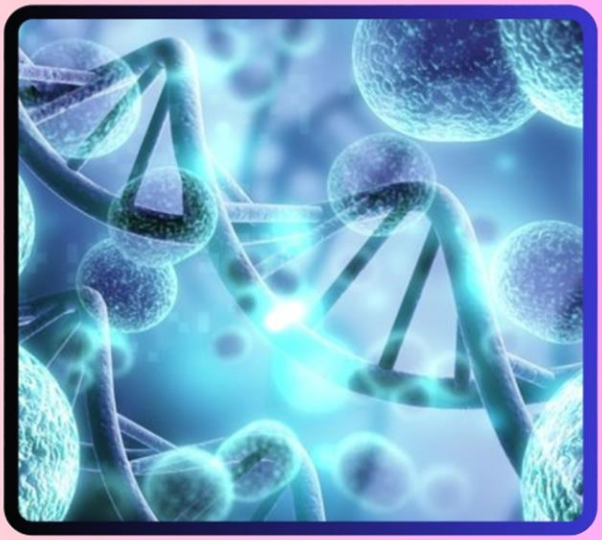
सेवाकालीन प्रशिक्षण
2023-24
स्नातकोत्तर शिक्षक
(जीवविज्ञान एवं जैव-प्रौद्योगिकी)

आज़ादी का अमृत महोत्सव

In-Service Course (ISC)
2023-24
For Post Graduate Teacher (Biology & Bio-Technology)



केन्द्रीय विद्यालय संगठन, आं.शि.प्र.सं, मुंबई
KVS, ZIET, Mumbai

zietmumbai@gmail.com
https://zietmumbai.kvs.gov.in

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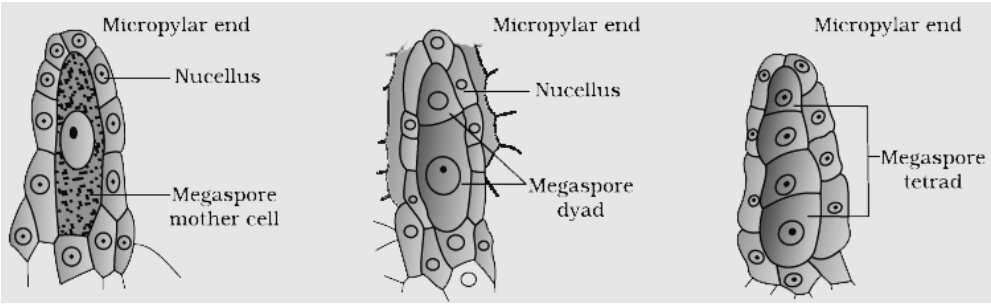
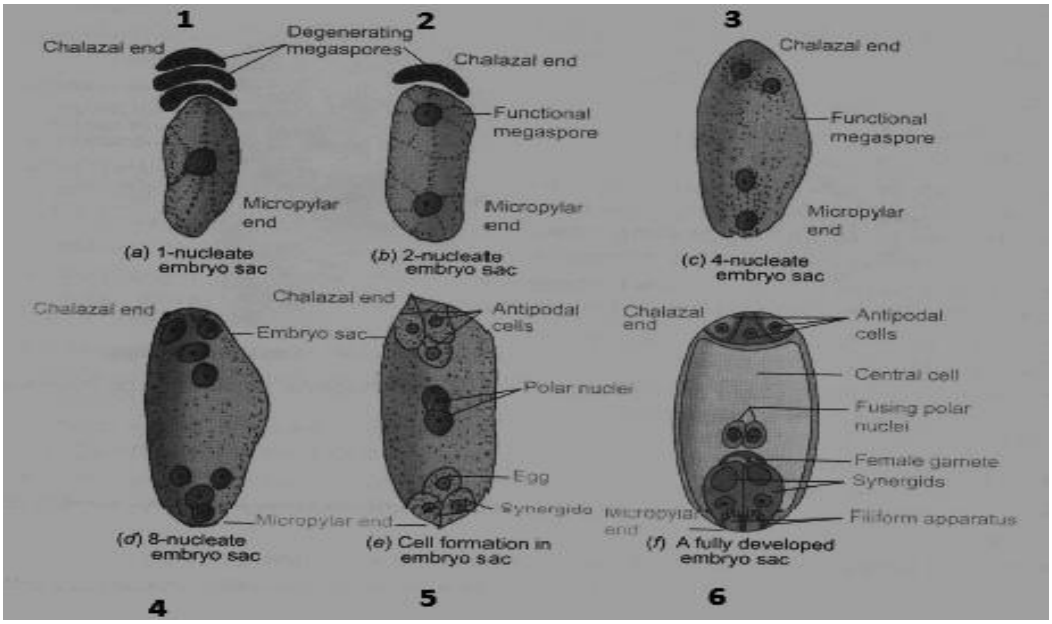
IN-SERVICE COURSE FOR BIOLOGY AND BIOTECHNOLOGY 2023-24

COMPETENCY BASED QUESTIONS

CLASS XII

Q1. Observe the figure given below and answer all questions from (i) to (iv) :- 4 Mark





(i) Which process is shown in above figure?

A Only megasporogenesis

B Only Embryo sac formation

C Megasporogenesis and Embryo sac formation

D Embryo formation

(ii) What is the arrangement of four megaspores after Megasporogenesis ?

A Tetrad

B Linear

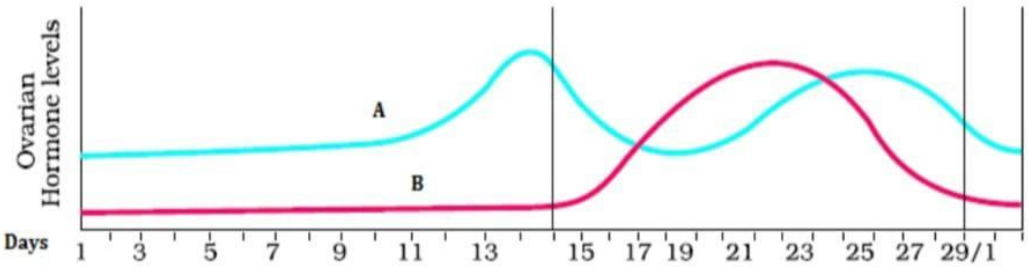
C Cuboidal
D Irregular

(iii) What is the role of filiform apparatus shown in figure c?

