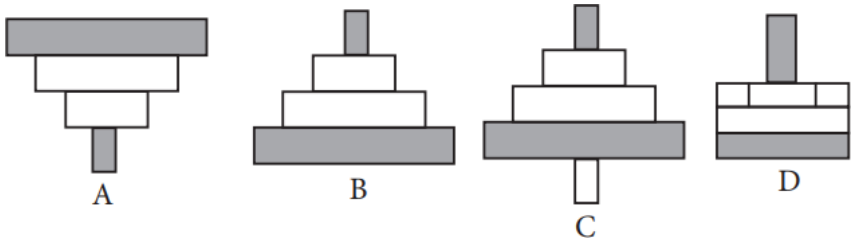
C. Species develop favourable mutations.

D. New species evolved due to different environment.

(a) A and B are correct.
(b) A, C and D are correct.
(c) C and D are correct.
(d) B, C and D are correct.

10. Tight one-to one relationship between plant and pollinator is found in
(a) fig and wasp
(b) fungus and roots of Pinus
(c) Anabaena and Azolla
(d) all of these.

11. Which of the following representations shows the pyramid of numbers in a forest ecosystem?



(a) D
(b) A
(c) B
(d) C

12. Which one of the following fish is being illegally introduced for aquaculture purposes and is posing a threat to the indigenous catfishes of Indian rivers?
(a) Clarias gariepinus
(b) Nile perch
(c) Clarias batrachus
(d) Protopterus

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

(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.

13. Assertion : All copulation lead to fertilisation and pregnancy.

Reason : Simultaneous transport of sperm and ovum in ampullary region results in fertilisation.

14. Assertion: Mendel conducted artificial pollination experiments for his genetic studies using true-breeding pea lines.

Reason : A true-breeding line shows the stable trait inheritance and expression for several generations.

15. Assertion : Agrobacterium tumefaciens is the causative agent of crown gall disease of dicots.

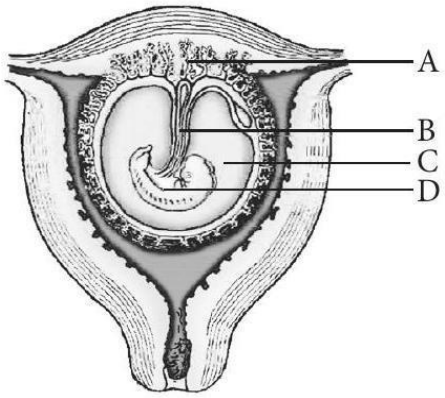
Reason : Agrobacterium tumefaciens transforms normal cell into tumour by inserting T-DNA.

16. Assertion : A population growing in a habitat with limited resources shows initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote, when the population density reaches the carrying capacity.

Reason : In Verhulst-Pearl Logistic growth, plot of N (population density) at time (t) results in a sigmoid curve.

SECTION - B

17. The following figure shows a fetus within the uterus. On the basis of the given figure, answer the questions that follow.



(i) In the given figure, identify the correct part among A, B, C and D that acts as a temporary endocrine gland and substantiate your answer. Why is it also called the functional junction?

(ii) Mention the role of B in the development of the embryo.

18. In Pisum sativum, the pod colour may be green (G) or yellow (g). What percentage of offsprings with green pod colour trait would be obtained in a cross of $Gg \times Gg$?

19. (a) What precaution(s) would you recommend to a patient requiring repeated blood transfusion?

(b) If the advise is not followed by the patient, there is an apprehension that the patient might contract a disease that would destroy the immune system of his/her body. Explain with the help of schematic diagram only how the immune system would get affected and destroyed.

20. What are recombinant proteins? How do bioreactors help in their production?

21. Construct a pyramid of biomass starting with phytoplanktons. Label 3 trophic levels. Is the pyramid upright or inverted. Give reason.

OR

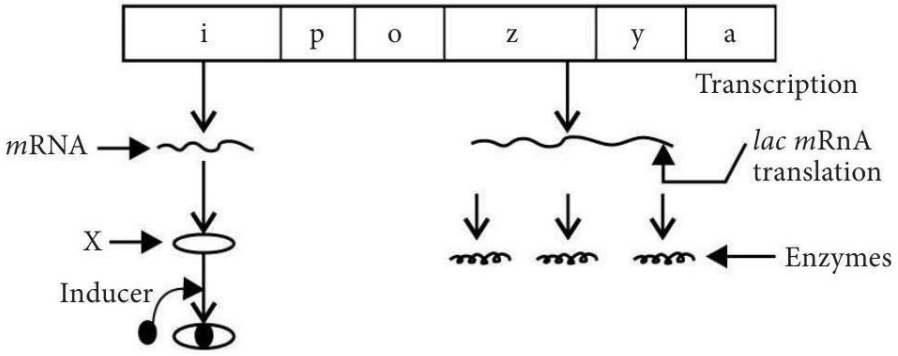
Construct an ideal pyramid of energy when 1,00,000 joules of sunlight is available. Label all its trophic levels.

SECTION - C

22. When does the corpus luteum degenerate? Explain the immediate consequences of its degeneration in human female.

23. Describe the development of endosperm in coconut.

24. Refer to the given figure of lac operon and answer the following questions.



(a) Name the molecule ' X ' synthesised by ' i ' gene. How does this molecule get inactivated?

(b) Which one of the structural genes codes for β-galactosidase?

(c) When will the transcription of this gene stop?

25. Explain convergent evolution taking one example for plants.

26. (a) The barriers in the innate immunity are given in the following table. Identify A, B, C, and D.

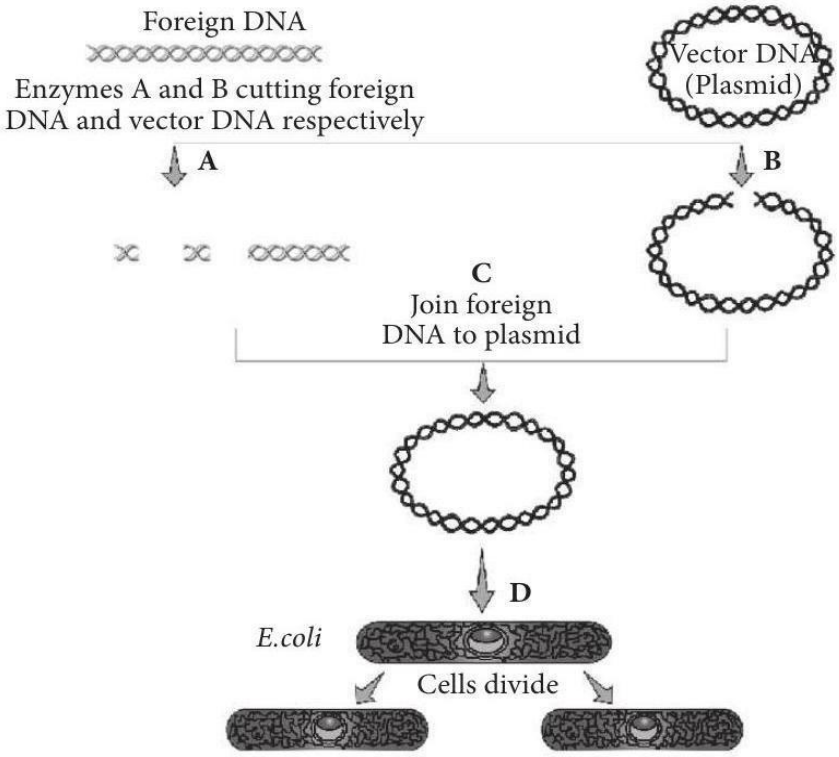
Type of barrier		**Barrier**
(i)	A	Skin, Mucous membrane
(ii)	Physiological	B, in the eye
(iii)	Cytokine	C
(iv)	Cellular	WBC, D

(b) Why sharing of injection needles between two individuals is not recommended?

OR

Write the scientific names of the causal organisms of amoebiasis, elephantiasis and ringworm in humans. Mention the body parts affected by them.

27. (a) Identify A, B, C and D in the flow chart given below that represents the process of recombinant DNA technology.



(b) State the role of C in biotechnology.

28. Explain, giving one example, how co-extinction is one of the causes of loss of biodiversity. List the three other causes also (without description).

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. Mendelism has certain limitations. Each trait controlled by atleast two alleles is not universally applicable. There are few exceptions to law of dominance which was discovered after Mendel. Incomplete dominance and codominance are such examples.

	Pattern of inheritance	**Monohybrid F_1 phenotypic expression**
(i)	Codominance	**X**
(ii)	**Y**	The progeny resembled only one of the parents.
(iii)	Incomplete dominance	**Z**

(a) Identify X, Y and Z in the given table.

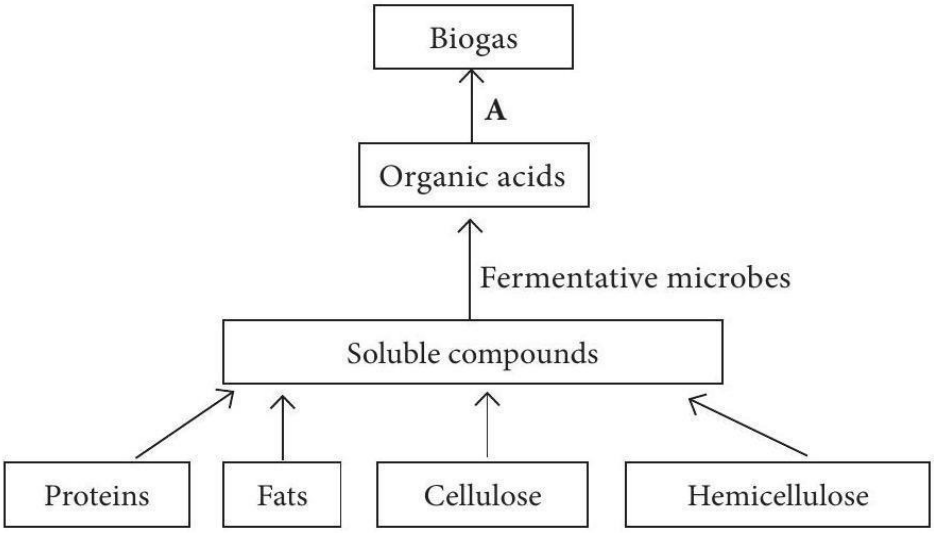
OR

Give one example where Y pattern of inheritance is seen.

(b) Discuss inheritance pattern of ABO blood groups shown by humans.

(c) Name the pattern of inheritance shown by flower colour of snapdragon. Explain with the help of cross upto F_2 generation.

30. 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 given flow chart for biogas production and answer the following questions.



(a) Name the group of bacteria (A) responsible for biogas production.

(b) What is the composition of biogas?

(c) How the bacteria responsible for biogas production is useful to cattle?

OR

Why biogas production is more common in rural areas?

SECTION - E

31. Mention the role of gonadotropins in menstrual cycle. On what day of the menstrual cycle do the gonadotropins reach a peak?

OR

Angiosperm flowers may be monoecious, cleistogamous or show self-incompatibility. Describe the characteristic features of each one of them and state which one of these flowers promotes inbreeding and outbreeding.

32. (a) What is a genetic code?

    (b) Explain the following:

    (i) Degenerate codon; (ii) Unambiguous codon; (iii) Initiator codon.

    OR

    Name and describe the technique that will help in solving a case of paternity dispute over the custody of a child by two different families.

33. (a) A recombinant vector with a gene of interest inserted within the gene of β-galactosidase enzyme, is introduced into a bacterium. Explain the method that would help in selection of recombinant colonies from non-recombinant ones.

    (b) Why is this method of selection referred to as "insertional inactivation"?

    OR

    Rahul was having a debate with Rohan regarding the advantages and disadvantages of transgenic animals. Rahul viewed that the production of transgenic animals violates the integrity of species and animals suffer from cruelty so, it is unethical. On the other hand, Rohan emphasised the benefits that transgenic animals provide to the human race in various fields especially medicine.

    (a) How do transgenic animals benefit humans?

    (b) List the ethical issues related with the production of transgenic animals.

SAMPLE PAPER

SOLUTION

BIOLOGY

CLASS 12

Solutions

1. (d) **2. (d)**

3. (a) : Both the codons UGC and UGU code for cystine amino acid. UAA, UGA and UAG are stop codons. UGG codes for tryptophan amino acid.

4. (b) : The Hardy-Weinberg principle says that allele frequencies in a population are stable and constant from generation to generation as long as:

- the population is large enough and changes in allele frequencies due to chance or accident are insignificant.
- mating occurs at random.
- mutation does not occur or if it does occur it must reach a state of equilibrium.
- all the members of the population survive and have equal reproductive rates.

5. (a) : Autoimmunity is a disorder of the body's defence mechanism in which an immune response is elicited against its own tissues, which are thereby damaged or destroyed. Autoimmunity may be caused due to genetic or environmental factors.

6. (c)

7. (d) : Hard liquors such as gin, whisky, sake, brandy and rum are obtained by distillation of fermented broth.

8. (d)

9. (a) : The population of native species may became very low due to introduction of invasive alien species. Increase in population of exotic species could be due to lack of predators.

10. (a) : In many species of fig trees, there is tight one-to-one relationship with pollinator species of wasp.

11. (d) : The representation of forest ecosystem in pyramid of numbers is always upright but spindle shaped because higher trophic level comprising of tertiary consumers is generally smaller than that of the lower trophic levels (*i.e*., secondary consumer, than primary consumer and primary producer).
The pyramid of number in parasitic food chain is inverted in case of single tree producer which can provide nourishment to several herbivores such as birds which can further support larger population of ectoparasites.

12. (a) : *Clarias gariepinus,* the African catfish has been illegally introduced for aquaculture in India. It is threatening native catfish (*Clarias batrachus*) of Indian rivers.

13. (d) : All copulations do not lead to fertilisation and pregnancy.

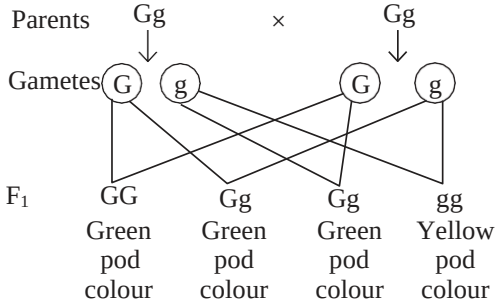
14. (a) : Mendel carried out hybridisation experiments on garden pea for many years. He performed various types of cross breeding and then allowed the offspring to self breed. All selected varieties used by him were pure lines of true breeding lines, *i.e.,* they produce offspring resembling the parents. These lines show the stable trait inheritance and expression for several generations making them suitable for genetic studies.

15. (a) : *Agrobacterium tumefaciens* is a rod shaped, Gram –ve soil bacterium which causes crown gall disease in over 140 species of dicots but it does not infect cereals. The bacterium contains tumour inducing plasmid (Ti plasmid) which integrates a segment of its DNA (T-DNA) into the DNA of its host plant thereby inducing formation of cancerous growth called crown gall tumour usually at graft or bud union, on roots and lower stem.

16. (b)

17. (i) Part labelled as A is placenta. It acts as an endocrine tissue and produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens, etc. It is also called the functional junction because it facilitates the supply of oxygen and nutrients to the embryo and removes carbon dioxide and excretory or waste materials produced by the embryo.
(ii) The labelled part B is umbilical cord. Placenta is connected to the embryo through an umbilical cord which helps in the transport of substances to and from the embryo.

18. In *Pisum sativum,* green pod colour is dominant over yellow. Thus, the cross between Gg × Gg will be:

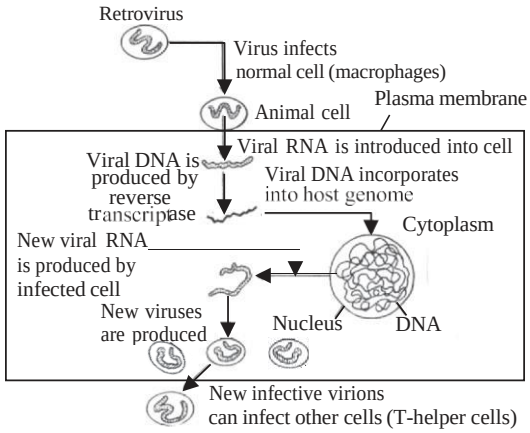


Genotype : GG : Gg : gg
1 : 2 : 1

Phenotype : Green pod colour : Yellow pod colour
3 : 1

Thus, 75% of offsprings will produce green pod colour.

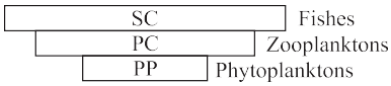
19. (a) If a patient requires repeated blood transfusion, it should be ensured that donor's blood has been screened for HIV and the syringes used should be new and disposable.
(b) If the patient does not follow these precautions, then he/she might get infected with HIV which causes AIDS (Acquired Immuno Deficiency Syndrome).
AIDS is a disorder of cell mediated immune system of the body. There is a reduction in the number of helper T-cells which stimulate antibody production by B-cells. This results in the loss of natural defence of the body against viral infection.



Thus, the immune system gets hampered due to the action of AIDS virus on T-lymphocytes and macrophages.

20. Recombinant protein is a protein obtained by introducing recombinant DNA into a heterologous host and causing it to produce the gene product. Bioreactors are vessels in which raw materials are biologically converted into specific products. A bioreactor provides the optimal conditions for achieving the desired product by providing optimum growth conditions (temperature, pH, substrate, salts, vitamins, oxygen). To maintain a higher yield, optimum temperature must be maintained and suitable pH must be provided.

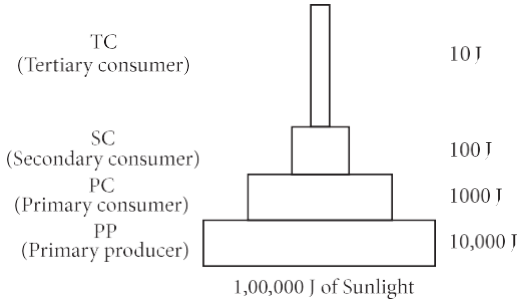
21. Pyramid of biomass starting with phytoplanktons will be for an aquatic ecosystem. It can be drawn as follows:



The pyramid of biomass in aquatic ecosystem is generally inverted because the biomass of fishes far exceeds that of phytoplanktons.

OR

An ideal pyramid of energy with primary producers when 100000 J of sunlight available is shown below:



22. In the absence of fertilisation, the corpus luteum degenerates. Degeneration of the corpus luteum leads to decrease in the production of progesterone. As progesterone is needed for the maintenance of the endometrium, its reduction leads to disintegration of endometrium thus causing menstruation.