A Formation of endosperm
B helps in fertilization
C Guiding pollen tube towards egg cell
D Secretion of Nutrients for pollen tube

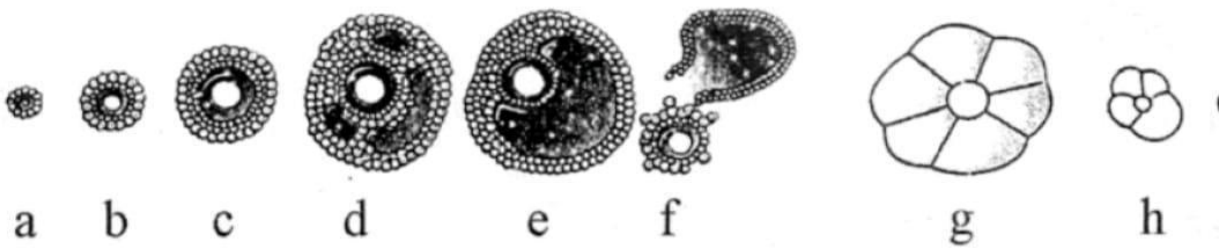
(iv) Explain the structure shown in figure C is called as 7 celled , 8 nucleated.

Q2. The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle:



i. Identify 'A' and 'B'.
ii. What are the sources of hormones marked in the diagram.
a) A corpus luteum, B graffian follicle
b) A graffian follicle, B uterus
c) A graffian follicle, B corpus luteum
d) A uterus, B corpus luteum
iii. Compare the role of A and B.
iv. There is an increase in the level of hormone B from 15th to 27th day. Why?

Q3. The following diagram is the illustration of the sequence of ovarian events (a to h) in human female:



(i) Identify the figure that illustrate
A. Ovulation
B. Graffian follicle
C. Mature corpus luteum

(ii) Choose the ovarian hormone and pituitary hormone from the following that causes the ovulation:-
A. Estrogen and LH
B. Progesterone and LH
C. Estrogen and FSH
D. Progesterone and FSH

iii) Endometrium degenerates if fertilization does not take place. What may be the cause for this event?
A. Degeneration of graffian follicle
B. Degeneration of ovary
C. Degeneration of corpus luteum
D. Degeneration of uterus

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

Q. 4 A married couple was unable to produce children inspite of unprotected sexual co-habitation. The female was blamed by her family for the couple being childless.She was very upset with this and went to the doctor with her husband. After diagnosis it was found that everything was alright in female but her husband was having low sperm counts & could not be able to produce children.

Answer the following questions based on above paragraph:-

i) What would be the possible ART for this couple?

a) GIFT

b) ZIFT

c) Artificial insemination (AI)

d) IVF

ii) Which of following techniques cannot be used if the female is not able to produce children?

a) AI

b) ZIFT

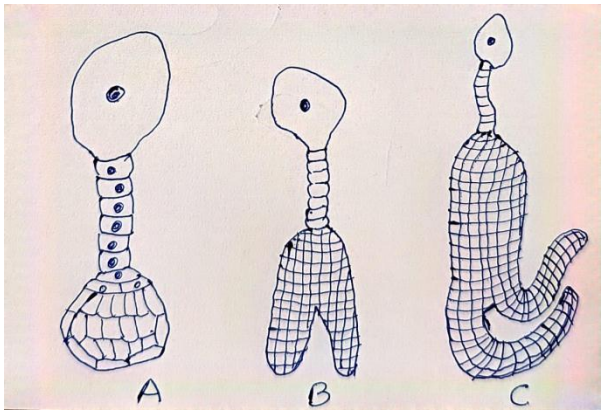
c) GIFT

d) IVF

iii) What is the name given to the technique in which semen is collected from a healthy donor is artificially introduved into the uterus?

iv) "A female should be blamed for being childless". Write your views on the above statement.

Q. 5 Observe the following diagram and answer the questions:-



i) Name A, B and C in the above diagram.

ii) Which of the following is not the part of embryo?

a) Plumule

b) Radicle

c) Cotyledons

d) Endosperm.

(iii) In the above diagram, how many cotyledons can be seen?

a) Two

b) Three

c) One

d) No cotyledon.

iv) Draw and label the diagram C.

CBQ Answers:-

Ans 1 I) C ii) B iii) C

iv) The structure shown in figure C is of embryo sac. It has seven cells- one egg cell, two synergids, three antipodals and one central cell. Each cell has one nucleus except the central cell because it has two nuclei called polar nuclei. Therefore, the embryo sac is a 7 celled and 8 nucleate structure.

Ans 2 i) A is estrogen B is progesterone ii) C

iii) A (estrogen) plays a role in ovulation while B (progesterone) thickens the endometrium.

iv) Because after ovulation on 14th day, the ruptured graffian follicle gets converted into corpus luteum which releases progesterone.

Ans 3 i) A – f, B – e, C - g

ii) A

iii) C

iv) The innermost membrane of uterus thickens itself for the process of implantation.

Ans 4 i) C ii) A

iii) Intra uterine insemination

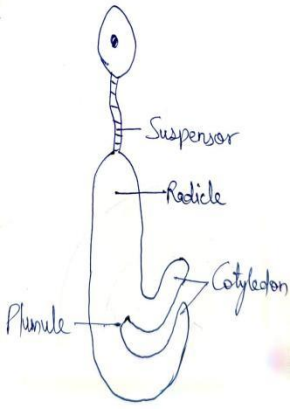
iv) Female should not be blamed always for being childless because as in this case sometimes male partner may have some infertility related issues.

Ans 5 i) A globular embryo, B heart shaped embryo, C mature embryo

ii) D

iii) A

iv)



Unit- VII
Genetics and Evolution

Q.1. Two types of genetic disorders are present– Mendelian disorders and Chromosomal disorders. Mendelian disorders show the mendelian inheritance. It mainly determined by alteration or mutation in the single gene. These disorders are transmitted to the offspring on the same lines as we have studied in the principles of inheritance. Most common and prevalent Mendelian disorders are Haemophilia, Cystic fibrosis, Sickle cell anaemia, Colour blindness, Phenylketonuria, Thalassemia. The Mendelian disorders may be recessive or dominant. Similarly, the trait may also be linked to the case of sex chromosome like haemophilia and colour blindness. It is evident that this X – linked recessive trait shows transmission from carrier female to male progeny. A Mendelian disorder occurs if the mutated gene is found either in homozygous or in heterozygous forms. The recessive disease shows itself in homozygous condition. Whereas the dominant diseases expressed in both homozygous and heterozygous condition. The defected/mutated gene may be found on to the autosome, like in thalassemia, the alpha type, gene is found on chromosome number 16 and beta type gene is found on chromosome number 11. On the other hand, when the defected gene is on X chromosome, then it will be considered as X linked diseases. Father never transmits X linked diseases to the son, because son inherits Y chromosome from his father (not the X-chromosome) and this chromosome does not has any gene of the diseases.