23. In *Cocos nucifera* (coconut), the coconut water represents free-nuclear endosperm and the surrounding kernel represents the cellular endosperm. The primary endosperm nucleus (PEN) first undergoes a number of free nuclear divisions without wall formation to form a large number of free nuclei (free nuclear endosperm). When the fruit is about 50 mm long, the embryo sac gets filled with a clear fluid in which float numerous nuclei of various sizes. At a later stage (about 100 mm long fruit), the suspension shows, in addition to free nuclei, several cells each enclosing a variable number of nuclei. Gradually these cells and free nuclei start settling at the periphery of the cavity, and layers of cellular endosperm start appearing. This forms the coconut meat. The quantity of the cellular endosperm increases further by divisions of the cells.

24. (a) The molecule 'X' is repressor. It gets inactivated when lactose (inducer) binds with it.
(b) *z*-gene codes for β-galactosidase.
(c) Transcription of the gene stops when lactose is absent and thus repressor is free to bind with the operator.

25. Convergent evolution refers to the development of similar adaptive functional structures in unrelated group of organisms. It is also called adaptive convergence. *E.g.*, sweet potato (root modification) and potato (stem modification). Both look alike and perform the same function of food storage but are different in origin.

26. (a) A – Physical
B – Lysozyme
C – Interferon
D – Natural killer cells

(b) Sharing of injection needles between two individuals can transmit various diseases like AIDS and hepatitis B, as these diseases are transmitted *via* blood and semen.

OR

Amoebiasis is caused by *Entamoeba histolytica* and mainly affects large intestine of human.

Elephantiasis is caused by *Wuchereria bancrofti* and mainly affects lower limbs.

Ringworm is caused by *Trichophyton* and affects skin, hair and nails.

27. (a) In the given figure showing process of recombinant DNA technology, labelled parts A, B, C and D respectively represents restriction endonuclease, restriction endonuclease, DNA ligase and transformation respectively.

(b) DNA ligases (Label C) are also called genetic gum. They join two individual fragments of double stranded DNA by forming phosphodiester bonds between them thus, help in sealing of DNA fragments. Therefore, acts as molecular glue. The enzyme used most often is T_4 DNA ligase.

28. Co-extinction means that when a species become extinct, the plant and animal species associated with it in an obligatory relation also become extinct. For example, the case of a co-evolved plant-pollinator mutualism like in *Pronuba yuccaselles* and *Yucca* where extinction of one invariably leads to the extinction of the other.

The three other causes of biodiversity loss are:

(i) Habitat loss and fragmentation

(ii) Over-exploitation

(iii) Alien species invasion.

29. (a) X-Both the forms of a trait are equally expressed in F_1 generation.

Y-Dominance

Z-Phenotypic expression of F_1 generation is somewhat intermediate between the two parental forms of a trait.

OR

Dominance(Y) is seen when true breeding tall pea plant is crossed with true breeding dwarf pea plant.

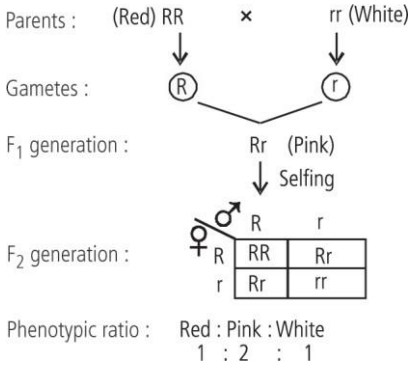
(b) ABO blood group in humans show following patterns of inheritance:

(i) Dominance : The alleles I^A and I^B both are dominant over allele *i* as I^A and I^B form antigen A and antigen B respectively but *i* does not form any antigen.

(ii) Codominance : Both the alleles I^A and I^B are codominant as both of them are able to express themselves in the presence of each other in blood group AB (I^AI^B) by forming antigens A and B.

(iii) Multiple allelism : It is the phenomenon of occurrence of a gene in more than two allelic forms on the same locus. The ABO blood groups in humans are determined by three different allelic forms I^A, I^B and *i*.

(c) Inheritance of flower colour in snapdragon is a good example of incomplete dominance.



30. (a) Methanogens or A (*e.g.*, *Methanobacterium*) grow anaerobically on celllosic material and produce large amount of methane along with CO_2 and H_2.

(b) Biogas is a mixture of gases, composed mainly of methane alongwith carbon dioxide and hydrogen.

(c) Methanogens are also present in rumen of cattle. These bacteria help in the breakdown of cellulose present in food of cattle and thus, play important role in nutrition of cattle.

OR

The excrete of cattle (dung) is rich in methanogen bacteria which is required for biogas production. Cattle dung is available in large quantities in rural areas, so, biogas plants are more often built in rural areas.

31. LH and FSH secreted by pituitary gland are called gonadotropins. The secretion of FSH and LH increases gradually during the follicular phase and stimulates the development of follicles as well as secretion of estrogens by the growing follicles. Both gonadotropins reach a peak level in the middle of the cycle (14th day). LH surge induces rupture of Graafian follicle and thereby the release of ovum (ovulation). This ovulatory phase is followed by luteal phase during which LH stimulates the remaining cells of the Graafian follicle to transform into corpus luteum which secretes large amounts of progesterone needed for maintenance of endometrium. In the absence of fertilisation, LH production gets reduced leading to degeneration of corpus luteum. This causes disintegration of endometrium leading to menstruation.

OR

Monoecious flowers are bisexual, *i.e.*, they bear both male and female reproductive organs on the same plant, *e.g.*, maize.

Cleistogamous flowers are those flowers which do not open at all. These flowers are bisexual and remain closed causing self pollination. In cleistogamous flowers, the anthers dehisce inside closed flowers. Growth of style brings the pollen grains in contact with stigma. Pollination and seed setting are assured. Pollinators are not required, *e.g*., *Commelina benghalensis,* balsam.

Self incompatibility is inability of pollen of a plant to fertilise the pistil of the same plant, *e.g*., *Primula.*

Monoecious and cleistogamous flowers promote inbreeding whereas self incompatibility in plants promotes outbreeding.

32. (a) The relationship between the sequence of amino acids in a polypeptide and nucleotide sequence of DNA or *m*RNA is called genetic code.

(b) (i) Degenerate codon : More than one codons code for a single amino acid. In degenerate codons, generally the first two nitrogen bases are similar while the third one is different. *E.g*., UUU and UUC code for phenylalanine.

(ii) Unambiguous codon : Codons that specify only one amino acid and not any other. *E.g*., AUG codes for methionine.

(iii) Initiator codons : The start codon is the first codon of mRNA transcript. It initiates the process of translation. *E.g*., AUG.

OR

DNA fingerprinting technology is a technique of determining nucleotide sequences of certain portion of DNA which are unique to each individual. DNA fingerprints can be prepared from extremely minute amounts of blood, semen, hair bulb or certain other cells of the body. The major steps are as follows :

(i) DNA is extracted from the cells. It is cut into fragments with the help of restriction enzymes. The fragments of DNA also contain VNTRs (Variable Number Tandem Repeats) which vary in number from person to person.

(ii) DNA fragments are separated by passing through gel electrophoresis.

(iii) Separated DNA sequences are transferred from gel onto a nitrocellulose or nylon membrane.

(iv) Radioactive DNA probes complementary to VNTRs are poured over the nylon membrane. Some of them bind with VNTRs (Southern Blotting).

(v) X-ray film is exposed to the nylon sheet which gives dark bands at the probe sites. Thus, hybridised fragments are detected by autoradiography. The dark bands on X-ray film represent the DNA fingerprints (DNA profiles).

33. (a) Insertional inactivation refers to the process where insertion of *r*DNA within the coding sequence of an enzyme causes its inactivation. The non-recombinants having intact functional gene, *e.g.* β-galactosidase produce blue colour with chromogenic substrate but when *r*DNA is inserted within the coding sequence of enzyme β-galactosidase, recombinants do not produce any colour. Hence, recombinants can be easily differentiated from non-recombinants due to insertional inactivation.

(b) In this method, insertion of recombinant DNA in the coding sequence of enzyme β-galactosidase causes its inactivation, hence named insertional inactivation.

OR

(a) Benefits derived from transgenic animals are as follows:

(i) They produce useful biological products, that can be created by introduction of portion of gene, which codes for a particular product such as human protein (α-1- antitrypsin) from transgenic sheep is used to treat emphysema.

(ii) Transgenic mice are being developed for use in testing the safety of vaccine before they are used for humans.

(iii) They carry genes which make them more sensitive to toxic substances than non-transgenic animals. They are then exposed to toxic substances and the effects are studied.

(iv) Transgenic animals can be specifically designed to allow the study of how genes are regulated and how they affect the normal functions of the body and its development, e.g., study of complex factors involved in growth such as insulin-like growth factor.

(v) Many transgenic animals are designed to increase our understanding of how genes contribute to the development of disease. Today transgenic models exist for many human diseases such as cancer, cystic fibrosis, rheumatoid arthritis and Alzheimer's.

(b) The ethical issues concerned with the production of transgenic animals include:

(i) Use of animals in biotechnology causes great suffering to them.

(ii) It is disrespectful to living beings, and only exploits them for the benefit of human beings.

☺ ☺ ☺

SAMPLE PAPER

CLASS 12

BIOLOGY

SET 2

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. The function of copper ions in copper releasing IUDs is that they

   (a) inhibit gametogenesis

   (b) make uterus unsuitable for implantation

   (c) inhibit ovulation

   (d) suppress sperm motility and fertilising capacity of sperms.

2. Match List-I with List-II.

	List-I		**List-II**
(p)	Vaults	(i)	Entry of sperm through cervix is blocked
(q)	IUDs	(ii)	Removal of vas deferens
(r)	Vasectomy	(iii)	Phagocytosis of sperms within the uterus
(s)	Tubectomy	(iv)	Removal of fallopian tube

Choose the correct answer from the options given below.

	p	q	r	s
(a)	(iii)	(i)	(iv)	(ii)
(b)	(iv)	(ii)	(i)	(iii)
(c)	(i)	(iii)	(ii)	(iv)
(d)	(ii)	(iv)	(iii)	(i)

3. If the total amount of adenine and thymine in a double stranded DNA is 55%, the amount of guanine in this DNA will be
   (a) 45%
   (b) 27.5%
   (c) 25%
   (d) 22.5%.

4. Hardy-Weinberg equilibrium is known to be essentially affected by factors like, gene flow, genetic drift, mutation, genetic recombination and
   (a) evolution
   (b) limiting factors
   (c) saltation
   (d) natural selection.

5. Identify the type of immunity obtained when a injection of antitoxin in tetanus is given?
   (a) Active immunity
   (b) Humoral immunity
   (c) Passive immunity
   (d) All of these

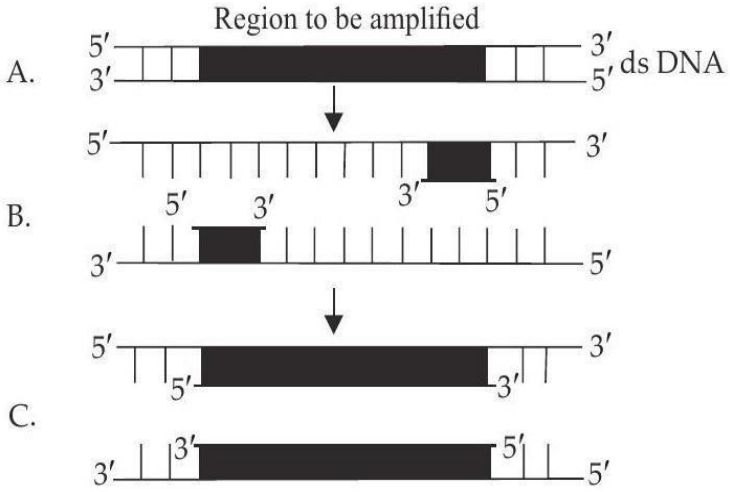
6. Which lymphoid organ atrophies with age?
   (a) Bone marrow
   (b) Peyer's patches
   (c) Thymus
   (d) Spleen

7. BOD is (i) in polluted water and (ii) in potable water.

	(i)	(ii)
(a)	more	less
(b)	less	more
(c)	less	less

(d) medium less

8. The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents.



(a) B - denaturation at a temperature of about 98°C separating the two DNA strands

(b) A - denaturation at a temperature of about 50°C

(c) C - extension in the presence of heat stable DNA polymerase

(d) A - annealing with two sets of primers

9. A biologist studied the population of rats in a barn. He found that the average natality was 250 , average mortality 240, immigration 20 and emigration 30 . The net increase in population is
(a) 05
(b) zero
(c) 10
(d) 15.

10. Which interaction is shown when the invasive prickly pear cactus brought under control after introduction of moth from its natural habitat?
(a) Predation
(b) Amensalism
(c) Mutualism
(d) Competition

11. Mr. *X* is eating curd/yoghurt. For this food intake in a food chain he should be considered as occupying
(a) first trophic level
(b) second trophic level
(c) third trophic level
(d) fourth trophic level.

12. In which of the following, both pairs have correct combination?
    (a) In-situ conservation : Seed Bank Ex-situ conservation : National Park
    (b) In-situ conservation : Tissue culture Ex-situ conservation : Sacred groves
    (c) In-situ conservation: National Park
    (d) In-situ conservation : Cryopreservation Ex-situ conservation : Botanical Garden Ex-situ conservation : Wildlife Sanctuary

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

    (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.

13. Assertion : In angiosperms, the central cell after triple fusion becomes the primary endosperm cell.

    Reason : Double fertilisation ensures that the nutritive tissue is formed before the zygote starts cleaving.

14. Assertion : When yellow bodied, white eyed Drosophila females were hybridised with brown-bodied, red eyed males; and F_1 progeny was intercrossed, F_2 ratio deviated from $9:3:3:1$.

    Reason : When two genes in a dihybrid are on the same chromosome, the proportion of parental gene combinations are much higher than the non-parental type.

15. Assertion : Organisations like GEAC are necessary to monitor GM researches and to test the safety of introducing GM organisms for public services.

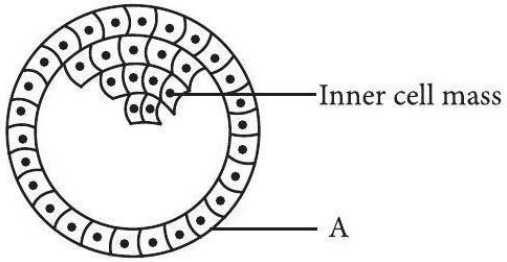
    Reason : GM researches can have unpredictable results which even can be disastrous when genetically modified organisms are introduced into the ecosystem.

16. Assertion : Predators maintain prey population under control.

    Reason : Predators reduce the intensity of competition among competing prey species.

SECTION - B

17. Refer to the following figure and answer the questions that follow :



(i) Name the stage of human embryo the figure represents. Identify ' *A* ' in the figure and mention its functions.

(ii) Where are the stem cells located in this figure?

18. A cross between a red flower bearing plant and a white flower bearing plant of Antirrhinum produced all plants having pink flowers. Work out a cross to explain how this is possible.

19. Name an allergen and write the response of the human body when exposed to it.

20. (a) How is an exonuclease functionally different from an endonuclease?

    (b) Give an example of any two endonucleases other than Sal I.

21. Construct a pyramid of numbers considering a big banyan tree supporting a population of insects, small birds and their predators.

    OR

    Explain 'standing crop' in an ecosystem. Draw a pyramid of biomass when a small standing crop of phytoplanktons supports large standing crop of zooplanktons in the sea.

SECTION - C

22. Explain the hormonal control of spermatogenesis in humans.

23. Emasculation and bagging are the two important steps carried during artificial hybridisation to obtain superior varieties of desi red plants. Explain giving reasons, in which types of flowers and at what stages are the two processes carried out.

24. What are 'SNP's? Where are they located in a human cell? State any two ways the discovery of SNPs can be of importance to humans.

25. (a) Rearrange the following in the correct order of their appearance on earth between two million years and 40,000 years back.

    Neanderthals, Australopithecines, Homo erectus and Homo habilis.

    (b) Which one of the above
    (i) had the largest brain size
    (ii) ate fruits?

26. (a) Name and explain giving reasons, the type of immunity provided to the newborn by the colostrum and vaccinations.

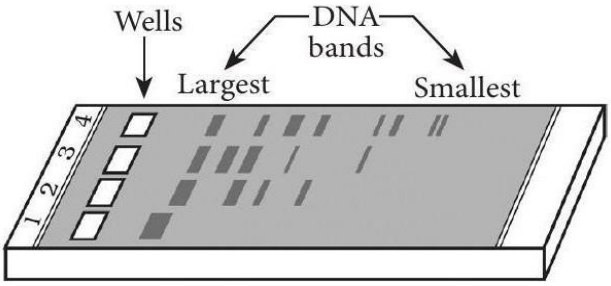
    (b) Name the type of antibody

    (i) present in colostrum (ii) produced in response to allergens in human body.

OR

At what stage is Plasmodium picked up by the female Anopheles? Describe the life cycle of the parasite in this insect.

27. Name and describe the technique shown below that helps in separating the DNA fragments formed by the use of restriction endonuclease.

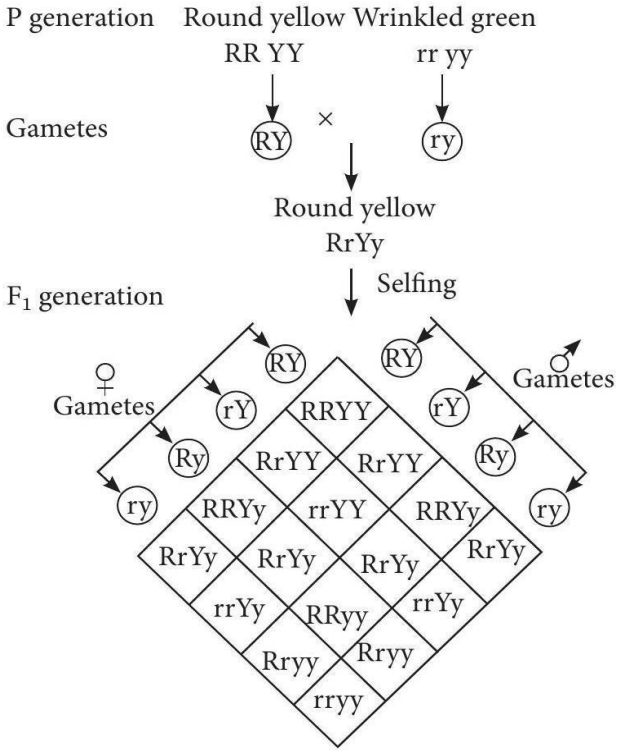


28. What are the consequences of loss of biodiversity in a region? Explain.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. A scientist crosses homozygous round yellow seeded pea plant to homozygous wrinkled green seeded pea plant and observed the inheritance of both traits as per the following pattern. He collected total 1600 seeds in F_2 generation.



(a) How many seeds would be homozygous for round shape and green colour in F_2 generation? OR

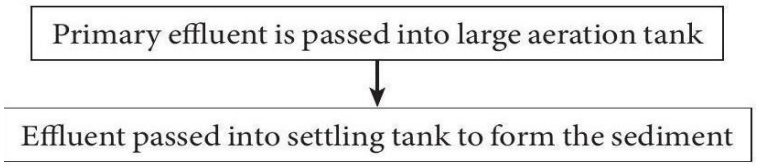
How many seeds could be heterozygous for round shape and yellow colour in F_2 generation?

(b) What phenotypic ratio would be obtained if the plants of F_1 generation would be crossed with wrinkled green seeded plant?

(c) What would be the total number of seeds heterozygous for yellow colour and homozygous for round seed shape?

30. Large quantities of sewage is generated everyday in cities and towns, which is treated in Sewage Treatment Plants (STPs) to make it less polluted. Given below is the flow chart of one of the stages of STP.

Observe the given flow chart and answer the questions accordingly.



(a) Why large aeration tanks are important for primary effluent?

(b) Write the significance of activated sludge.

(c) Explain the digestion step in the formation of biogas.

OR

Explain the role of flocs in the given sewage treatment plant (STP).

SECTION - E

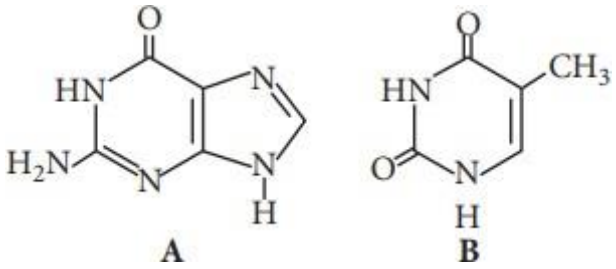
31. Explain the different stages of oogenesis in humans starting from fetal life till its completion. When and where in body is oogenesis completed?
(a) Trace the development of embryo after syngamy in a dicot plant with diagrams.
(b) Endosperm development precedes embryo development. Give reason.

32. Observe the given figures and answer the following questions.

(a) Identify the nitrogenous bases A and B.

(b) Where are these molecules found?

(c) What are the type and number of bonds they form with other nitrogenous bases?



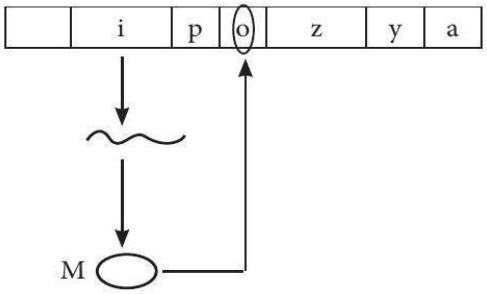
OR

Refer to given figure showing regulation of gene expression in E.coli and answer the following questions.

(a) Name the molecule ' *M* ' that binds with the operator.

(b) Mention the result of such binding.

(c) What will prevent the binding of the molecule ' M ' with the operator gene? Mention the event that follows.



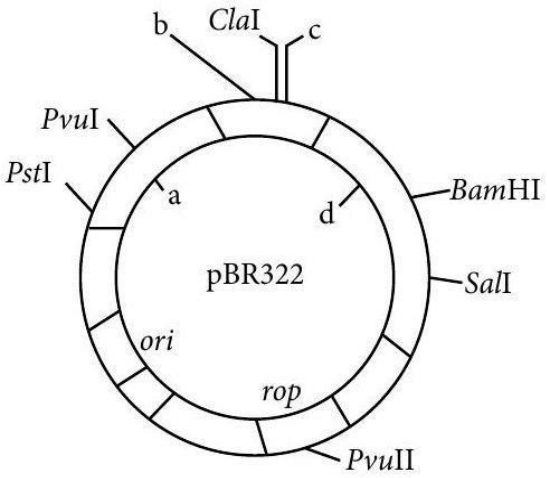
33. (a) A and B are the two different cloning vectors in two different bacterial colonies cultured in chromogenic substrate. Bacterial colonies with cloning vector A were colourless whereas those with B were blue coloured. Explain giving reasons the cause of the difference in colour that appeared.

(b) What are cloning vectors? Give examples.

(c) How do 'ori' and 'cloning sites' facilitate cloning into a vector?

OR

(a) Identify the selectable markers in the diagram of E. coli vector shown below.



(b) How is the coding sequence of β-galactosidase considered a better marker than the ones identified by you in the diagram? Explain.

SAMPLE PAPER

CLASS 12

BIOLOGY

SET-03

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. To prove that DNA is the genetic material, which radioactive isotopes were used by Hershey and Chase (1952) in their experiments?
   (a) ^{35} and ^{15} N
   (b) ^{32}P and ^{35} S
   (c) ^{32}P and ^{15} N
   (d) ^{14} N and ^{15} N

2. Complete the given table showing different possibilities of genotypes and their corresponding blood groups, by selecting the correct option.

Genotypes	**Blood groups**
I^AI^A,___(i)___	A
I^BI^B, ___(ii)___	B
__(iii)___	AB
__(iv)___	O

(i) (ii) (iii) (iv)

(a) ii I^Bi I^Ai I^AI^B

(b) I^A $_i$ I^Bi ii I^AI^B

(c) I^A ^{A} I^B ^{i} I^AI^B ii

(d) I^A $_i$ I^Bi I^AI^B I^Bi

3. The theory of natural selection was given by
   (a) Lamarck
   (b) Alfred Wallace
   (c) Charles Darwin
   (d) Oparin and Haldane.

4. The biomass available for consumption by the herbivores is called
   (a) net primary productivity
   (b) secondary productivity
   (c) standing crop
   (d) gross primary productivity.

5. Which of the following is correctly matched for the product produced by them?
   (a) Methanobacterium : Lactic acid
   (b) Penicillium notatum : Penicillin
   (c) Saccharomyces cerevisiae : Acetic acid
   (d) Acetobacter aceti : Antibiotics

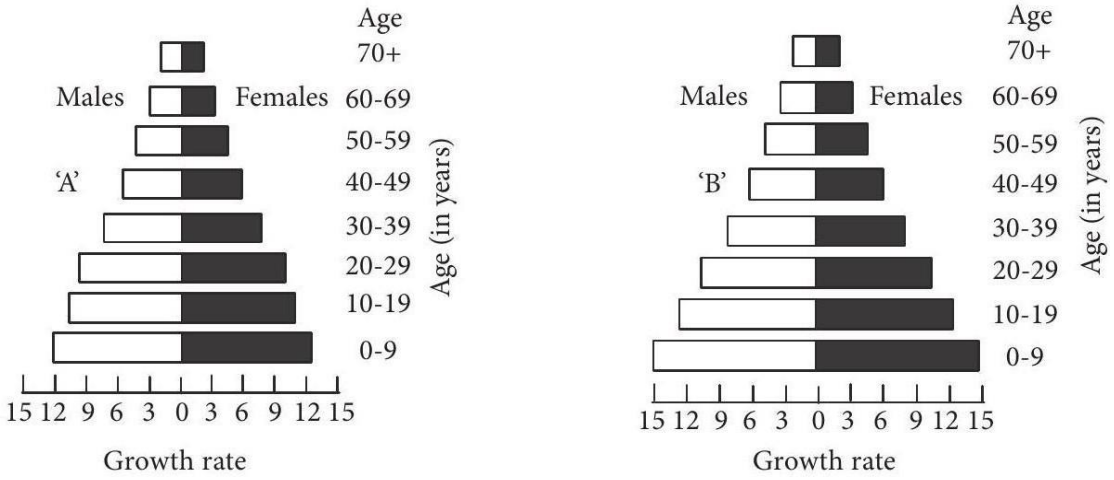
6. Which of the following is not a cloning vector?
   (a) Cosmid
   (b) pBR322
   (c) Sal I
   (d) Phagemid

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

	Column I		**Column II**
A.	amp^R gene	(i)	Artificial plasmid
B.	Separation of DNA fragments	(ii)	Selectable marker
C.	Hind II	(iii)	Electrophoresis
D.	pBR322	(iv)	Haemophilus influenzae Rd

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

8. A country with a high rate of population growth took measures to reduce it. The figure below shows age-sex pyramids of populations A and B twenty years apart. Select the correct interpretation about them.



Interpretations:

(a) " B " is earlier pyramid and shows stabilised growth rate.

(b) " B " is more recent showing that population is very young.

(c) "A" is the earlier pyramid and no change has occurred in the growth rate.

(d) "A" is more recent and shows slight reduction in the growth rate.

9. A plant has 24 chromosomes in "microspore mother cell". The number of chromosomes in its endosperm will be
(a) 36
(b) 24
(c) 12
(d) 48 .

10. Which of the following microbes is used for the commercial production of ethanol?
(a) Clostridium butylicum
(b) Trichoderma polysporum
(c) Monascus purpureus
(d) Saccharomyces cerevisiae

11. Match column I with column II and select the correct option.

	Column I		Column II
A.	Apomixis	(i)	Mango
B.	Polyembryony	(ii)	Seedless fruit
C.	Parthenocarpy	(iii)	Asteraceae

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

12. Which of the following is used as 'clot buster' for removing clots from blood vessels of patient who have undergone myocardial infarction?
(a) Ethanol
(b) Statins
(c) Cyclosporin-A
(d) Streptokinase

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

(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.

13. Assertion: Relationship between Balanus and Chthamalus is said to be an example of competition.

Reason: In amensalism, one species is harmed whereas the other is unaffected.

14. Assertion: Dodo, Passenger pigeon, Steller's sea cow have become extinct due to over exploitation.

Reason: Excessive exploitation of a species, whether animal or plants reduces size of its populationso that it becomes vulnerable to extinction.

15. Assertion: Threatened species are those living species which have been greatly reduced in number and are liable to become extinct if the causative factors continue.

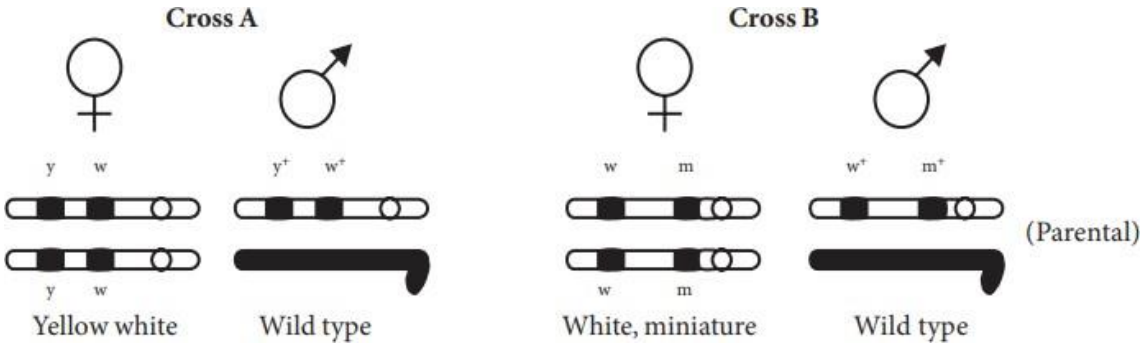
Reason: IUCN is an international organisation which maintains the IUCN Red List of threatened species, to assess the conservation status of different species.

16. Assertion: In a microsporangium, the tapetal cells possess little cytoplasm and generally have a single prominent nucleus.

Reason : During microsporogenesis, the microspore mother cells (MMCs) undergo meiotic divisions to produce haploid microspore tetrads.

SECTION - B

17. Study the figures given below and answer the question.



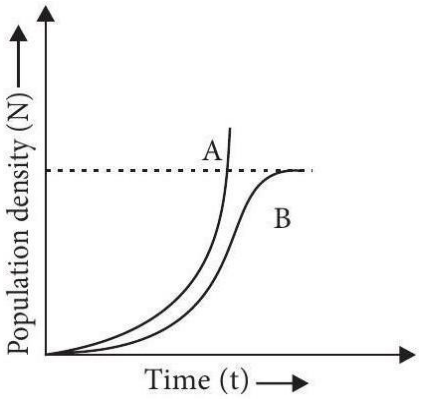
Identify in which of the given crosses, the strength of linkage between the genes is higher. Give reason in support of your answer.

18. List the different parts of the human oviduct through which the ovum travels till it meets the sperm for fertilisation.

19. How is insertional inactivation of an enzyme used as a selectable marker to differentiate recombinants from non-recombinants?

20. Explain, giving two reasons, how immune response by "vaccine" is different from that by "antitoxin injected to humans.

21. Study the graph given below and answer the questions that follow.



(a) Write the status of food and space in the curves A and B.

(b) Time has been shown on X-axis and there is a parallel dotted line above it. Give the significance of this dotted line.

R

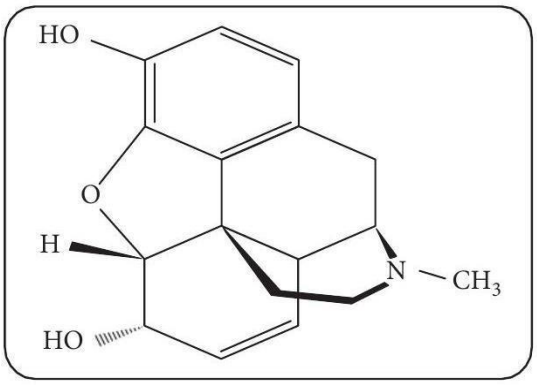
What is mutualism? Explain with an example.

SECTION - C

22. Why is the possibility of a human female suffering from haemophilia rare ? Explain.

23. How would lac operon operate in E. coli growing in a culture medium where lactose is present as source of sugar?

24. Identify the chemical structure of compound shown below. State any three of its physical properties.



25. Explain the roles of the following with the help of an example each, in recombinant DNA technology :

    (a) Restriction endonucleases

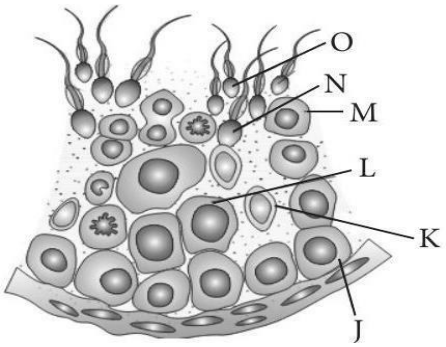
    (b) Plasmids

26. Many plant and animal species are on the verge of their extinction because of loss of forest land by indiscriminate use by the humans. As a biology student what method would you suggest along with its advantages that can protect such threatened species from getting extinct?

OR

Compare narrowly utilitarian and broadly utilitarian approaches to conserve biodiversity, with the help of suitable examples.

27. Study the transverse section of part of seminiferous tubule and answer the following questions.



(a) Identify the cell that undergo reduction division to form secondary spermatocyte.

(b) How many among the labelled parts have 46 chromosomes?

(c) State the role of ' K ' in this figure.

28. Explain the events in a normal woman during her menstrual cycle on the following days:

(a) Pituitary hormone levels from 8 to 12 days.

(b) Uterine events from 13 to 15 days.

(c) Ovarian events from 16 to 23 days.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. A person gave blood at a blood donation camp where the nurse recklessly injected used syringe. After that, he suffered from bouts of fever, diarrhoea and weight loss and experienced weakness. The levels of helper T-lymphocytes and interferons showed significant change. Doctor suggested he was suffering from severe viral infection.

(a) Name the diagnostic test for the given condition.

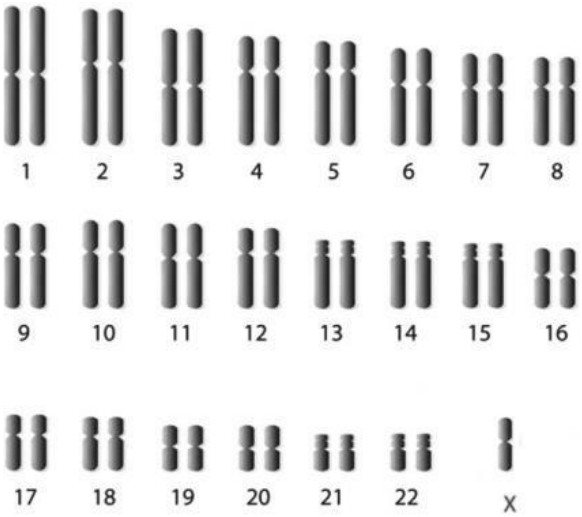
OR

Name the virus and enzyme responsible for its replication.

(b) Mention two measures for preventing this viral infection.

(c) Name the cells of immune system of body that are affected by this infection. Also, mention its role.

30. Given below shows karyotype of a child who is suffering from a sex chromosomal abnormality which occurs during failure of segregation of chromatids during cell division cycle. This results in the gain or loss of a chromosome (s), called aneuploidy.



(a) Name the type of aneuploidy shown in this disease.

(b) Write the chromosomal complement of the child.

(c) How does sex chromosomal abnormality occurred in the child?

OR

Mention the diagnostic features of the disease.

SECTION - E

31. (a) What is gene therapy?

(b) Mention the cause of ADA deficiency in humans. How has genetic engineering helped patients suffering from it?

OR

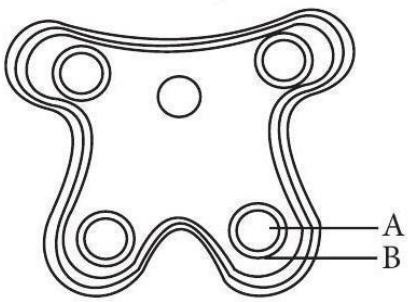
Explain with the help of diagram the process of amplification of a gene of interest using polymerase chain reaction.

32. (a) IUDs are said to be effective contraceptives. Name any two commonly used IUDs and write their mode of action.

(b) Name and explain the surgical method advised to human males and females as a means of birth control. Mention its one advantage and one disadvantage.

OR

(a) In the T.S. of a mature anther given below, identify "A" and " B " and mention their functions.



(b) Name the organic material present in outer layer of pollen grain.

(c) How are 'pollen banks' useful?

33. Work out a monohybrid cross upto F_2 generation between two pea plants and two Antirrhinum plants both having contrasting traits with respect to colour of flower. Comment on the pattern of inheritance in the crosses carried above.