(i) The two colours which do not identify by colourblind person.
a. Red & green

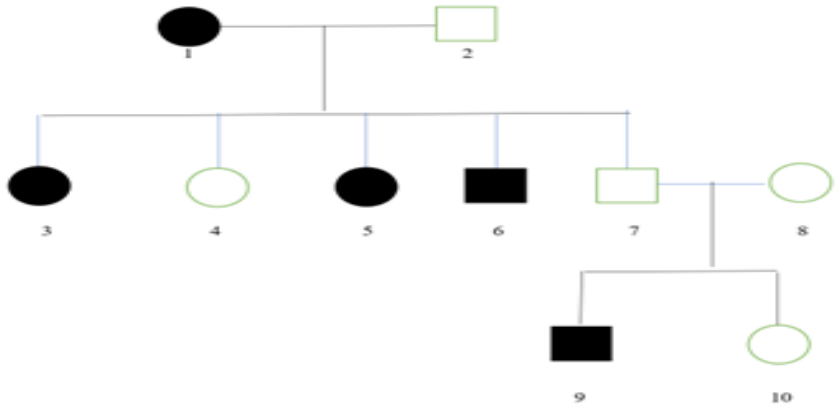
b. Violet & blue
c. Blue & green
d. Red & blue

(ii) In which condition the female have the disease gene but she is not colourblined.
   a. One X chromosome has the defected /mutated gene while other X-chromosome is normal
   b. Both X chromosomes have defected/mutated gene.
   c. Y chromosome has the defected/muted gene.
   d. Both A & B

(iii) Why the son does not inherit X linked Mendelian disease from affected father because: -
   a. The gene is located on X chromosome.
   b. Father transmits Y chromosome to his son, not the X-chromosome.
   c. Father's X chromosome is transmitted to the daughter.
   d. All of the above

(iv) Sickle cell Anaemia and thalassemia both are similar: -
   a. They created by autosomal genes.
   b. They are related to the disorder of blood.
   c. They are autosomal recessive diseases.
   d. All of these.

Q.2. Sudhesh suffer from the one blood disease. But she does not understand about the blood disease. Also, she not understands about that this disease is dominant or recessive. After this she learned more about this disease and finally, she got it that disease may be sickle cell anaemia, thalassemia or heamophila. She is getting married after the four months. With the help of the pedigree analysis, she assumed the heredity of the upcoming family.



1. According to the low of dominance this it is which type of disease-

   (a) Dominant Disease (b) Recessive Disease

   (c) Both Dominant and Recessive Disease (d) None of these

2. According to the Chromosomes it is which type of disease

   (a) Autosomal (b) Allosomal

(c) Sex linked (d) None of these

3. This disease may be referred to

(a) Autosomal dominant (b) Autosomal recessive

(c) Sex linked dominant (d) Sex linked recessive

4. The genotype of 5,6 and 9 number persons-

(a) AA (b) Aa

(c) aa (d) Both AA and Aa

Q.3. DNA replicates through the semiconservative method. It is proved by scientists Matthew Meselson and Franklin Stahl.
Meselson and Stahl conducted an experiment to prove that DNA replication is semi conservative. They grew bacterium E. coli in a medium containing nitrogen salts ($^{15}NH_4Cl$) labeled with radioactive ^{15}N. ^{15}N was incorporated into both the strands of DNA and such a DNA was heavier than the DNA obtained from E.coli grown on a medium containing ^{14}N. Then they transferred the E.coli cells on to a medium containing ^{14}N. After one generation, when one bacterial cell has multiplied into two, they isolated the DNA and evaluated its density. Its density was intermediate between that of the heavier ^{15}N-DNA and the lighter ^{14}N-DNA. This is because during replication, new DNA molecule with one ^{15}N-old strand and a complementary ^{14}N-new strand was formed (semi-conservative replication) and so its density is intermediate between the two.

1. In Meselson and Stahl experiment, ^{15}N can only be differentiated on the basis of

(a) Radioactivity (b) Radioactive t ½

(c) Physical observation (d) Density gradient

2. *E. coli* completes DNA replication in approximately

(a) 15 minutes (b) 20 minutes

(c) 18 minutes (d) 40 minutes

3. Which Chemical essential for density gradient centrifugation-

(a) $CsCl_2$ (b) Cs_2Cl_2

(c) Cs_2Cl (d) CsCl

4. If Meselson and Stahl's experiment is continued for four generations in bacteria, the ratio of N15/N15: N15/N14: N14/N14 containing DNA in the third generation would be:

a. 0:2:2

b. 1:4:0

c. 0:1:3

d. 0:1:7

Q.4. Convergent evolution refers to the process by which different species independently evolve similar traits or characteristics. This occurs when unrelated species face similar environmental challenges and develop analogous features as a result.

Divergent evolution is the process by which two or more related species become more dissimilar over time. This usually happens when a common ancestor gives rise to different species with distinct adaptations to different environments or ecological niches.

1. Homologous organ represents
   (a) Convergent evolution (b) Divergent evolution
   (c) Anthropogenic evolution (d) Genetic drift

2. Analogous organs represent
   (a) Convergent evolution (b) Divergent evolution
   (c) Anthropogenic evolution (d) Genetic drift

3. Which of the following shows convergent evolution?
   (a) Mouse and Marsupial mouse (b) Bobcat and Spotted cuscus
   (c) Anteater and Marsupial mole (d) Lemur and Tasmanian wolf

4. What does this diagram show?

   (a) Convergent evolution (b) Divergent evolution
   (c) Homologous organ (d) Both (b) and (c)

Q.5. RNA polymerase binds to promoter and initiates transcription. RNA polymerase associates with initiation factor and termination factor to initiate and terminate the transcription respectively. In prokaryotes, since the mRNA does not require any processing, the transcription and translation take place in the same compartment and can be coupled.

In eukaryotes, the primary RNA contains both the exons and introns and is non-functional. Hence, these non-coding introns will be removed by the process called Splicing. Then this mature RNA undergoes Capping (addition of unusual nucleotide methyl guanosine triphosphate at 5' –end) and Tailing (addition of adenylate residues at 3' –end). Now, this fully matured RNA will be transported out of the nucleus for translation.