OR

(a) Dihybrid cross between two garden pea plant, one homozygous tall with round seeds and the other dwarf with wrinkled seeds was carried.

(i) Write the genotype and phenotype of the F_1 progeny obtained from this cross.

(ii) Give the different types of gametes of the F_1 progeny.

(iii) Write the phenotypes and its ratios of the F_2 generation obtained in this cross along with the explanation provided by Mendel.

(b) How were the observations of F_2 progeny of dihybrid crosses in Drosophila by Morgan different from that of Mendel carried in pea plants? Explain giving reasons.

SAMPLE PAPER

CLASS 12

BIOLOGY

SET-04

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. A decline in population size will be in the simulation
   (a) Natality < Mortality
   (b) Mortality < Natality
   (c) Immigration = Emigration
   (d) Emigration < Immigration.

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

	Column I		**Column II**
A.	Chromosomal aberration	(i)	An additional sex chromosome
B.	Down's syndrome	(ii)	Inversion
C.	Klinefelter's syndrome	(iii)	Presence of an extra chromosome
D.	Turner's syndrome	(iv)	Absence of sex chromosome

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

3. Cancer cells do not exhibit the property of
   (a) generating tumors
   (b) metastasis
   (c) contact inhibition
   (d) less number of mitochondrial cristae.

4. Mendel's law of independent assortment does not hold true for the genes that are located closely on
   (a) same chromosome
   (b) non-homologous chromosomes
   (c) X-chromosome
   (d) autosomes.

5. Percentage of photosynthetically active radiation (PAR) that is captured by plants in synthesis of organic matter is
   (a) $50 - 70\%$
   (b) $30 - 40\%$
   (c) $80 - 100\%$
   (d) $2 - 10\%$.

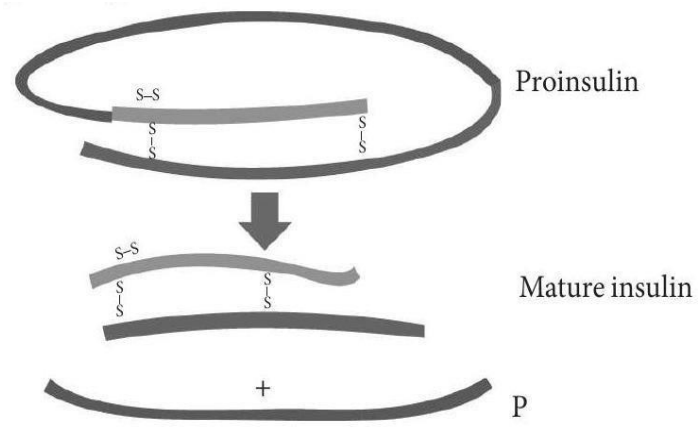
6. Monascus purpureus is a yeast commercially used in the production of
   (a) citric acid
   (b) ethanol
   (c) blood cholesterol lowering statins
   (d) streptokinase for removing clots from blood vessels.

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

	Column I		**Column II**
A.	Sporozoites	(i)	Infectious form of Plasmodium
B.	Filariasis	(ii)	Aedes mosquitoes
C.	Typhoid	(iii)	Wuchereria
D.	Chikungunya	(iv)	Widal test

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

8. Identify the product P in the given figure.



(a) Polypeptide chain A
(b) Polypeptide chain B
(c) Polypeptide chain C
(d) None of these

9. Identify the disease, that can affect both the male and the female genitals.
(a) Cholera
(b) Pneumonia
(c) Gonorrhoea
(d) amoebiasis.

10. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis?

(a) The smaller the fragment size, the farther it moves.

(b) Positively charged fragments move to farther end.

(c) Negatively charged fragments do not move.

(d) The larger the fragment size, the farther it moves.

11. Population growth-curve is sigmoid, if the growth pattern is
(a) logistic
(b) geometric
(c) exponential
(d) accretionary.

12. Red List contains data or information on
(a) all economically important plants
(b) plants whose products are in international trade
(c) threatened species
(d) marine vertebrates only.

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

(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.

13. Assertion : In a terrestrial ecosystem, detritus food chain is the major conduit for energy flow.

    Reason : Solar energy is the direct source for energy supply in a detritus food chain.

14. Assertion: Although geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy.

    Reason : In geitonogamy, pollen grains from the anthers of one flower are transferred to the stigma of another flower borne on the same plant.

15. Assertion: The female external genitalia includes mons pubis, labia majora and labia minora.

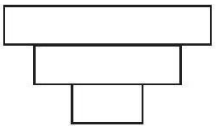
    Reason : The glandular tissue of each breast is divided into 5-10 mammary lobes.

16. Assertion : Hardy-Weinberg principle explains the variations occurring in population and species over a number of generations.

    Reason : Hardy-Weinberg principle is applicable in absence of genetic drift and gene flow.

SECTION - B

17. Identify the type of the given ecological pyramid and give one example each of pyramid of number and pyramid of biomass in such cases.



18. Write the basis of naming the restriction endonuclease EcoRI.

19. Write the Oparin and Haldane's hypothesis about the origin of life on Earth. How does meteorite analysis favour this hypothesis?

20. Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible?

21. Why is "Saheli" considered an effective contraceptive for women to space children?

    OR

List any two reasons other than physical and congenital disorders for causing infertility in couples.

SECTION - C

22. (a) Differentiate between geitonogamy and xenogamy.

    (b) Write the difference in the characteristics of the progeny produced as a result of the two processes.

23. (a) Differentiate between a template strand and coding strand of DNA.

    (b) Mention the contribution of genetic maps in human genome project.

24. (a) Why are transgenic animals so called?

    (b) Explain the role of transgenic animals in (i) vaccine safety and (ii) biological products with the help of an example each.

25. Explain the genetic basis of blood groups in human population.

26. (a) How many number of nuclei are present in a fully developed male gametophyte of angiospermic plants?

    (b) How many meiotic divisions are required for the formation of 400 pollen grains?

    Draw a well labelled diagram of L.S. of embryo of grass.

27. (a) Name the two growth models that represent population growth and draw the respective growth curves they represent.

    (b) State the basis for the difference in the shape of these curves.

    (c) Which one of the curves represent the human population growth at present? Do you think such a curve is sustainable? Give reason in support of your answer.

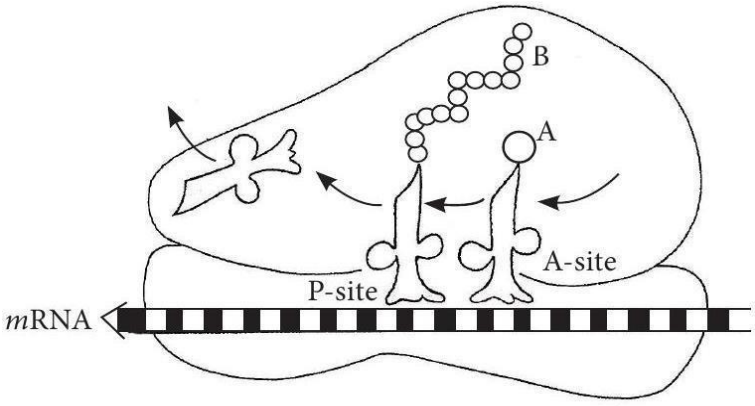
28. (a) Why is there a fear amongst the guardians that their adolescent wards may get trapped in drug/alcohol abuse?

    (b) Explain 'addiction' and 'dependence' in respect of drug/alcohol abuse in youth.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. Observe the given figure and answer the following questions.



(a) Identify A and B in the given figure.

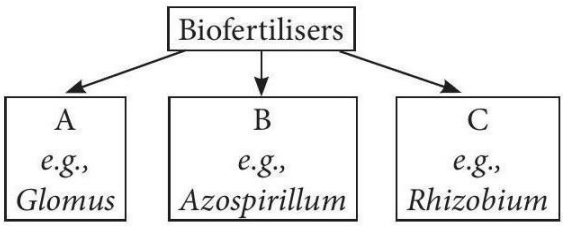
OR

Write the two specific codons that a translational unit of m RNA is flanked by one on either sides.

(b) State the functions of amino acyl (A) site and peptidyl transfer (P) site.

(c) How does elongation of B occur?

30. Study the given flow chart and answer the following questions.



(a) Identify A, B and C in the given flow chart.

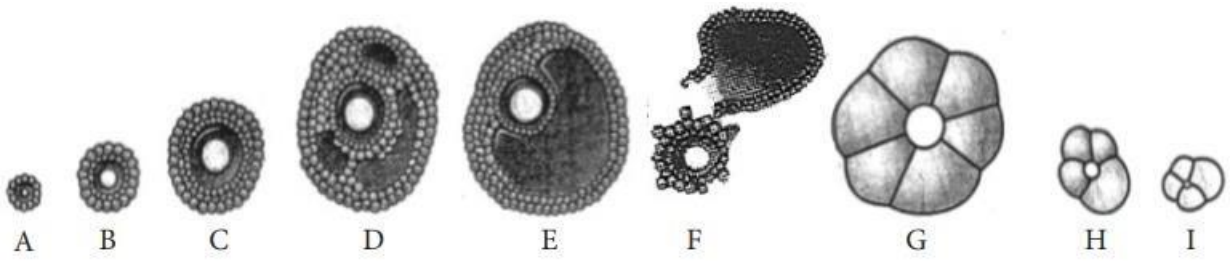
(b) Give one another example of biofertiliser B.

(c) How does the application of the fungal genus, Glomus, to the agricultural farm increase the farm output?

Why is Rhizobium act as a biofertiliser?

SECTION - E

31. The following is the illustration of the sequence of ovarian events "A" to "I" in a human female.



(a) Identify the figure that illustrates ovulation and mention the stage of oogenesis it represents.

(b) Name the ovarian hormone and the pituitary hormone that have caused the above mentioned event.

(c) Explain the changes that occur in the uterus simultaneously in anticipation.

(d) Write the difference between ' C ' and ' H '.

(e) Draw a labelled sketch of the structure of a human ovum prior to fertilisation.

OR

(a) Explain the menstrual phase in a human female. State the levels of ovarian and pituitary hormones during this phase.

(b) Why is follicular phase in the menstrual cycle also referred as proliferative phase? Explain.

(c) Explain the events that occur in a Graafian follicle at the time of ovulation and thereafter.

(d) Draw a Graafian follicle and label follicular antrum and secondary oocyte.

32. In pea plantlet, symbol Y represent dominant yellow; symbol y, the recessive green; symbol R, the round seed shape and symbol r, the wrinkle seed shape. A typical Mendelian dihybrid cross was carried out in pea plants.

(a) Write the genotypes of

(i) homozygous dominant and recessive parents

(ii) gametes produced by both the parents

(iii) F_1 offspring

(iv) gametes produced by F_1 offspring

(b) Write the Mendelian F_2 phenotypic ratio in a dihybrid cross. State the law that he proposed on the basis of this ratio. How is this law different from the law of segregation?

OR

How are the following formed and involved in DNA packaging in a nucleus of a cell?

(i) Histone octamer

(ii) Nucleosome

(iii) Chromatin

33. (a) List the key tools used in recombinant DNA technology.
(b) Explain the role of Ti plasmids in biotechnology.

OR

(a) Describe the different steps in one complete cycle of PCR.

(b) State the purpose of such an amplified DNA sequence.

SAMPLE PAPER

CLASS 12

BIOLOGY

SET-05

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. Which of the following contraceptive methods involve a role of hormone?

   (a) Pills, Emergency contraceptives, Barrier methods

   (b) LNG-20 Pills, Emergency contraceptives

   (c) Barrier method, Lactational amenorrhea, Pills

   (d) Copper T, Pills, Emergency contraceptive

2. Given below are four methods (A-D) and their modes of action (i-iv) in achieving contraception. Select their correct matching from the four options that follow.

	Method		**Mode of Action**
A.	The pill	(i)	Prevents sperms reaching cervix
B.	Condom	(ii)	Prevents implantation
C.	Vasectomy	(iii)	Prevents ovulation
D.	Copper T	(iv)	Semen contains no sperms

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

3. In a 3.2Kbp long piece of DNA, 820 adenine bases were found. What would be the number of cytosine bases?
   (a) 780
   (b) 1560
   (c) 740
   (d) 1480

4. Evolutionary convergence is characterised by

   (a) development of dissimilar characteristics in closely related groups

   (b) development of a common set of characteristics in groups of different ancestry

   (c) development of characteristics by random mating

   (d) replacement of common characteristics in different groups.

5. Which one of the following immune system components does not correctly match with its respective role?

   (a) Interferons - Secreted by virus-infected cells and protect non-infected cells from further viral infection.

   (b) B-lymphocytes - Produce antibodies in response to pathogens into blood to fight with them.

   (c) Macrophages - Mucus secreting cells that trap microbes entering in the body.

   (d) IgA - Present in colostrum in early days of lactation to protect infant from diseases.

6. MALT is
   (a) Muscle Associated Lymphoid Tissue
   (b) Mucosal Associated Lymphoid Tissue
   (c) Mucosal and Lymphoid Tissue
   (d) Memory Associated Lymphoid Tissue.

7. From a sewage treatment plant, three water samples A, B and C are tested for BOD value and the recorded values of BOD are 6mg/L, 400mg/L and 20mg/L respectively. What is correct about these samples?

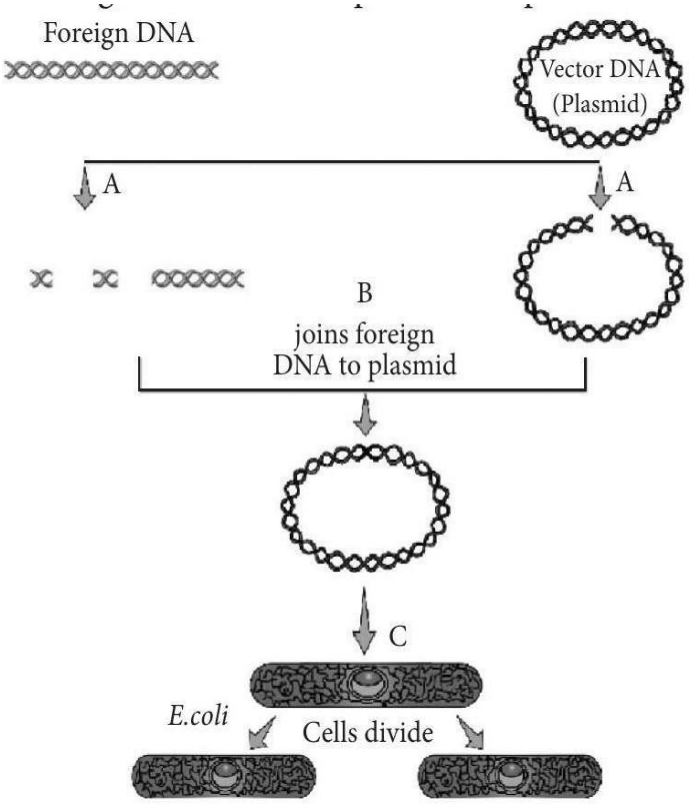
   (a) Sample A is taken from untreated sewage.

   (b) Sample B belongs to secondary effluent of sewage treatment plant.

   (c) Sample C is taken from primary effluent.

(d) Sample B is collected from untreated sewage.

8. Identify A, B and C in the flow chart given below that represents the process of recombinant DNA technology.



(a) A-Restriction exonuclease, B-DNA ligase, C-Transformation

(b) A-Restriction endonuclease, B-DNA ligase, C-Transformation

(c) A-Restriction endonuclease, B-Hydrolase, C-Transcription

(d) A-Restriction exonuclease, B-Hydrolase, C-Transcription

9. The age structure of a population influences population growth because

(a) younger females have more offsprings than older females

(b) different age groups have different reproductive capabilities

(c) more the number of immature individuals, slower the growth of population

(d) a shorter generation time results in slower population growth.

10. Competition for light, nutrients and space is most severe between

(a) closely related organisms growing in different niches

(b) closely related organisms growing in the same area/niche

(c) distantly related organisms growing in the same habitat

(d) distantly related organisms growing in different niches.

11. Food chain in which microorganisms break down the dead organic matter is
    (a) parasitic food chain
    (b) detritus food chain
    (c) consumer food chain
    (d) predator food chain.

12. Which of the following is not an example of in situ conservation?
    (a) Biosphere reserves
    (b) National parks
    (c) Wildlife sanctuaries
    (d) Zoological parks

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

(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

13. Assertion : Ex-albuminous seeds do not possess any residual endosperm, as it is completely consumed during embryo development.

    Reason : Wheat, castor, pea and groundnut all are examples of ex-albuminous seeds.

14. Assertion : Linked genes do not show dihybrid ratio of 9: 3: 3: 1.

    Reason : Linked genes do not undergo independent assortment.

15. Assertion: Human insulin can be produced into bacterial cells using biotechnology.

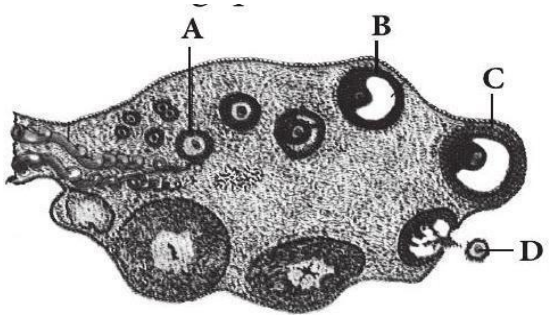
    Reason : To produce human insulin the A, B and C polypeptides of the human insulin are produced separately in the bacterial cells, extracted and combined by creating disulphide bonds.

16. Assertion : Mycorrhizae represent a mutually beneficial interspecific interaction of fungi with roots of higher plants.

    Reason : In a mutualistic relationship, both the organisms enter into some sort of physiological exchange.

SECTION - B

17. Refer to the given figure and answer the following questions.



(i) Which of the labelled structures is a pre-birth structure and is not formed thereafter?

(ii) Which of the labelled structures responds to LH surge by rupturing?

18. Tallness of pea plant is a dominant trait, while dwarfness is the alternate recessive trait. When a pure-line tall is crossed with pure-line dwarf, what fraction of tall plant in F_2 shall be heterozygous? Give reasons.

19. A young boy when brought a pet dog home started to complaint of watery eyes and running nose. The symptoms disappeared when the boy was kept away from the pet.

(a) Name the type of antibody and the chemicals responsible for such a response in the boy.

(b) Mention the name of any one drug that could be given to the boy for immediate relief from such a response.