1. In a post-transcriptional modification, capping adds an unusual nucleotide like

(a) Guanosine triphosphate (b) Methyl gunanine triphosphate

(c) Methyl guanosine triphosphate (d) Adenosine triphosphate

2. In a post-transcriptional modification called tailing, _____ residues are added at the_____ of mRNA.

(a) Adenylate, 5′- end (b) Guanylate, 3′- end

(c) Adenylate, 3′- end (d) Guanylate, 5’- end

3. mRNA is in fact

(a) Unprocessed rRNA (b) Unprocessed hnRNA

(c) Processed hnRNA (d) Processed mRNA itself

4. Additional post-transcriptional processing like capping and tailing is characteristic to

(a) rRNA (b) hnRNA (c) snRNA (d) tRNA

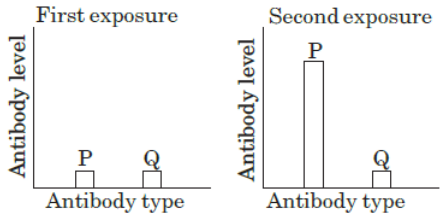
MARKING SCHEME

Q.1	1	2	3	4
	a	a	c	d
Q.2	1	2	3	4
	b	a	b	c
Q.3	1	2	3	4
	a	c	d	d
Q.4	1	2	3	4
	b	a	a	d
Q.5	1	2	3	4
	b	d	a	a

Biology in Human welfare

Question 1:

In a study to test a new vaccine against a viral disease, mouse model testing is done. In this process, mice are vaccinated and their blood samples were tested. Mice developed mild disease symptoms. After a few days those mice were again infected with the virus. This time they do not show any disease symptoms. Their blood samples were tested. Two graphs show antibody concentration for the first and second infection in mice blood.



Based on the above information, answer the following questions.

(i) P and Q in the given graphs indicate

a. IgM and IgG respectively
b. IgG and IgM respectively
c. IgG and IgE respectively
d. IgM and IgA respectively.

(ii) Which form of pathogen is used in vaccination?

a. Activated and strong pathogenic antigens
b. Inactivated and weakened pathogenic antigens
c. Hyperactive and strong pathogen
d. Preformed antibodies

(iii) Which of the following is incorrect for P?

a. It is the most abundant class of Ig.
b. It is found in blood, lymph and intestine.
c. It is unable to cross the placental barrier.
d. It is a monomer.

(iv) How does vaccination work?

a. The immune system produces antibodies which stay in the blood.
b. Memory lymphocytes remain in the body to fight off any future infection with the same
c. pathogen.
d. Antigenic proteins of pathogens generate primary immune response and the memory B and T cells.
All of these.

(v) Read the given statements and select the correct option.

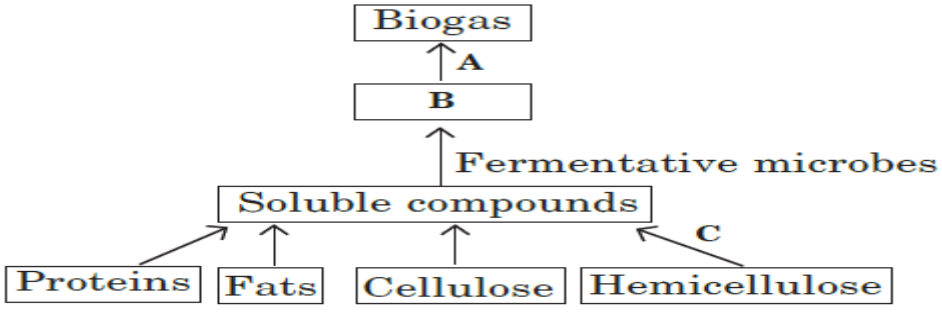
Statement A : Mice do not show any disease symptoms during second exposure to the pathogenic virus.

Statement B : The antibody production is accelerated and more intense during secondary immune response.

(a) Both statements A and B are true.
(b) Statement A is false but statement B is true.
(c) Statement A is true but statement B is false.
(d) Both statements A and B are false.

Question 2:

Villagers in a place near Chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the flow chart for biogas



production given below and answer the following questions.

(i) Biogas is composed of majorly

a. methane, CO_2 and O_2
b. CO_2, H_2S and H_2O
c. methane, CO_2 and H_2S
d. H_2S, H and O_2.

(ii) In the given flow chart, 'A' denotes

a. aerobic bacteria
b. methanogenic bacteria
c. cellulose degrading bacteria
d. yeast and protozoa.

(iii) What is represented by 'B' in the flow chart?

a. Carbohydrates
b. Protein polymers
c. Organic acids
d. Fat globules

(iv) 'C' in the given flow chart causes

a. aerobic breakdown of complex organic compounds
b. anaerobic digestion of complex organic compounds
c. fermentation of organic compounds
d. fermentation of monomers.

(v) If 'A' is not added in the procedure

a. methane will not be formed
b. CO_2 will not be formed
c. organic compounds will not be converted to H_2S
d. O_2 will not be formed.

Question:3

Yeast and certain bacteria play a key role in fermentation to break down carbohydrates into ethanol and carbon dioxide which are then further used to prepare acetic acid with the help of the bacterium *Acetobacter aceti*. Alcoholic fermentation in anaerobic process, but the conversion of alcohol to acetic acid is aerobic.
This process can be represented by the following equation:

$$C_6H_{12}O_6 \xrightarrow[\text{Complex}]{\text{Zymase}} \underset{\text{Ethyl alcohol}}{2C_2H_5OH} + 2CO_2$$

$$C_2H_5OH + O_2 \longrightarrow \underset{\text{Acetic acid}}{CH_3COOH} + H_2O$$

(i) The rate of alcohol production is measured on the basis of

a. amount of sugar present in the medium
b. amount of CO2 produced per unit of time
c. amount of yeast added in the medium
d. all of these.

(ii) A number of chemicals are produced at the time of alcoholic fermentation with the change of nutrient media, pH and aeration. Select such a by-product from the following.

a. Butanol
b. Succinic acid

c. Acetaldehyde
d. All of these

(iii) During alcoholic fermentation of cereals and potato, the crushed food mixed with hot water for obtaining malt is called

a. Juice
b. Mash
c. Wort
d. None of these.

(iv) Distilled alcohol with 95% ethanol content is called

a. absolute alcohol
b. rectified spirit
c. gin
d. brandy

(v) _____ is used in the preparation of vinegar.

a. Toddy
b. acetic acid
c. butter
d. both (a) and (b)

Question: 4

Alcohols are important industrial solvents. Ethanol, methanol, propanol, and butanol are produced commercially by the fermentation activity of some fungi, majorly yeasts. During fermentation, yeast cells convert cereal-derived sugars into ethanol and CO2. At the same time, hundreds of secondary metabolites that influence the aroma and taste of alcohol are produced. Sugar concentration affects the rate of fermentation reactions. Yeast cannot grow in a very strong sugar solution. In the case of complex carbohydrate-containing nutrient media, 1% malt or Rhizopus is used along with yeasts. Hydrolysis of starch is carried out at high temperatures for 30 mins. The crushed food mixed with hot water for obtaining malt is called mash. The nutrient medium prior to fermentation is called wort. Wort is cooled down to the appropriate temperature and inoculated with a strain of yeast.

(i) The rate of alcohol production is measured on the basis of

a. Amount of sugar present in the medium
b. Amount of CO_2 produced per unit time
c. Amount of yeast added in the medium
d. All of these

(ii) A number of chemicals are produced at the time of alcoholic fermentation with the change of nutrient media, pH and aeration. Select such by-product from the following.

a. Phenyl ethanol
b. Amyl alcohol
c. Glycerol
d. All of these

(iii) During alcoholic fermentation of cereals and potato, the crushed food mixed with hot water for obtaining malt is called

a. Juice
b. Mash
c. Wart
d. None of these

(iv) Distilled alcohol with 95% ethanol content is called

a. Absolute alcohol
b. Rectified
c. Gin
d. Brandy

(v) Assertion: Rhizopus or 1% malt is used in the nutrient medium when it contains complex carbohydrates.
Reason: Yeast does not possess sufficient diastase or amylase.

a. Both assertion and reason are true and reason is the correct explanation of assertion.
b. Both assertion and reason are true but reason is not the correct explanation of assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

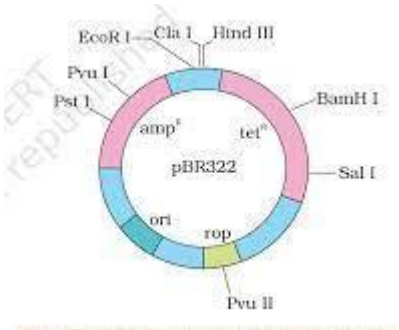
ANSWERS

Q.N.	Ans	Q.N.	Ans	Q.N.	Ans	Q.N.	Ans
1(i)	B	2(i)	C	3(i)	B	4(i)	B
1(ii)	B	2(ii)	B	3(ii)	D	4(ii)	D
1(iii)	C	2(iii)	C	3(iii)	B	4(iii)	B
1(iv)	D	2(iv)	B	3(iv)	B	4(iv)	B
1(v)	A	2(v)	A	3(v)	D	4(v)	A

Competency Based Questions

Biotechnology

1. A biotechnology research team is conducting a project aimed at cloning a gene of interest using the pBR322 plasmid. The gene encodes a protein with potential applications in medicine. The researchers have successfully inserted the gene into the pBR322 plasmid and introduced it into bacterial cells. The next steps involve optimizing the conditions for gene expression and further characterizing the properties of the cloned protein.



This scenario allows for exploration and analysis of various aspects related to gene cloning, expression, and characterization without specifying a particular challenge. Researchers can focus on optimizing conditions, analyzing protein properties, and conducting experiments to better understand the functionality of the cloned gene. (1+1++1+1=4M)

a) What could be used to cut the plasmid DNA to insert the gene of interest?
b) How could you as a scientist differentiate between the plasmid that contains the gene of interest from the one that does not?

c) Explain any two main factors that allows scientists to use PBR322 as a cloning vector.
d) What causes insertion inactivation

OR

What do amp^R and tet^R signify?

2. Agricultural scientists are engaged in a project focused on the development and cultivation of Bt cotton . The primary objective is to harness the benefits of Bt genes inserted into the cotton genome to confer resistance against certain insect pests. This initiative aims to improve crop yields, reduce the need for chemical pesticides, and enhance the overall sustainability of cotton farming.
The research team has successfully introduced the Bt genes into the cotton plants, creating genetically modified Bt cotton. Now, the project is transitioning to field trials to assess the performance of Bt cotton under real-world agricultural conditions. The researchers are particularly interested in evaluating the effectiveness of Bt cotton in pest resistance, monitoring potential environmental impacts, and studying the economic implications for farmers adopting this genetically modified crop.
(1+1+1+1=4M)

a) What does Bt represent here?
b) Name the gene that is used for providing resistance against cotton bollworm.
c) Explain how this gene provides resistance against the insect pests?
d) Which protein is produced by cry gene in Bt plants?

OR

Name two other crop plants in which Bt gene is incorporated for insect resistance.

3. A pharmaceutical company named XXX is engaged in the development and production of Humulin, a biosynthetic human insulin. The goal of the project is to provide a safe and effective alternative to insulin derived from animal sources, such as porcine or bovine insulin. Humulin is produced using recombinant DNA technology, where the human insulin gene is inserted into a suitable host organism for large-scale production. The researchers have successfully cloned and expressed the human insulin gene in a bacterial expression system, generating the precursor to human insulin. The next steps involve refining the purification process, optimizing production yields, and conducting rigorous quality control to ensure the safety and efficacy of Humulin for patients with diabetes.
(1+1+1+1=4M)

a) What problems are associated with insulin obtained from animal sources?
b) What is the difference between the Humulin and the naturally produced inactive insulin in our body.
c) Name the bond that binds the A and B peptide.
d) In which prokaryotic organism, both chain A and Chain B of insulin were synthesised?.

OR

Which pharmaceutical company was the pioneer in the manufacturing of Genetically engineered insulin.

4. In a rural community, farmers are facing challenges related to crop yield, pest resistance, and soil health. A biotechnology firm has collaborated with local agricultural

authorities to implement advanced biotechnological techniques for sustainable and efficient farming practices.

Question:

As a biologist involved in this project, address the following aspects based on the given scenario:

i. Identify and explain two genetically modified (GM) crops that could be introduced to address pest-related challenges in the region.

ii. Elaborate a mechanisms these GM crops employ to resist pests.

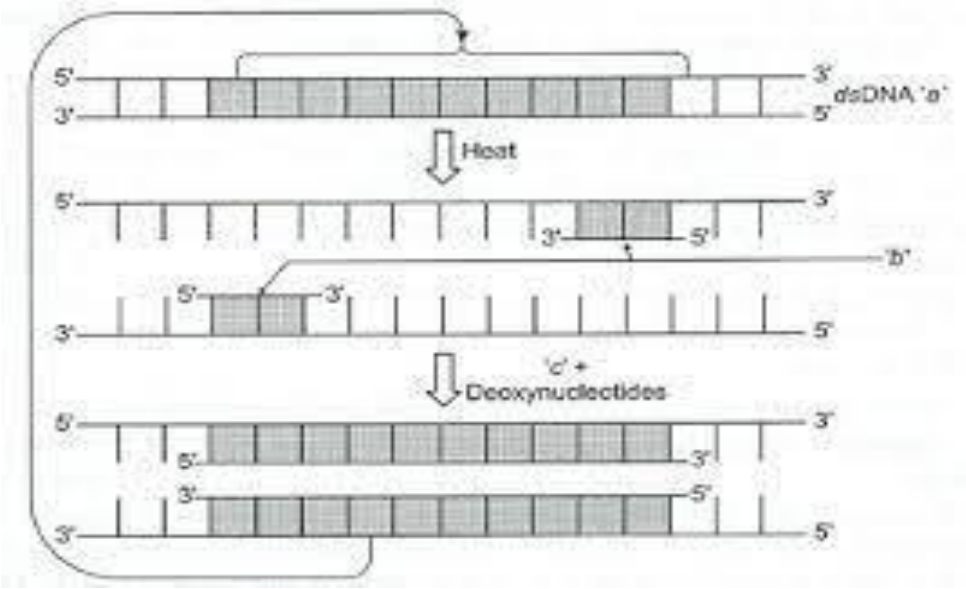
iii. Mention two potential advantages they offer over traditional crops.

iv. Mention one ethical considerations associated with the use of biotechnology in agriculture.