20. State the functions of the following in the cloning vector pBR322 :
(a) ori
(b) *rop*

21. Write the relationship between productivity, gross primary productivity, net primary productivity and secondary productivity.

OR

State the difference between the first trophic levels of detritus food chain and grazing food chain.

SECTION - C

22. Explain the steps in the formation of an ovum from an oogonium in humans.

23. (a) Can a plant flowering in Mumbai be pollinated by pollen grains of the same species growing in New Delhi? Provide explanations to your answer.

(b) Draw the diagram of a pistil where pollination has successfully occurred. Label the parts involved in transferring the male gametes to their desired destination.

24. (a) What do ' Y ' and ' B ' stand for in ' YAC ' and 'BAC' used for DNA sequencing in Human Genome Project (HGP)? Mention their role in the project.

    (b) Write the percentage of human genome that codes for proteins and the percentage of discovered genes whose functions are unknown.

    (c) Expand 'SNPs' identified by scientists in HGP.

25. (a) Explain adaptive radiation with the help of a suitable example.

    (b) Cite an example where more than one adaptive radiation have occurred in an isolated geographical area. Name the type of a evolution your example depict and state why it is so named.

26. Why are lymph nodes and bone marrows called lymphoid organs? Explain the functions of each one.

    OR

    (a) Name the causative organisms for the following diseases:
    (i) Elephantiasis
    (ii) Ringworm
    (iii) Amoebiasis

    (b) How can public hygiene help control infectious diseases?

27. (a) Explain the basis on which the gel electrophoresis technique works.

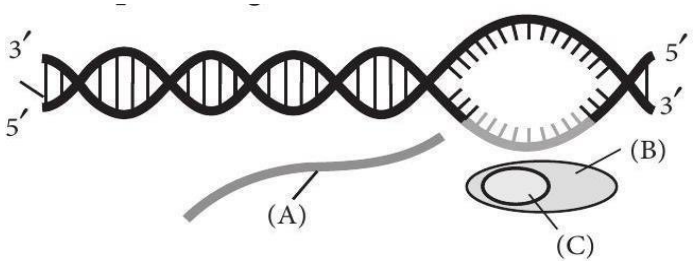
    (b) Write any two ways by which products obtained through this technique can be utilised.

28. Name and describe any three causes of biodiversity losses.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. The process of copying genetic information from template strand of DNA into RNA is called transcription. It is mediated by RNA polymerase. Transcription takes place in the nucleus of eukaryotic cells. In transcription, only a segment of DNA and only one of the strands is copied into RNA. Transcription mainly consists of three steps. One of the steps of transcription is given below.



(a) Identify the given step and name the labels B and C.

OR

What will happen if C is not available in the above process?

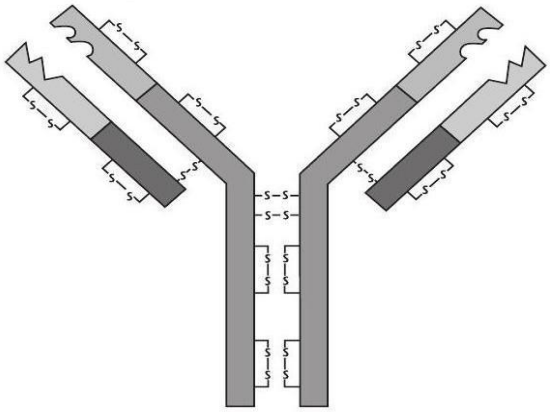
(b) What changes will take place in A after the completion of above process in eukaryotes?

(c) Briefly explain the previous step or given figure taking place in prokaryotes.

30. Acquired immunity is pathogen specific and characterised by memory. Whenever our body encounters a pathogen for the first time, it produces a response. Subsequent encounter with the same pathogen elicts a highly intensified secondary response.

(a) Name the two lymphocytes which are responsible for acquired immunity.

(b) Identify the structure shown in the figure.



(c) It is generally observed that the children who had suffered from chicken-pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.

OR

Differentiate between the two lymphocytes responsible for acquired immunity.

SECTION - E

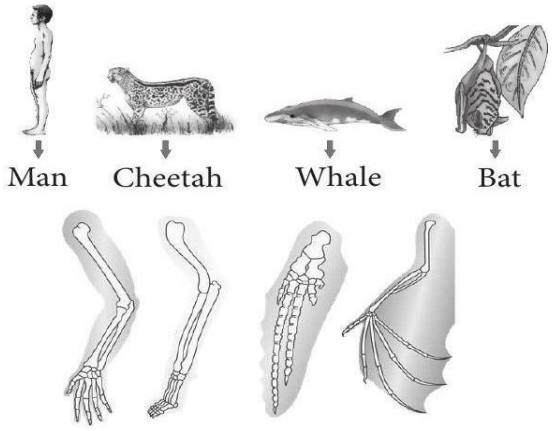
31. Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

OR

(i) Trace the development of megaspore mother cell up to the formation of a mature embryo sac in a flowering plant.

(ii) Draw a labelled diagram of the structure of mature dicot embryo.

32. (a) Forelimbs of given animals have the same basic structural plan. Such organs have similar developmental pattern and they develop in related organisms, but these do differ morphologically. What type of evolution and structure is exhibited by the organisms given in the figure.



(b) (i) Differentiate between analogy and homology giving one example each of plant and animal.

(ii) How analogy and homology considered as an evidence in support of evolution?

OR

Refer to the given information regarding human evolution given below and answer the following questions. The fossil evidence clearly indicates that origin of man occured in Central Asia. About 15 mya, primates called Dryopithecus and Ramapithecus were existing. Among the stories of evolution, the story of evolution of modern man appears to parallel evolution of human brain and their charactristics development.

(a) Where did Australopithecus evolve?

(b) Write the scientific name of Java man.

(c) Name the first human like hominid. Mention his food habit and brain capacity.

(d) Write the characteristics of Ramapithecus and Neanderthal man.

33. (i) What is EcoRI? How does EcoRI differ from an exonuclease?

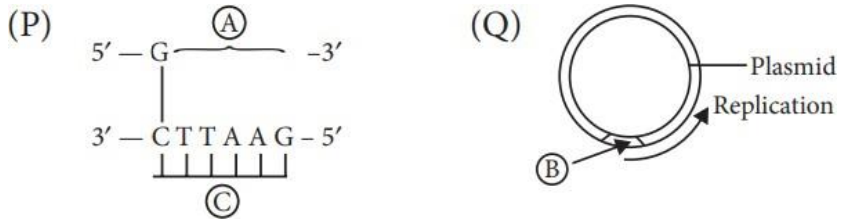
(ii) EcoRI is used to cut a segment of foreign DNA and that of a vector DNA to form a recombinant DNA. Show with the help of schematic diagrams.

(a) The set of palindromic nucleotide sequence of base pairs the EcoRI will recognise in both the DNA segments. Mark the site at which EcoRI will act and cut both the segments.

(b) Sticky ends formed on both the segments where the two DNA segments will join later to form a recombinant DNA.

OR

(i) (a) Identify (A) and (B) illustrations in the following:



(b) Write the term given to (A) and (C) and why?

(ii) (a) Expand PCR. Mention its importance in biotechnology.

(b) Describe the roles of heat, primers and the bacterium Thermus aquaticus in the process of PCR.

SAMPLE PAPER

CLASS 12

BIOLOGY

SET-06

BIOLOGY

Time: 3 Hours **Maximum 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.

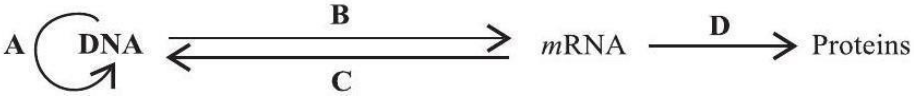
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

1. The three codons which result in the termination of polypeptide chain synthesis are
   (a) UAA, UAG, GUA
   (b) UAA, UAG, UGA
   (c) UAA, UGA, UUA
   (d) UGU, UAG, UGA.

2. The given flow chart represents the flow of genetic information between biomolecules. Identify the processes A, B, C and D and select the correct option.



	A	B	C	D
(a)	Translation	Transcription	Replication	Reverse Transcription
(b)	Replication	Transcription	Translation	Reverse Transcription
(c)	Replication	Transcription	Reverse Transcription	Translation
(d)	Replication	Reverse Transcription	Transcription	Translation

3. Which of the following appeared during ice age between 75,000 - 10,000 years ago?
   (a) Cro-Magnon man
   (b) Neanderthal man
   (c) Modern Homo sapiens
   (d) Heidelberg man

4. Which of the following equations correctly represents Verhulst-Pearl logistic growth?
   (a) $dN/dt = rN\left(\frac{K-N}{K}\right)$
   (b) $dN/dt = \frac{rN}{K}$
   (c) $dN/dt = \left(\frac{N(K-N)}{K}\right)$
   (d) $dN/dt = \left(\frac{r(K-N)}{K}\right)$

5. Introduction of Nile Perch in lake Victoria of East Africa resulted in
   (a) excessive growth of water weeds
   (b) elimination of water weeds
   (c) elimination of many species of cichlid fish
   (d) excessive growth of cichlid fish.

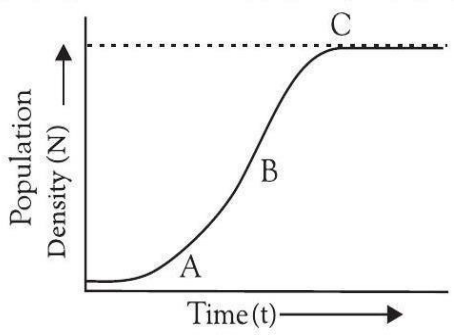
6. During isolation of genetic material, the chemical used to precipitate out the purified DNA is
   (a) bromophenol blue
   (b) chilled ethanol
   (c) ethidium bromide
   (d) both (b) and (c).

7. Match column I (enzyme) with column II (characteristic/activity) and select the correct answer from the given codes.

	Column I		**Column II**
A.	Taq DNA polymerase	(i)	Cleaves the ends of linear DNA
B.	Exonuclease	(ii)	Breakdown of fungal cell wall
C.	Protease	(iii)	Stable above 90°C
D.	Chitinase	(iv)	Made only by eukaryotic cells
		(v)	Degradation of proteins

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

8. For a population, the population density (N) was plotted against time (t) and growth curve obtained is shown in figure marked by A, B and C. Find the correct information about marked phases.



(a) A-initial log phase of growth

(b) C-final growth phase with rapid increase

(c) B-middle log phase with exponential growth

(d) A-initial exponential growth phase

9. Every time, when the dosage of a drug has to be increased to achieve the same 'kick' that initially occurred in response to a smaller dose, this condition is known as
(a) rebound effect
(b) tolerance
(c) withdrawal symptoms
(d) addiction.

10. Which of the following is widely used as a successful biofertiliser in Indian rice field ?
(a) Rhizobium
(b) Acacia arabica
(c) Acalypha indica
(d) Azolla pinnata

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

	List I		**List II**
A.	Parthenocarpy	(i)	Seed formation without fertilisation
B.	Polyembryony	(ii)	More than one embryo in same seed
C.	Apomixis	(iii)	Seedless fruits without fertilsation
D.	False fruit	(iv)	Thalamus contributes to fruit formation

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

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

12. Pollination in water hyacinth and water lily is brought about by the agency of
    (a) water
    (b) insects or wind
    (c) birds
    (d) bats.

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

    (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.

13. Assertion : Net primary productivity is equal to gross primary productivity minus respiration.

    Reason : Secondary productivity is produced by heterotrophs.

14. Assertion: Plasmodium is an endoparasite.

    Reason : Plasmodium lives over the surface of their host.

15. Assertion : A network of food chains existing together in an ecosystem is known as a food web.

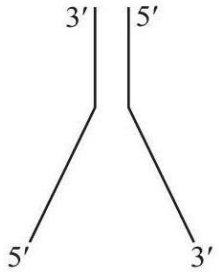
    Reason : An animal like kite cannot be a part of a food chain.

16. Assertion : Water constitutes a major mode of pollination in most of the aquatic angiospermous plants.

    Reason : Vallisneria and Zostera are examples of water pollinated plants.

SECTION - B

17. Refer to the figure given below.



(a) Redraw the structure as a replicating fork and label the parts.

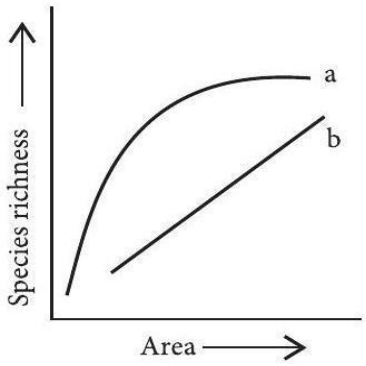
(b) Write the source of energy for this replication.

18. Where is sporopollenin present in plants? State its significance with reference to its chemical nature.

19. What could be the possible treatments for a patient exhibiting ADA deficiency?

20. Name the genus of baculovirus that acts as a biological control agent inspite of being a pathogen. Justify by giving three reasons that make it an excellent candidate for the job.

21. Refer to the given graph showing species-area relationship. Write the equation of the curve 'a' and explain it.



OR

How does over-exploitation of beneficial species affect biodiversity? Explain with the help of one example.

SECTION - C

22. A cross was carried out between two pea plants showing the contrasting traits of height of the plants. The result of the cross showed 50% parental characters.

(a) Work out the cross with the help of a Punnett square.

(b) Name the type of the cross carried out.

23. Although a prokaryotic cell has no defined nucleus, yet DNA is not scattered throughout the cell. Explain.

24. 'Plasmid is a boon to biotechnology'. Justify this statement quoting the production of human insulin as an example.

25. Prior to a sports event, blood and urine samples of sports persons are collected for drug tests.

(a) Why is there a need to conduct such tests?

(b) Name the drugs the authorities usually look for.

(c) Write the generic names of two plants from which these drugs are obtained.

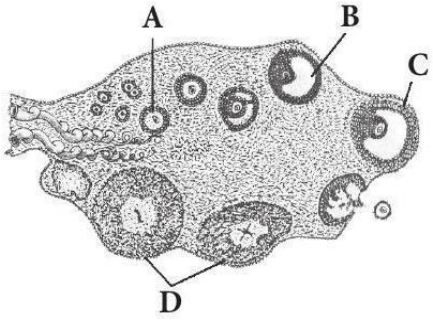
26. Why is predation required in a community of different organisms?

OR

(a) Explain "birth rate" in a population by taking a suitable example.

(b) Write the other two characterstics which only a population shows but an individual cannot.

27. Study the transverse section of human ovary given below and answer the questions that follow.



(a) Name the hormone that helps in growth of A → B → C.

(b) Name the hormone secreted by A and B.

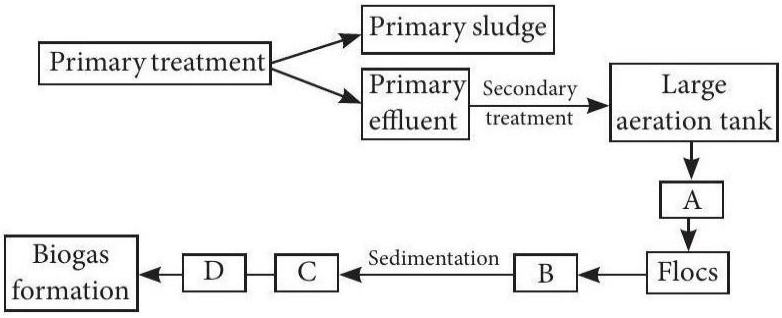
(c) State the role of hormone produced by D.

28. Explain the post-pollination events leading to seed production in angiosperms.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. Refer to the flow chart given below that shows the sewage treatment.



(a) With reference to the flow chart explain the role of step A in the given process.

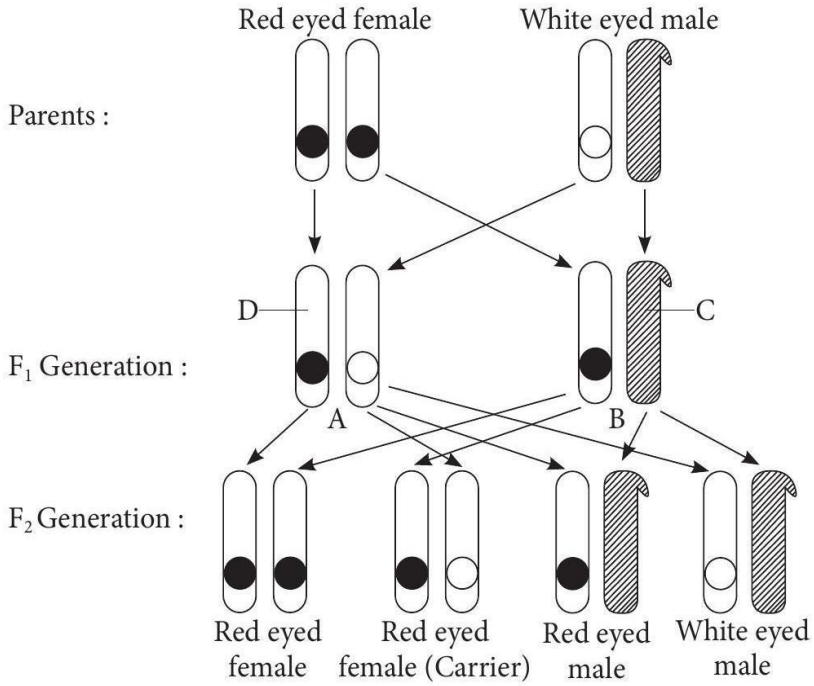
OR

Identify A, B, C and D in the given process.

(b) Explain the process at step D.

(c) What is the significance of low B in the given process and how does it forms C ?

30. Study the given figure and answer the following questions.



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

(b) What kind of inheritance is shown in the given the figure?

(c) State the significance of this inheritance in the above mentioned cross.

OR

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

31. Give reasons why:

(a) DNA cannot pass into a host cell through the cell membrane.

(b) Proteases are added during isolation of DNA for genetic engineering.

(c) Single recognition site is preferred in a vector.

(d) Maintenance of sterile conditions in biotechnological processes.

(e) Genes encoding resistance to antibiotics considered as useful selectable markers for E.coli cloning vector.