OR

Propose a biotechnological approach to enhance soil health in the region.

5 A schematic representation of polymerase chain reaction (PCR) upto the extension stage is given below. Answer the questions that follow



(i) Name the process 'a'.

(ii) Identify 'b'

(iii) Identify 'c' and mention its importance in PCR.

(iv). What is the role of Taq polymerase enzyme.

OR

Mention the significance of PCR technique.

ANSWERS:

CASE 1:

a) Restriction enzyme

b) On the basis of transformants and non-transformants with the help of antibiotic resistant markers

c) Presence of two antibiotic resistant gene eases the selection process of recombinant.it has high copy number.

d) Insert of gene of interest in the antibiotic resistant region causes insertional I nactivation.

OR

Ampicillin resistance and Tetracycline resistance.

CASE 2

a) Bacillus thuringeinsis

b) cry IAc and cry IIAb

c) The gene produces a crystalline protein which is inactive toxic in nature.when the I nsect ingest the inactice toxin in its alkaline gut , the activataed toxin creates pores in the midgut of epithelial cell causing the death of insects.

d) CRY protein OR Bt Brinjal and Bt Corn.

CASE 3:

a) May cause allergic reactions in the patient.

b) Presence of C-peptide.

c) Disulphide bonds

d) *E. coli*

OR

Eli Lilly pharmaceutical company.

CASE 4:

ANS:

a) Two GM crops suitable for the region could be Bt Cotton and Bt Brinjal.(any other correct name will also be awarded) 0.5*2=1

b) These crops have been genetically modified to express Bacillus thuringiensis (Bt) toxin, which is toxic to certain insect pests. These GM crops produce Bt toxins that specifically target pests like bollworms in cotton and fruit and shoot borers in brinjal. 1

c). Reduced dependence on chemical pesticides and environment friendly. 1

d). Ethical issues revolve around transparency, informed consent, and potential unforeseen consequences of manipulating living organisms. 1

OR

Introducing genetically engineered microbes like Pseudomonas and Bacillus species that possess specific enzymatic activities for soil remediation. These microbes break down organic pollutants, degrade pesticides, and improve soil fertility.

CASE 5:

a) Denaturation process -1/2

b) Primers-1/2

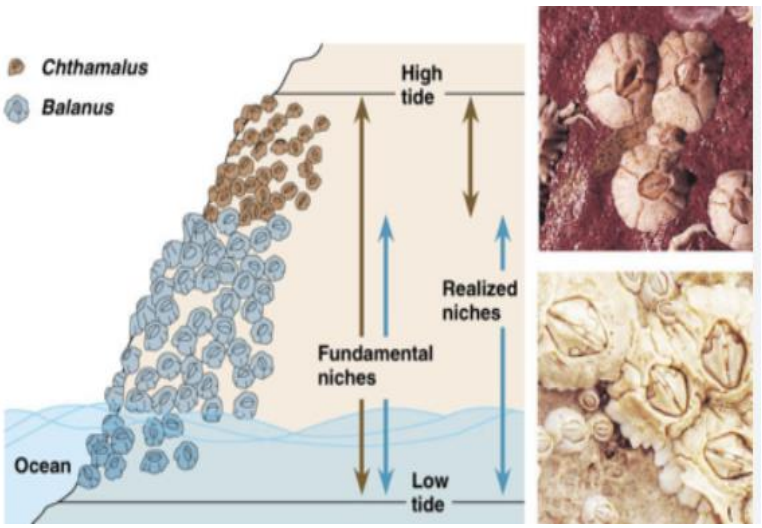
c) Taq DNA polymerase,Taq polymerase is a thermostable enzyme which remains active during the high temper at induced denaturation of DNA- 1+1

d) Taq- polymerase can withstand high temperature.

OR

PCR technique helps in formation of multiple copies of gene of interest.Also helps in disease diagnosis.

CHAPTER: ORGANISM AND POPULATION



1. Write the phenomenon took place in the absence of Balanus. (1m)
2. Identify the interaction between Chathamalus and Balanus. (1m)
3. Compare this phenomenon with competitive exclusion principle. (2 m)

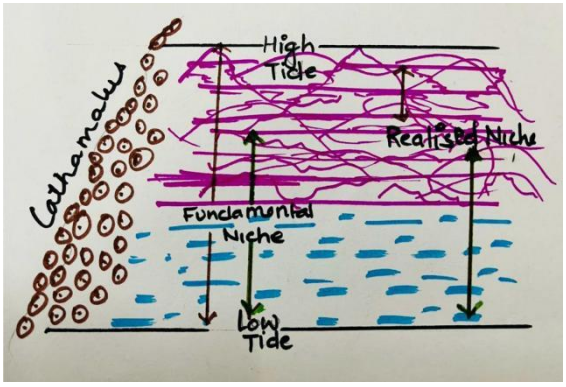
Or

Analyse the above figure and sketch a diagram to show the niche of *Chathamalus* in the absence of *Balanus.* (2m)

Answers:

1. Competitive Release
2. Competition
3. Competitive exclusion implies that one species will outcompete and eliminate another occupying the same ecological niche while in competitive release There is expansion in the absence of Balanus contrasts with the competitive exclusion principle, as it suggests coexistence rather than elimination.

Or



II. A population of bacteria in a laboratory experiment initially consists of 100 Individuals. The bacteria reproduce every hour, doubling in number. After 5 hours, the experimenters observe a significant increase in the population.

1. Explain the concept of exponential growth in the context of this bacterial population.(1m)
2. Calculate the population of bacteria after each hour, assuming exponential growth. (2m)

Or

Compare exponential growth and logistic growth diagrammatically and along with the equations.

2. Examine a hypothetical ecosystem and describe how changes in resource availability and habitat could influence its carrying capacity.

Answers:

1. In this experiment, the bacteria double in number every hour, leading to a rapid and exponential increase in the population of the bacteria.
2. Population Calculation:

   After 1 hour: 100 * 2 = 200

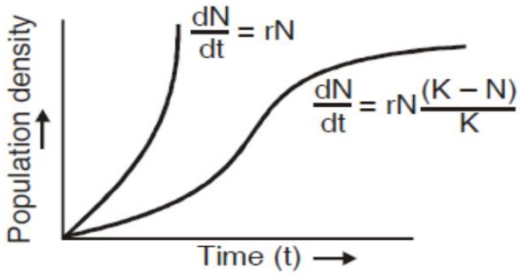
   After 2 hours: 200 * 2 = 400

   After 3 hours: 400 * 2 = 800

After 4 hours: 800 * 2 = 1600

After 5 hours: 1600 * 2 = 3200

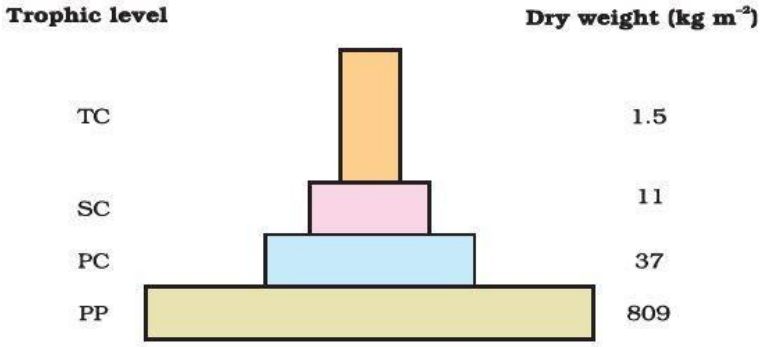
Or



2. A decrease in resources or habitat could lead to a reduce carrying capacity.

CHAPTER-ECOSYSTEM

1.Observe the diagram and answer the following questions-

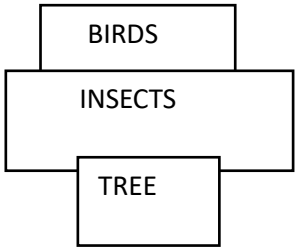


a. Identify the type of ecological pyramid.
b. Can the ecological pyramid be inverted? If yes, give one example.
c. Which type of ecological pyramid. Is always upright? Justify your answer.
d. A tree harbours many insects which are eaten by few birds. Draw a suitable ecological pyramid.

ANSWER

1. a- Pyramid of Biomass

   b. Yes. In Sea, biomass of fishes far exceeds that of phytoplankton.
   c. Pyramid of Energy. 10% law
   d.



2. The important point to note is that the amount of energy decreases at successive trophic levels. When any organism dies it is converted to detritus or dead biomass that

serves as an energy source for decomposers. Organisms at each trophic level depend on those at the lower trophic level for their energy demands.
Each trophic level has a certain mass of living material at a particular time called as the **standing crop**. The standing crop is measured as the mass of living organisms (**biomass)** or the number in a unit area. The biomass of a species is expressed in terms of fresh or dry weight. Measurement of biomass in terms of dry weight is more accurate.
Based on the above informations, answer the folloeing questions –

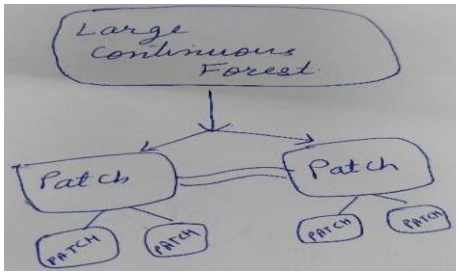
a. The amount of energy decreases at successive trophic levels.Justify .
b. What is DFC. How it is different from GFC?
c. Establish relationship of GPP with NPP.
d. In which trophic level, standing crop will be the highest?

ANSWER

2. a. 10% law
   b. Detritus food chain. **Detritus food chain** (DFC) begins with dead organic matter whereas GFC starts with producer.
   c. GPP – R = NPP
   d. Producers

Chapter- BIODIVERSITY AND ITS CONSERVATION

Q. The accelerated rates of species extinctions that the world is facing now are largely due to human activities leading to 'Evil Quartet'. Observe the given figure and answer the questions-



1. Identify the cause of biodiversity loss.
2. Give one example of biodiversity loss related with the above figure.
3. Writeone more cause with example other than the above for biodiversity loss.
4. The most dramatic examples of habitat loss come from the -
   (a) Tropical rain forests (b) Temperate forests (c) Grasslands (d) Deserts
5. Find the incorrect statement.
   (a) 'Sixth extinction' is different from previous extinction in terms of rate of extinction.
   (b) Ecologist warn that if the present trend of extinction continues, nearly 50 per cent all species on earth might be wiped out within the next 100 years.
   (c) Amphibians appear to be vulnerable to extinction.
   (d) Recent extinction is completely natural

ANSWERS-

1. Habitat loss and fragmentation.
2. The amazon rainforest harbouring millions of species is being cut and cleared for cultivating soyabean or for conversion to grasslands for raising beef cattle.

3. Over exploitation Eg-stellar's cow /Alien species invasion-Water hyacinth, Carrot grass/ co extinction Eg- plant pollinator mutualism
4. (a)
5. (d)

KENDRIYA VIDYALAYA SANGATHAN

ZIET MUMBAI

IN-SERVICE COURSE FOR BIOLOGY AND BIOTECHNOLOGY 2023-24

ASSERTION AND REASON QUESTIONS

CLASS XII

UNIT VI
REPRODUCTION

The following questions 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.

1. **Assertion**: Primary endosperm nucleus is triploid.

   Reason: It is the product of double fertilization.

2. **Assertion**:The germ cell of developing microspore is bigger, has abundant food reserves and a large irregularly shaped nucleus.

   Reason: Pollen grains are rich in nutrients and has been claimed to increase the performance of athletes.

3. **Assertion**:Integuments not encircle the nucellus completely .

   Reason: Antipodal cells are located towards the micropyle.

4. **Assertion**:Diaphragms, cervical caps, and vaults are barriers.

   Reason: Barrier methods prevent ovum and sperm physical meeting.

5. **Assertion:**A typical angiosperm embryo sac, at maturity, though 8-nucleate is 7-celled.

   Reason: Synergids develop into the primary endosperm nucleus.

6. **Assertion**: Entry of sperm into the ovum induces immediate development of the embryo.

R**eason:**Sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane that block the entry of additional sperms.

7. Assertion:Venereal Diseases are transmitted through sexual intercourse.

R**eason:**Childless couples could be assisted to have children of their own by ART.

8. Assertion: Cleavage starts as the zygote moves through the isthmus towards the uterus.

R**eason:**Attachment of the blastocyst to uterine wall is called implantation and it leads to pregnancy**.**

9. Assertion:A typical angiosperm anther is bilobed with each lobe having two theca.

R**eason:**Anther has four microsporangia which further develop into pollen sacs.

10. Assertion: Sporopollenin which is one of the most resistant organic materials known.

R**eason:**Pollen is incredibly well documented in the fossil record.

11. **Assertion**: The scrotum helps in maintaining the low temperature of the testes.