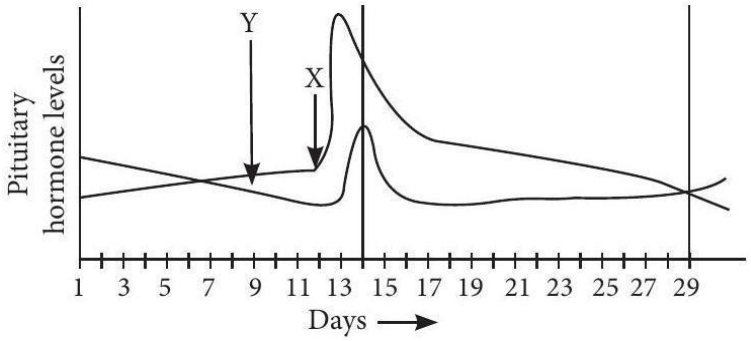
OR

Causative agents of HIV-AIDS and COVID-19 belong to the same group of viruses. To diagnose and amplify the genetic material for further study of COVID-19 virus, 'RT-PCR' test is carried out.

(a) What does 'RT-PCR' stand for?

(b) Explain the various steps of PCR technique.

32. Study the graph given below and answer the questions that follow.



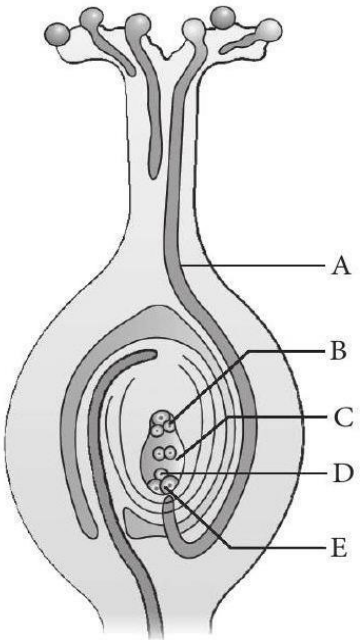
(i) Name the hormones ' X ' and ' Y '.

(ii) Identify, the ovarian phases during given days of menstrual cycle.
(a) $6^{th} - 13^{th}$ day of the cycle.
(b) 14^{th} day of the cycle.
(c) $15^{th} - 28^{th}$ day of the cycle.

(iii) Explain the ovarian phases (a), (b) and (c) under the influence of hormones ' X ' and ' Y '.

OR

Refer the given below figure and answer the questions that follows:



(i) What phenomenon is represented in the above given figure?

(ii) What is the path of entry of pollen tube?

(iii) Label the parts marked as A to E.

(iv) What will happen after entering of pollen into one of the synergids?

33. An experiment ' X ' provided evidence in support of ' Y '. In this experiment, four gases were circulated 'A', 'B', 'C', and 'D' in an air tight apparatus and electrical discharge from electrodes was passed at $800^{\circ}C$. The mixture of gases were passed through a condenser. After a week, the chemical composition of the liquid inside the apparatus was analysed. The results provided evidence through which ' *Y* ' was more or less accepted.

(i) Identify gases A, B, C, D.

(ii) Which theory of origin of life is supported by the above experiment?

(iii) Draw a diagrammatic representation of experiment X.

(iv) What does A, B, C and D together produced in the experiment X ?

OR

Explain three different ways in which natural selection can affect the frequency of a heritable trait in a population.

SAMPLE PAPER

CLASS 12

BIOLOGY

SET-07
BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. Which of the following is incorrect regarding vasectomy?
   (a) No sperm occurs in seminal fluid.
   (b) No sperm occurs in epididymis.
   (c) Vasa deferentia is cut and tied.
   (d) Irreversible sterility

2. Match the following columns and select the correct option.

	Column I		**Column II**
A.	Contraceptive pill	(i)	Prevents sperms reaching the female reproductive tract
B.	Condom	(ii)	Inhibits ovulation and implantation
C.	Vasectomy	(iii)	Increases phagocytosis of sperms
D.	Copper T	(iv)	Blocks gamete transport

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

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

3. In the double-helical structure of DNA, the pitch of the helix is
   (a) 3.4 nm
   (b) 0.34 nm
   (c) 6.6 nm
   (d) 34 nm.

4. Replacement of the lighter-coloured variety of peppered moth (Biston betularia) to its darker variety (Biston carbonaria) in England is the example of
   (a) natural selection
   (b) regeneration
   (c) genetic isolation
   (d) temporal isolation.

5. Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the new born infants because it contains
   (a) immunoglobulin A
   (b) natural killer cells
   (c) monocytes
   (d) macrophages.

6. The main reason why antibiotics could not always treat the bacteria-mediated diseases is

   (a) insensitivity of the individual following prolonged exposure to antibiotics

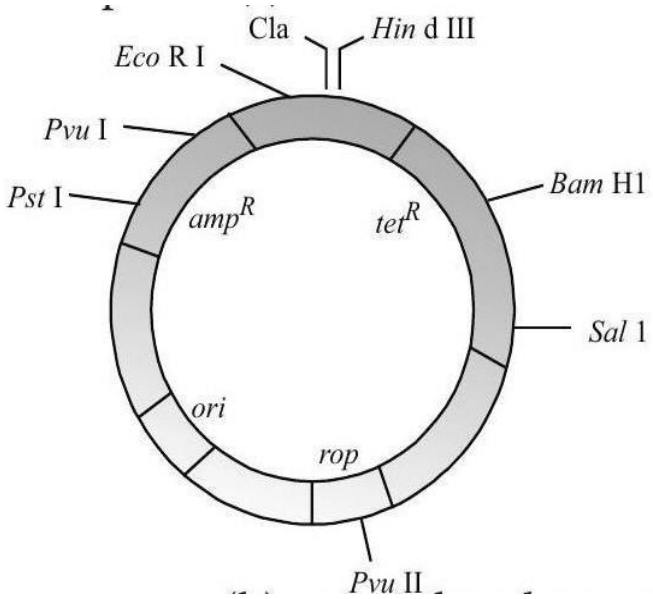
   (b) inactivation of antibiotics by bacterial enzymes

   (c) decreased efficiency of immune system

   (d) the development of mutant bacterial strains resistant to antibiotics.

7. Which one of the following pairs is wrongly matched?
   (a) Yeast - Ethanol
   (b) Streptomycetes - Antibiotic
   (c) Coliform - Vinegar
   (d) Methanogens - Gobar gas

8. The given figure is the diagrammatic representation of the E. coli vector pBR322. Which one of the given options correctly identifies its certain component(s)?



(a) ori-original restriction enzyme
(b) rop-reduced osmotic pressure
(c) HindIII, EcoRI - selectable markers
(d) amp^R, tet ^{R}-antibiotic resistance genes

9. The birth and death rates of four countries are given below. Which one will have the least population growth rate?

Country	Birth rate/1000	Death rate / 1000
P	20	5
Q	15	3
R	50	18
S	48	41

(a) P
(b) Q
(c) R
(d) S

10. Cuscuta is an example of
(a) ectoparasitism
(b) brood parasitism
(c) predation
(d) endoparasitism.

11. Which one of the following animals may occupy more than one trophic levels in the same ecosystem at the same time?
    (a) Sparrow
    (b) Lion
    (c) Goat
    (d) Frog

12. World Summit on Sustainable Development, 2002 was held in
    (a) Rio de Janeiro, Brazil
    (b) Johannesburg, South Africa
    (c) Dehradun, India
    (d) New York, USA.

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

    (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.

13. Assertion : In plants, apomixis is a form of asexual reproduction that mimics sexual reproduction.

    Reason : Apomixis involves the production of seeds without the fusion of gametes.

14. Assertion : In Mirabilis jalapa the pink coloured flowers appear in F_1 generation.

    Reason : Pink colour is observed due complete suppression of white colour alleles in one of parental flowers by red colour alleles.

15. Assertion : GM plants are made tolerant to abiotic stress.

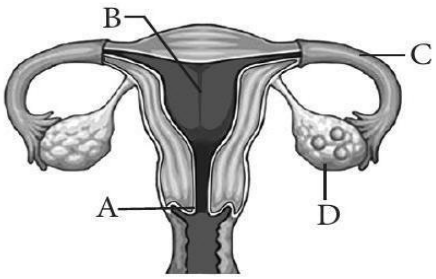
    Reason : Golden rice is rich in β-carotene.

16. Assertion : Bell shaped age pyramid represents a stable population.

    Reason : In a stable population, proportion of individuals in reproductive age group is higher than the individuals in pre-reproductive age group.

SECTION - B

17. Refer to the given figure of human female reproductive system and answer the following questions.



(a) Write the function of part labelled as C?

(b) What is ovulation? Which of the labelled part is involved in this process?

18. Differentiate between male and female heterogamety.

19. A student on a school picnic to a park on a windy day started sneezing and having difficulty in breathing on reaching the park. The teacher enquired whether the student was allergic to something.

    (a) What is an allergy?

    (b) Write the two unique characteristics of the system involved in the response observed in the student.

20. How are the desirable DNA sequences cut?

21. "It is possible that a species may occupy more than one trophic level in an ecosystem at the same time". Explain with the help of one example.

    OR

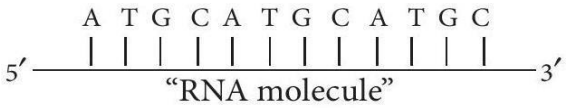
    Why is earthworm considered a farmer's friend? Explain humification and mineralisation occurring in a decomposition cycle.

SECTION - C

22. Name and explain the role of the inner and middle walls of the human uterus.

23. Explain three different modes of pollination that can occur in a chasmogamous flower.

24. Construct and label a transcription unit from which the RNA segment given below has been transcribed. Write the complete name of the enzyme that transcribed this RNA.



25. As we know that evolution occurs, when the genetic equilibrium is upset,

    (a) List any four factors which affect genetic equilibrium.

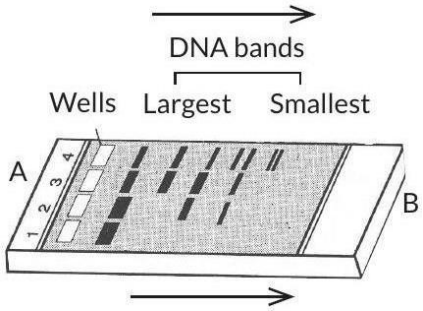
(b) Describe Founder's effect.

(c) What kind of evolution is shown by vertebrate brains?

26. What is the functional difference between B-cells and T-cells?

Mention any two human diseases caused by roundworms along with their causative agents and their mode of transmission into the human body.

27. Given below is the diagram representing the observations made for separating DNA fragments by gel electrophoresis technique. Observe the illustration and answer the questions that follow.



(a) Why are the DNA fragments seen to be moving in the direction A → B ?

(b) Write the medium used in which DNA fragments separate.

(c) Mention how the separated DNA fragments can be visualised for further technical use.

28. Since the origin of life on earth, there were five episodes of mass extinction of species.

(a) How is the 'Sixth extinction', presently in progress, different from the previous episodes?

(b) Who is mainly responsible for the 'Sixth extinction'?

(c) List any four points that can help to overcome this disaster.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. Read the given passage and answer the questions that follow:

In a dihybrid cross white eyed, yellow bodied female Drosophila is crossed with red eyed, brown bodied male Drosophila. 1.3% recombinants and 98.7% progeny with parental type combinations were produced in F_2 generation. This observation deviated from Mendelian F_2 phenotypic dihybrid ratio.

(a) What could be the most probable reason for the deviation of the cross from Mendelian ratio?

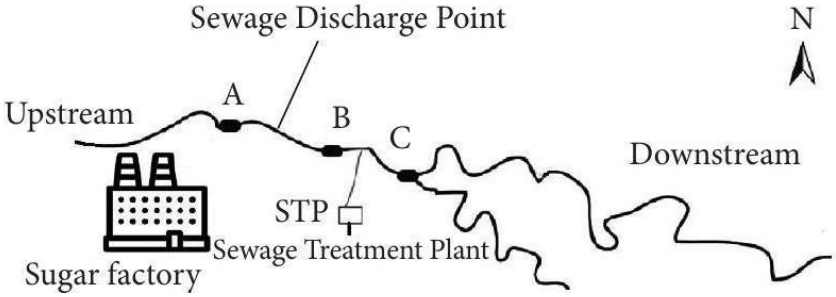
OR

Who first conducted the given cross?

(b) How the physical distance between two genes work in such type of crosses?

(c) If number of offspring obtained in the above case is 847, then what will be the number of recombinants?

30. Water samples were collected at points A, B and C in a segment of a river near a sugar factory and tested for BOD level. The BOD levels of samples A, B and C were $400mg/L$, $480mg/L$ and $8mg/L$ respectively.



(a) What is high level of BOD at A and B indicative of?

(b) Explain why the BOD level gets reduced considerably at the collection point C.

(c) It was observed that fish mortality was high near point B. Give a suitable reason for this.

OR

Which part of river is fit for drinking and why?

SECTION - E

31. (a) Study the following chart. Name the hormones involved at each stage. Explain their functions.

Hypothalamus
↓
Pituitary
↓
Testes
↓
Sperms

(b) Explain with the help of schematic representation the process of formation of mature gamete in a human female.

(c) How is spermatogenesis different from the process mentioned above? Explain.

OR

Why is the process of fertilisation in a flowering plant referred to as double fertilisation?

32. During course of evolution why DNA was chosen over RNA as genetic material? Give reasons by first discussing the desired criteria in a molecule that can act as genetic material and in the light of biochemical differences between DNA and RNA.

OR

Refer to the given double stranded DNA molecule.

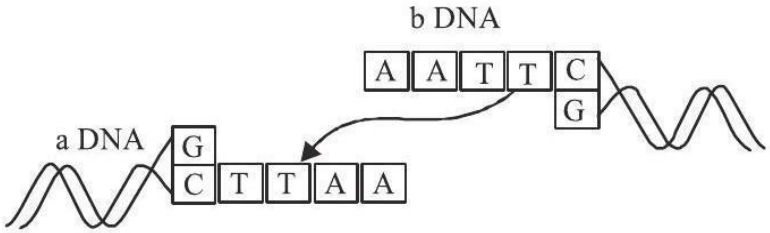
3′ - ATGCATGCATGCATGCATGCATGC - 5'

5′ - TACGTACGTACGTACGTACGTACG - 3′

(a) What would be the template DNA strand, coding DNA strand and transcribed m RNA sequence from this strand?

(b) How is m RNA made from DNA? Which enzyme catalyses this reaction?

33. (a) Study the linking of DNA fragments shown.



(i) Name 'a' DNA and 'b' DNA.

(ii) Name the restriction enzyme that recognises this palindrome.

(iii) Name the enzyme that can link these two DNA fragments.

(b) Why has a bacterium to first become 'competent' to be able to take up DNA? Explain how it become 'competent' and takes in the recombinant DNA.

OR

Consider the given base sequence of a certain DNA strand and answer the questions that follow:

G	A	A	T	T	C
C	T	T	A	A	G

(a) Give a short note on 'palindromic sequence' in a DNA. Also state the significance of enzymes that identify these palindromic nucleotide sequences.

(b) How the enzyme that recognises the given palindromic nucleotide sequence named so?

SAMPLE PAPER

CLASS 12

BIOLOG

SET-08

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?
   (a) 20%
   (b) 40%
   (c) 30%
   (d) 60%

2. The given Punnett's square represents the pattern of inheritance in a dihybrid cross where yellow (Y) and round (*R*) seed condition is dominant over white (y) and wrinkled (r) seed condition.

	YR	**Yr**	**yR**	**yr**
YR	F	J	N	R
Yr	G	K	O	S
yR	H	L	P	T
yr	I	M	Q	U

A plant of type ' H ' will produce seeds with the genotype identical to seeds produced by the plants of
(a) type M

(b) type J
(c) type P
(d) type N.

3. Hardy-Weinberg equilibrium is known to be essentially affected by factors like, gene flow, genetic drift, mutation, genetic recombination and
(a) evolution
(b) limiting factors
(c) saltation
(d) natural selection.

4. If most individuals in a population are young, why is the population likely to grow rapidly in the future?
(a) Many individuals will begin to reproduce soon
(b) Death rates will be low
(c) Immigration and emigration can be ignored
(d) All of these

5. Which of the following is a cause of transmission of HIV?
(a) Multiple sexual partners
(b) Transfusion of contaminated blood
(c) Sharing infected needles
(d) All of these

6. Plasmid used to construct the first recombinant DNA was isolated from which bacterium species?
(a) Escherichia coli
(b) Salmonella typhimurium
(c) Agrobacterium tumefaciens
(d) Thermus aquaticus

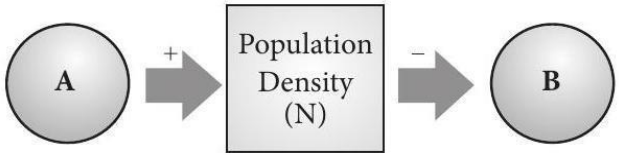
7. Match column I with column II and select the correct option from the given codes.

	Column I		**Column II**
A.	Recombinant DNA technology	(i)	Chilled ethanol
B.	Precipitation of DNA	(ii)	DNA staining
C.	PCR	(iii)	Gene amplification
D.	Ethidium bromide	(iv)	Genetic engineering

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

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

8. The density of a population in a given habitat during a given period, fluctuates due to changes in certain basic processes. On this basis, fill up boxes A and B in the given flow chart with correct option.



(a) A - Natality, B - Mortality
(b) A - Immigration, B - Emigration
(c) A - Natality, B - Immigration
(d) Both (a) and (b)

9. Microbes are used in

I. primary treatment of sewage

II. secondary treatment of sewage

III. anaerobic sludge digesters

IV. production of biogas.

Choose the correct option.

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

10. Which enzyme helps in removing oil stains from clothes?
(a) Streptokinase
(b) Trypsin
(c) Lipase
(d) Amylase

11. The given table shows differences between spermatogenesis and spermiogenesis. Select the incorrect option.

	Spermatogenesis	Spermiogenesis
(a)	Process of formation of spermatozoa.	Process of differentiation of spermatozoon from a spermatid.
(b)	It changes a haploid structure into another haploid structure.	It involves conversion of a diploid structure into haploid structure.
(c)	Growth and divisions occur.	Divisions and growth are absent.
(d)	A spermatogonium forms four spermatozoa.	A spermatid forms a single spermatozoon.

12. Primary endosperm nucleus (PEN) is formed by the fusion of

    (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.

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

    (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.

13. Assertion : Tropical regions have got a long evolutionary time for species diversification as compared to temperate regions.

    Reason : Temperate regions have undergone frequent glaciations in the past whereas tropical regions have remained relatively undisturbed for millions of years.

14. Assertion: Temperature and soil moisture are the important climatic factors that regulate the process of decomposition.

    Reason : Warm and moist environment favours decomposition whereas low temperature and anaerobiosis inhibit decomposition.

15. Assertion : Emigration is outward movement of some individuals from local population.

    Reason : Emigration is caused by occurrence of deficiencies and calamities.

16. Assertion: Vigorous contraction of the uterus at the end of pregnancy causes expulsion of the fetus.

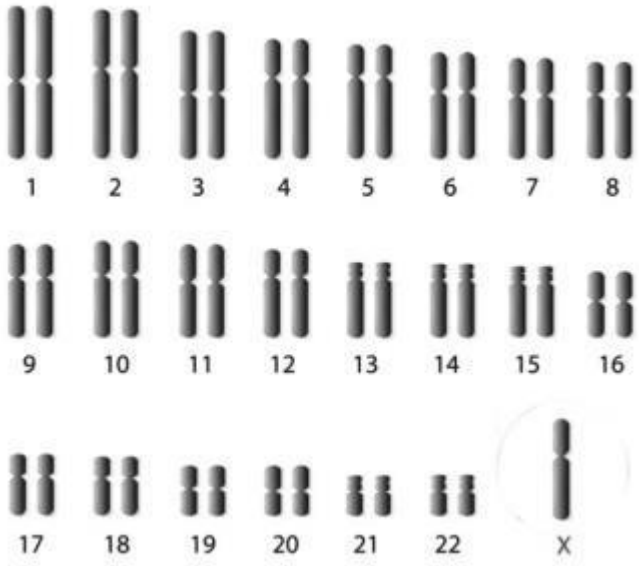
    Reason: The stimulatory reflex between the uterine contraction and oxytocin secretion results in weakening contractions.

SECTION - B

17. The given figure shows karyotype of a child who is suffering from a sex chromosomal abnormality which occurs during failure of segregation of chromatids during cell division cycle. This results in the gain or loss of a chromosome (s), called aneuploidy. Study the figure and answer the questions that follow :

    (a) Identify the disease from the given karyotype.

    (b) Write the chromosomal complement of the child.



18. Name the stage of the human embryo that gets implanted in the uterus and draw its labelled diagram.

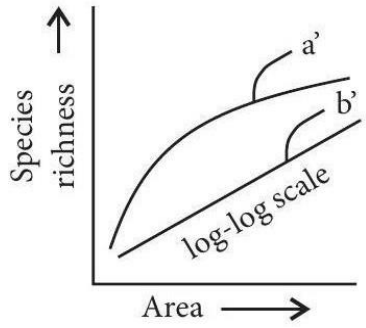
19. Why is Taq polymerase preferred in PCR? Mention the source of this enzyme?

20. Some of the microbes used as biofertilisers are prokaryotes. Name the taxonomic group they come under. With the help of an example, mention how they act as biofertilisers.

21. The given graph shows the species-area relationship. Answer the following questions as directed.

    (a) Name the naturalist who studied the kind of relationship shown in the graph. Write the observation made by him.

    (b) Write the situation as discovered by the ecologists when the value of ' Z ' (slope of the line) lies between



(i) 0.1 and 0.2
(ii) 0.6 and 1.2.
(c) What does 'Z' stand for?

OR

Explain any three ways other than zoological parks, botanical gardens and wildlife sanctuaries by which threatened species of plants and animals are being conserved ' ex-situ'.

SECTION - C

22. Explain mechanism of sex-determination in birds.

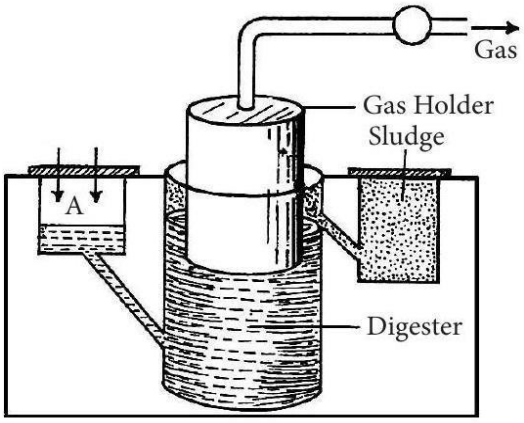
23. Differentiate between the genetic codes given below :
(a) Unambiguous and Universal
(b) Degenerate and Initiator

24. Study the given picture of biogas plant and answer the following questions:

(a) Name the components gaining entry from A into the chamber.

(b) Mention the group of bacteria and the condition in which they act on the component that entered from A in the digester.

(c) Name the components that get collected in gas holder.



25. (a) Why are transgenic animals so called?

    (b) Explain the role of transgenic animals in (i) vaccine safety and (ii) biological products with the help of an example each.

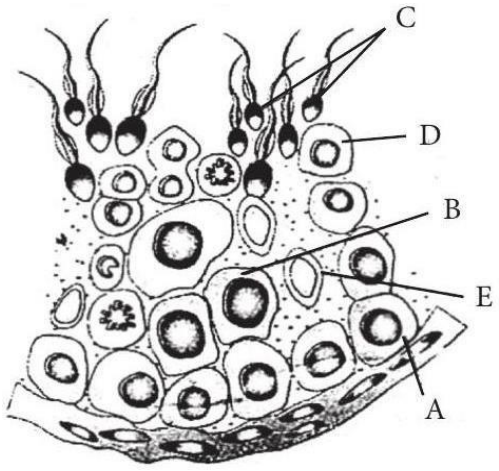
26. "In a food chain, a trophic level represents a functional level, not a species". Explain.

    OR

    (a) What is primary productivity? Why does it vary in different types of ecosystems?

    (b) State the relationship between gross and net primary productiviy.

27. (a) Name the labels A, B, C, D and E in the given diagram of seminiferous tubule.



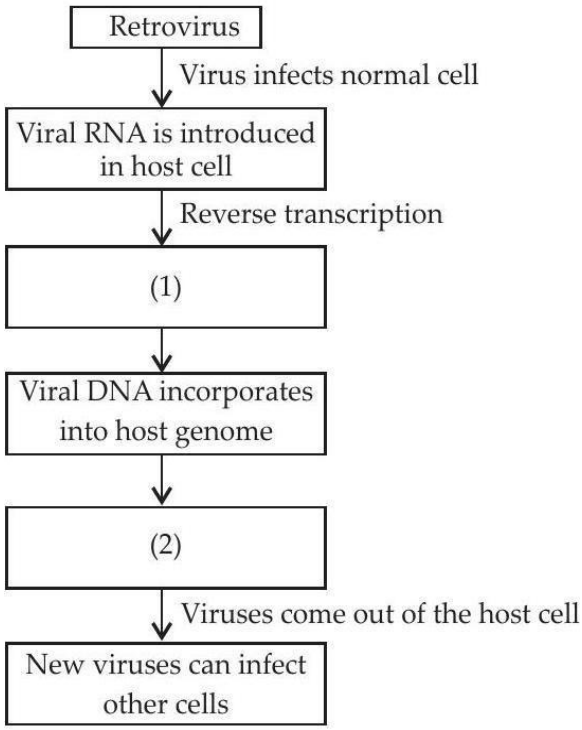
    (b) Give one function of 'E'.

28. Medically it is advised to all young mothers that breast feeding is the best for their newborn babies. Do you agree? Give reasons in support of your answer.

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. In the given flow chart, the replication of retrovirus in a host is shown. Observe and answer the following questions.



(a) What can be placed in blanks (1) and (2)?

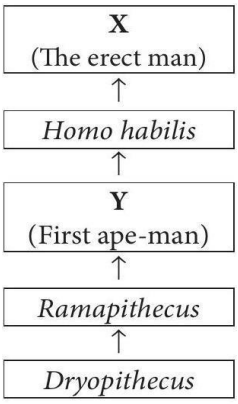
OR

Can the infected cell survive while viruses are being replicated and released?

(b) Why is the virus called retrovirus? Give one example.

(c) Name the disease which is caused by a retrovirus. How this virus gets transmitted?

30. Human evolution is a lengthy evolutionary process within the history of primates. The stages given here show the order of evolutionary history of man.



(a) Identify ' X ' and ' Y '.

(b) What was the brain capacity of ' X '?

(c) Give some important features of ' Y '.

OR

When was ' X ' discovered?

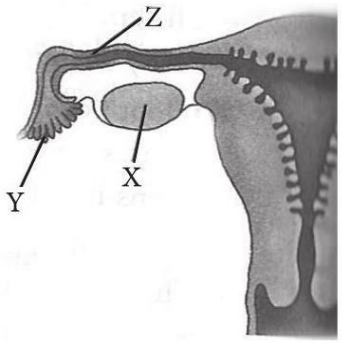
SECTION - E

31. Describe the various stages involved in the commercial production of human insulin.

OR

Explain the application of biotechnology in producing Bt cotton.

32. (a) The given diagram shows a part of the human female reproductive system.



(i) Identify the labelled part X, Y and Z. Also name the gamete cells that would be present in ' X ' if taken from a newborn baby.

(ii) What is the function of *Y* ?

(iii) Write the events that take place in Z.

(b) Name the muscular and the glandular layers of human uterus. Which one of these layers undergoes cyclic changes during menstrual cycle? Name the hormone essential for the maintenance of this layer.

OR

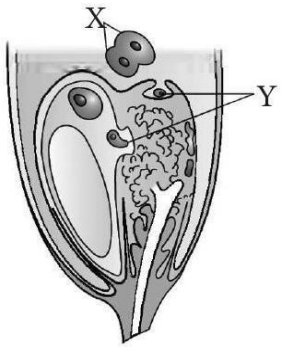
(a) Refer to the given figure and answer the following questions :

(i) Identify the labelled parts X and Y.

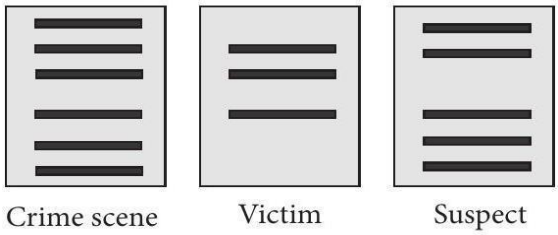
(ii) Write the role of X and Y.

(iii) Draw labelled prior stage of the given figure.

(b) Why is fertilisation in an angiosperm referred to as double fertilisation? Mention the ploidy of the cells involved.



33. Blood samples from a crime scene was 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.



(a) What will you conclude on the basis of 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 be the maternal and paternal identity disputes sorted out using the technique used above?

OR

(a) Select the homologous structures from the combinations given below:

(i) Forelimbs of whales and bats

(ii) Tuber of potato and sweet potato

(iii) Eyes of octopus and mammals

(iv) Thorns of Bougainvillea and tendrils of Cucurbita.

(b) State the kind of evolution represent by the homologous structures.

(c) What are analogous structures? How are they different from homologous structures? Provide one example for each.

SAMPLE PAPER

CLASS 12

BIOLOGY

SET 9

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. Which of the following phenomena was experimentally proved by Meselson and Stahl?
   (a) Transformation
   (b) Transduction
   (c) Semi-conservative DNA replication
   (d) Central dogma

2. Refer to the given table of contrasting traits in pea plants studied by Mendel.

S.No.	Character	Dominant trait	Recessive trait
(i)	Seed colour	 Green	 Yellow
(ii)	Flower colour	 Violet	 White

(iii)	Pod shape	 Full	 Constricted
(iv)	Flower position	 Terminal	 Axial

Which of the given traits are incorrectly placed?
(a) (i), (ii) and (iii) only
(b) (ii), (iii) and (iv) only
(c) (i) and (iv) only
(d) (iii) only

3. Fitness according to Darwin refers to
(a) number of species in a community
(b) useful variation in population
(c) strength of an individual
(d) reproductive fitness of an organism.

4. The biomass available for consumption to heterotrophs and the rate of formation of new organic matter by consumers are referred to as

(a) gross primary productivity and net primary productivity respectively

(b) net primary productivity and gross primary productivity respectively

(c) gross primary productivity and secondary productivity respectively

(d) net primary productivity and secondary productivity respectively.

5. Big holes in Swiss cheese are made by a

(a) a machine

(b) a bacterium that produces methane gas

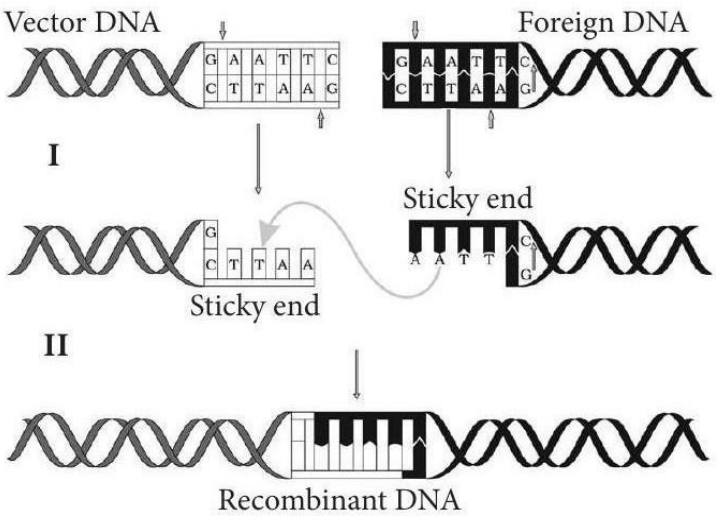
(c) a bacterium producing a large amount of carbon dioxide

(d) a fungus that releases a lot of gases during its metabolic activities.

6. In pBR322, tetracycline resistance gene (tet^R) has recognition site for which of the following restriction endonuclease?
(a) Hind III
(b) BamH I

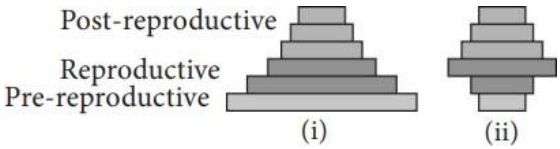
(c) EcoR I
(d) Pst I

7. Study the following figures and identify the enzymes involved in steps I and II respectively.



(a) EcoR I and DNA ligase
(b) Hind II and DNA ligase
(c) EcoR I and Hind II
(d) Restriction endonuclease and exonuclease

8. What does the shape of the given age pyramids reflects about the growth status of the related population?



	(i)	(ii)
(a)	Expanding	Stable
(b)	Stable	Declining
(c)	Expanding	Declining
(d)	Declining	Stable

9. Along with nicotine, cigarette smokers also have the intake tars, phenols, hydrocarbons, arsenic and many other chemicals. Which of the following is not an effect of smoking tobacco?

(a) Narrowing or hardening of blood vessels in the heart and brain

(b) A higher frequency of respiratory infections (e.g., cold, pneumonia)

(c) A higher risk of cancer, including cancer of the lungs, mouth, larynx, bladder and kidneys

(d) None of these

10. Ernst Chain and Howard Florey's contribution was

(a) establishing the potential of penicillin as an effective antibiotic

(b) discovery of streptokinase

(c) production of genetically engineered insulin

(d) discovery of DNA sequence.

11. What is the correct sequence of sperm formation?

(a) Spermatogonia, spermatozoa, spermatocytes, spermatids

(b) Spermatogonia, spermatocytes, spermatids, spermatozoa

(c) Spermatids, spermatocytes, spermatogonia, spermatozoa

(d) Spermatogonia, spermatocytes, spermatozoa, spermatids

12. 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 fertilisation
(d)	Intra uterine devices	Increase phagocytosis of sperms, suppress sperm motility and fertilising capacity of sperms

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

(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.

13. Assertion : The introduction of Nile perch in lake Victoria caused cichlids to become extinct.

Reason : Nile perch is an indigenous species of East Africa.

14. Assertion : Offsite collections can be used to restock depleted populations, reintroduce species in the wild and restore degraded habitats.

Reason : In situ conservation refers to the conservation of endangered species in their natural habitats.

15. Assertion: Biodiversity hotspots are the regions which possess low levels of species richness, high degree of endemism and no loss to habitats.

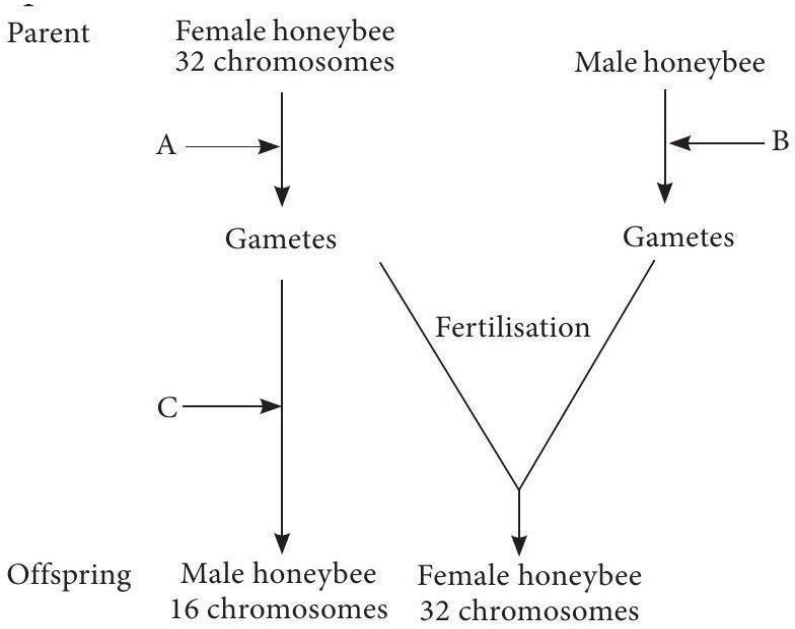
    Reason : Total number of biodiversity hotspots in the world is 34 with three of these hotspots found in India.

16. Assertion : Only the pre-pollination growth of male gametophyte occurs inside the microsporangium whereas the remaining growth occurs over the female reproductive organs.

    Reason : The complete growth of female gametophyte occurs inside the megasporangium.

SECTION - B

17. The cytological observations made in a number of insects led to the development of the concept of genetic/ chromosomal basis of sex-determination mechanism. Honeybee is an interesting example to study the mechanism of sex-determination. Study the schematic cross between the male and the female honeybees given below and answer the questions that follow :



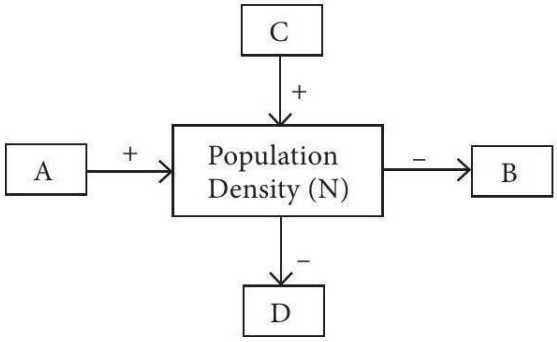
    (a) Identify the cell divisions ' A ' and ' B ' that lead to gamete formation in female and male honeybees respectively.

    (b) Name the process ' C ' that leads to the development of male honeybee (drone).

18. Explain the processes of emasculation and bagging of flowers. State their importance in breeding experiments.

19. Suggest a technique to a researcher who needs to separate fragments of DNA.

20. Ringworm is one of the most common infectious fungal disease in humans. Name any two genera of fungi which cause ringworm and state any of its two symptoms.



Study the schematic representation given above and answer the following questions.

(a) Identify *A* in it.

(b) When population density at time t is N as shown above, write the population density at time $t + 1$ in the form of an equation using appropriate symbols.

OR

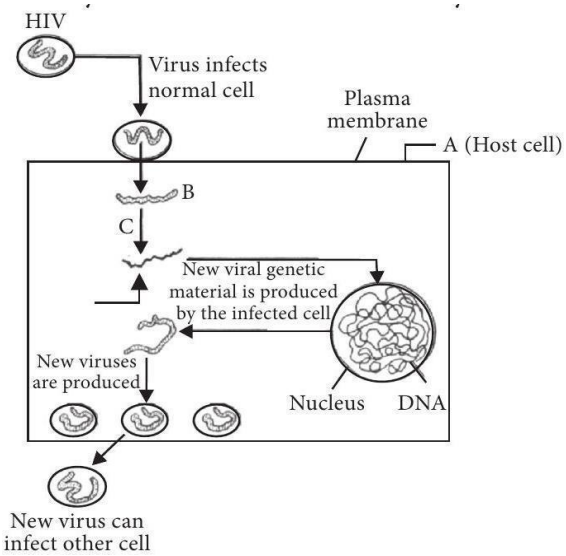
If 8 individuals in a population of 80 butterflies die in a week, calculate the death rate of population of butterflies during that period.

SECTION - C

22. Name the disorder humans suffer from as a result of monosomy of the sex chromosome. Give the karyotype and write the symptoms.

23. With the help of one example, explain the phenomena of co-dominance and multiple allelism in human population.

24. Study the diagram showing the entry of HIV into the human body and the process that follows.



(a) Name the human cells A, HIV enters into.

(b) Identify the genetic material (B) HIV releases into the cell.

(c) Identify enzyme C.

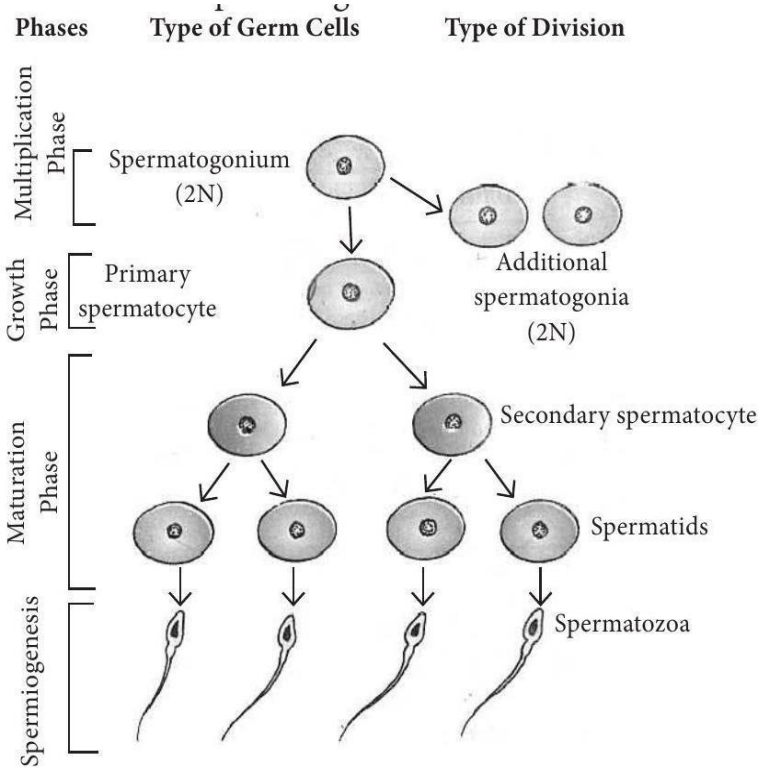
25. Explain the significance of 'palindromic nucleotide sequence' and restriction endonuclease in the formation of recombinant DNA.

26. Alien species are highly invasive and are a threat to indigenous species. Substantiate this statement with any three examples.

OR

What are the two types of desirable approaches to conserve biodiversity? Explain with examples bringing out the difference between the two types.

27. Study the schematic representation of spermatogenesis and answer the following questions.



(a) Which cell division occurs during multiplication phase?

(b) How many chromosomes are present in secondary spermatocyte and spermatids respectively?

(c) Which hormone acts on spermatogonia to stimulate sperm production?

28. Differentiate between :

(i) Vasa efferentia and vas deferens

(ii) Spermatogenesis and spermiogenesis

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. The immunity that an individual acquires after the birth is called acquired immunity. It is characterised by memory. Immune response are carried out with the help of two types of cells X and Y present in our Blood. X produces an army of proteins and Y themselves do not secrete those proteins but help X to produce them.

(a) What could be ' X ' and ' Y ' here?

OR

Differentiate between the roles of ' X ' and ' Y ' in generating immune responses.

(b) State two important functions of ' *Y* '

(c) Where do ' Y ' cells mature.

30. In a plant species that follows Mendelian inheritance yellow flower colour is dominant over white and round fruit shape is dominant over elongated. Crossing was performed between two purelines- one having yellow-flower and round fruit and another with white flower and elongated fruits. About 20 plants survived in F_1 progeny. Plants of F_1 were allowed to self fertilise and about 960 plants survived in F_2.

(a) How many plants would have yellow flower and round fruit in F_1 generation?

(b) How many plants would have yellow flower and round fruit in F_2 generation?

(c) Mention the phenotypic and genotypic ratio when plant heterozygous for yellow flower and round fruit is crossed with the double recessive parent.

OR

If the plant heterozygous for yellow flower and round fruit are self crossed, then what will be the genotype of plant with yellow flower and elongated fruit?

SECTION - E

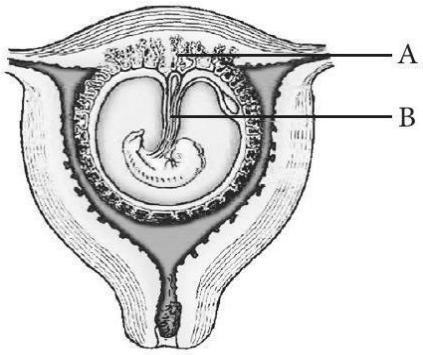
31. (a) Describe the different steps in one complete cycle of PCR.

(b) Write the applications of PCR.

OR

Explain the process by which a bacterial cell can be made 'competent'. Why is it essential to make bacterial cells 'competent' in recombinant DNA technology?

32. The given figure shows a fetus within the uterus. On the basis of the given figure, answer the questions that follow :



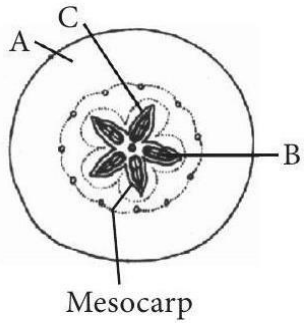
(a) Mention the role of B in the development of the embryo.

(b) Name the fluid surrounding the developing embryo. How is it misused for sex-determination?

(c) Give a short note on ' A '.

OR

(a) Given below is a T.S. of an apple. Identify A, B and C.



(b) Why is an apple categorised as a false fruit?

(c) Mention the ploidy levels of the cells of different parts of a maize seed.

33. Disease X is a chromosomal disorder occur due to autosomal aneuploidy. The children with this syndrome suffer from severe mental retardation, short statured with small round head, furrowed tongue and partially open mouth. Palm is broad with characteristic palm crease.

(a) Name the disease ' X ' and state main cause of autosomal aneuploidy in it.

(b) How many number of chromosomes are present in the child suffering from this syndrome?

(c) What will be the sex chromosomal complement in males suffering from this disease?

OR

Write the scientific name of the organism Thomas Hunt Morgan and his colleagues worked on for their experiments. Why did they select that organism to study sex linked genes for lab experiments?

SAMPLE PAPER

CLASS 12

BIOLOGY

SET 10

BIOLOGY

Time: 3 Hours **Maximum 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) 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

1. Two closely related different species cannot live for long duration in the same niche or habitat. This law is called
   (a) Allen's law
   (b) Gloger rule
   (c) Competitive exclusion principle
   (d) Weismann's theory.

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

Column I		Column II	
A.	Dihybrid test cross	(i)	9: 3: 3: 1
B.	Law of segregation	(ii)	Dihybrid cross
C.	Law of independent assortment	(iii)	1: 1: 1: 1
D.	ABO blood group in man	(iv)	Purity of gametes
		(v)	Multiple allelism

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

3. The term 'immunity' refers to

(a) mutualism between host and parasite

(b) ability of the host to fight the disease causing organisms

(c) ability of the parasite to survive within a host

(d) a fatal disease.

4. Genes with multiple phenotypic effects are known as
   (a) hypostatic genes
   (b) duplicate genes
   (c) pleiotropic genes
   (d) complementary genes.

5. Productivity at the second trophic level is always

   (a) greater than the productivity at the first trophic level

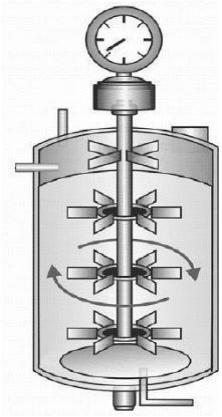
   (b) less than the productivity at the first trophic level
   (c) equal to the productivity at the first trophic level

   (d) extremely variable compared to the productivity at the first trophic level.

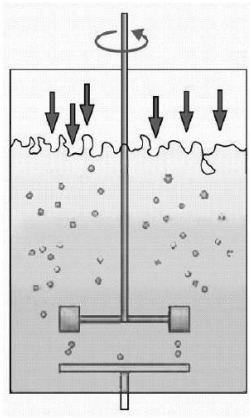
6. A sewage treatment process in which a part of decomposer bacteria present in the wastes is recycled into the starting of the process is called
   (a) primary treatment
   (b) activated sludge treatment
   (c) tertiary treatment
   (d) none of these.

7. Statin, a blood-cholesterol lowering agent, is commercially obtained from
   (a) Trichoderma polysporum
   (b) Acetobacter aceti
   (c) Clostridium butyricum
   (d) Monascus purpureus.

8. Identify the figures (A) and (B) and select the correct option.



(A)



(B)

	(A)	(B)
(a)	Sparged stirred-tank bioreactor	Simple stirred-tank bioreactor
(b)	Sparged stirred-tank bioreactor	Sparged stirred-tank bioreactor
(c)	Simple stirred-tank bioreactor	Sparged stirred-tank bioreactor
(d)	Simple stirred-tank bioreactor	Simple stirred-tank bioreactor

9. The permissible use of the technique amniocentesis is for

   (a) detecting sex of the unborn fetus

   (b) artificial insemination

   (c) transfer of embryo into the uterus of a surrogate mother

   (d) detecting any genetic abnormality.

10. Find the correct palindromic sequence for the given DNA segment.

5'ATTGCAAT3'

(a) 5'GAACGTTA 3'
(b) 3'TAACGTTA 5'
(c) 5'AAACGTTT 3'
(d) 3'ATTGCAAT 5'

11. The age pyramid with broad base indicates

(a) high percentage of old individuals

(b) low percentage of young individuals

(c) a stable population

(d) high percentage of young individuals.

12. The primary producers of the deep-sea hydrothermal vent ecosystem are
(a) green algae
(b) chemosynthetic bacteria
(c) blue-green algae
(d) coral reefs.

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

(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.

13. Assertion: Production ecology deals with the productivity.

Reason : Desert has lowest productivity.

14. Assertion: The development of embryo sac from a single functional megaspore is termed as monosporic development.

Reason : In monosporic (Polygonum) type of embryo sac development, usually the megaspore which is situated towards micropylar end remains functional.

15. Assertion: The endometrium undergoes cyclical changes during menstrual cycle.

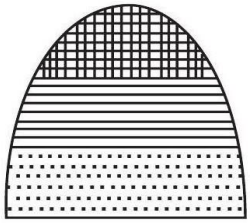
Reason : The myometrium exhibits strong contractions during delivery of the baby.

16. Assertion : Turner's syndrome is caused due to absence of any one of the X and Y sex chromosome.

Reason : Turner's syndrome is an example of aneuploidy.

SECTION - B

17. What does the given age pyramid signify about the status of a population? (The bar at the base represents pre-reproductive individuals.)



18. How are 'sticky ends' formed on a DNA strand? Why are they so called?

19. With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generations?

20. How does a vaccine for a particular disease immunise the human body against that disease?

21. Why are copper containing intrauterine devices considered an ideal contraceptive for human females?

    OR

    What is amniocentesis? How is it misused?

SECTION - C

22. Explain the process of microsporogenesis in angiosperms.

23. Which chromosomes carry the mutant genes causing thalassemia in humans? What are the problems caused by these mutant genes?

24. "Biotechnology is used to develop pest-resistant varieties of cotton plants". Given reason.

25. (a) How many kinds of phenotypes would you expect in F_2 generation in a monohybrid cross exhibiting co-dominance?

    (b) How co-dominance is different from dominance?

26. How is 'oogenesis' markedly different from 'spermatogenesis' with respect to the growth till puberty in the humans?

    OR

    Name the pituitary hormones involved in the process of spermatogenesis. State their function.

27. (a) How can you measure population density of a habitat?

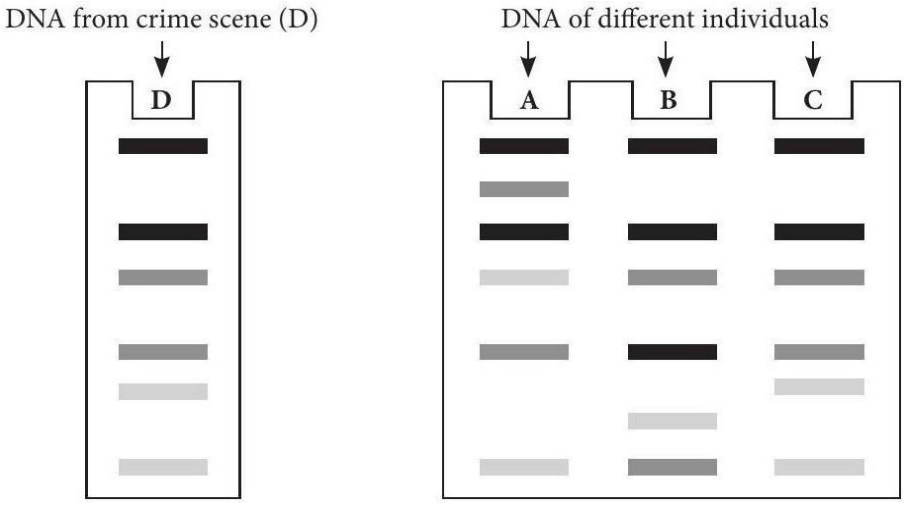
    (b) Mention the essential information that can be obtained by studying the population density of an organism.

28. How does the HIV breakdown the immune system of the AIDS patient?

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. Study the given below picture of the gel electrophoresis showing the banding pattern of DNA from crime scene.



Amplified repeats in different individuals.

(a) On the basis of the above given picture of gel electrophoresis, among A, B and C who will be the criminal? Give reason.

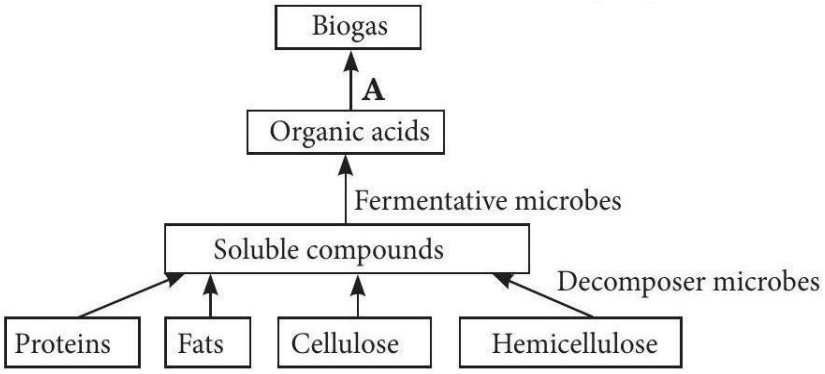
OR

Which technique is used in the given question for the identification of the criminals?

(b) On what basis, the DNA fragments of individual A, B and C are separated in the gel electrophoresis?

(c) What is the basis of technique which is used in the criminal investigation and forensic science?

30. The flow chart given below shows the different components of biogas plant.



(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

What is the significance of biogas produced by A ?

SECTION - E

31. Reproductive and Child Health Care (RCH) Programmes are currently in operation. One of the major tasks of these programmes is to create awareness amongst people about the wide range of reproduction related aspects as this is important and essential for building a reproductively healthy society.

    (a) "Providing sex education in schools is one of the ways to meet this goal." Give four points in support of your opinion regarding this statement.

    (b) List any two 'indicators' that indicate a reproductively healthy society.

    OR

    (a) Mention the event that induces the completion of the meiotic division of the secondary oocyte.

    (b) Trace the journey of the ovum from the ovary, its fertilisation and further development until the implantation of the embryo.

32. State and explain the "law of independent assortment" in a typical Mendelian dihybrid cross.

    OR

    A tall pea plant bearing violet flowers is given with its unknown genotypes. Explain by working out the crosses how would you find the correct genotypes with respect to the two traits mentioned only by "selfing" the given plants.

33. (a) Mention the number of primers required in each cycle of polymerase chain reaction (PCR). Write the role of primers and DNA polymerase in PCR. Give the characteristic feature and source organism of the DNA polymerase in PCR.

(b) Rearrange the following in the correct sequence to accomplish an important biotechnological reaction :

(i) Denaturation of ds-DNA

(ii) Chemically synthesised oligonucleotides

(iii) Primers

(iv) Complementary region of DNA

(v) Thermostable DNA polymerase (from Thermus aquaticus)

(vi) Nucleotides provided

(vii) Genomic DNA template

(viii) In vitro synthesis of copies of DNA of interest

OR

(a) Draw pBR322 cloning vector. Label 'ori', 'rop' and any one antibiotic resistance site on it and state their functions.

(b) State the role of 'biolistic gun' in biotechnology experiments.x