R**eason:** The low temperature of the testes is necessary for spermatogenesis.

12. **Assertion:** The enlarged part of penis is called glans penis.

Reason: The glans penis is covered by a loose fold of skin called foreskin.

13. **Assertion:** Ovaries are the primary sex organs.

Reason: Ovaries produce the female gamete.

14.**Assertion**: Ovaries produce gamete as well as steroid hormones.

Reason: The oviducts, ovaries and cervix constitute the female accessory ducts.

15.**Assertion**: The uterus opens into vagina through a narrow cervix.

Reason: The cavity of the cervix is called the cervical canal.

16. **Assertion:** Mons pubis is a cushion of fatty tissue covered by skin and pubic hair.

Reason: The labia majora are paired folds of tissue under the labia minora.

17. **Assertion**: The alveoli of mammary lobes open into their lumen.

Reason: Several mammary ducts join to form a mammary ampulla through which milk is sucked out.

18. **Assertion:** Spermatogenesis starts at the age of puberty.

Reason: There is a significant increase in the secretion of gonadotropin releasing hormone at puberty.

19. **Assertion**: Oogenesis is initiated at puberty.

Reason: Only one ovum is released every month.

20. **Assertion:** A large haploid secondary oocyte is formed due to unequal division.

Reason: A tiny second polar body is formed during this division.

21. **Assertion:** The lack of menstruation may be indicative of pregnancy.

Reason: Menstruation only occurs if the released ovum is not fertilized.

22. **Assertion:** During secretory phase the levels of LH and FSH gradually increase.

Reason: The increased secretion of LH induces rupture of Graafian follicles.

23. **Assertion:** During pregnancy, all events of the menstrual cycle stop.

Reason: In the absence of fertilization, the corpus luteum degenerates.

24. Assertion: Amniocentesis helps to detect foetal disorders during early pregnancy.

Reason: Jaundice can be prevented in foetus by amniocentesis.

25. **Assertion:** Menstruation does not occur during the intense period of lactation.

Reason: Chances of conception are higher after 1–2 months following parturition.

26. **Assertion:** Emergency contraceptives contain a high level of steroidal preparation.

Reason: Saheli is an emergency contraceptive.

27. **Assertion:** MTP helps to get rid of unwanted pregnancies due to unprotected intercourse.

Reason: MTPs are considered safe up to 28 weeks of pregnancy.

28. **Assertion:** Ban on amniocentesis helped to reduce the incidences of MTP in India.

Reason: Amniocentesis helps to determine the sex of an unborn child.

29. **Assertion:** In all ART, fertilization occurs outside the female's body.

Reason: It is possible for infertile couples to have a child through ART.

30. **Assertion:** ICSI technique is different from AI.

Reason: ICSI is carried out in laboratory.

ANSWER KEY
ASSERTION AND REASON QUESTIONS

CLASS-12 UNIT-VI REPRODUCTION

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
A	**D**	**C**	**A**	**C**	**D**	**B**	**B**	**A**	**B**
Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
A	**B**	**A**	**C**	**B**	**C**	**D**	**A**	**D**	**C**
Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
A	**D**	**B**	**C**	**C**	**C**	**C**	**B**	**D**	**A**

HEREDITY AND EVOLUTION

UNIT VII CLASS XII BIOLOGY

1. **Assertion** : Transcription is the mode in which DNA passes its genetic information to RNA.

Reason : Transcription takes place in the cytoplasm of eukaryotic cells.

2. **Assertion**: Viruses having shorter life span, mutate and evolve faster.

Reason: Viruses have generally RNA genome.

3. **Assertion** : The RNA molecules are essential for cell function in both prokaryotes and eukaryotes.

Reason : They play an important role in protein synthesis.

4. **Assertion**: The genetic codes are comma less.

Reason: Genetic codes are overlapping.

5. **Assertion** :'Split genes' concept is applicable only to the prokaryotes.

Reason : Prokaryotic genome is divided into exons and introns.

6. **Assertion**: DNA caused the transformation.

Reason: Digestion with DNase inhibits transformation.

7.**Assertion** : The hnRNA in humans has exons and introns.

Reason : The primary transcript produced in eukaryotes is translated without undergoing any modification or processing

8.**Assertion** : The two strands of DNA are antiparallel

Reason : Only antiparallel polynucleotides form a stable double helix.

9. **Assertion** : The two strands of DNA are antiparallel.

Reason : Only antiparallel polynucleotides form a stable double helix.

10. **Assertion** :DNA fingerprinting is also known as genetic fingerprinting.

Reason : It was developed by James Watson, the first director of human genome project.

11. **Assertion**: Enzymes required for DNA replication are efficient enzymes

Reason: They can polymerise large number of nucleotides in very short time

12. **Assertion**: Enzymes required for DNA replication are efficient enzymes

Reason: They can polymerise large number of nucleotides in very short time

13. **Assertion** : Ribosomal RNA is synthesized in the cytoplasm of the cell.

Reason : It is translated with the enzyme RNA polymerase III.

14. **Assertion** : Z-DNA follows a zig-zag course.

Reason : Z-DNA is left handed.

15**. Assertion** : The operon is a unit of gene expression.

Reason : Lac operon in E. coli is an inducible control.

16. Assertion: The law of dominance is used to explain the expression of only one of the parental character is a monohybrid cross in the F1- generation.

Reason: The law of dominance explains the proportion of 3 : 1 obtained at the F2 – generation.

17. Assertion: Deletions and insertions of base pairs of DNA, causes frame-shift mutation.

Reason: A classical example of frame-shift mutation is sickle cell anaemia.

18. Assertion: Genetic make up of sperm determines the sex of human child.

Reason: Males are homogametic in humans.

19. Assertion: Starch grain size is controlled by gene B in pea seed is an example of incomplete dominance.

Reason: Starch grain formed by genetic constitution Bb is of intermediate size.

20. Assertion: UTRs are present at both 5' end and 3'end in mRNA.

Reason: UTRs are required for efficient translation process.

21. Assertion: Polymorphism in DNA sequence is the basis of DNA fingerprinting.

Reason: Polymorphism arises due to mutation.

22. Assertion: Pouched mammals of Australia survived by continental drift.

Reason: It is because of lack of competition from any other mammals.

23. Assertion: Chemical evolution was more or less accepted.

Reason: Miller in his experiment observed the formation of amino acids in similar condition which was there on earth at the time of origin.

24. Assertion: Homology is based on divergent evolution.

Reason: Analogy is result of convergent evolution.

25. Assertion: Herbicide resistant varieties can be selected in lesser time scale.

Reason: It can be possible by anthropogenic action that is excessive use of herbicides.

26. **Assertion** : According to big-bang hypothesis about 20 billion years ago universe was a big ball of only neutrons.

Reason : Movement of these particles is known to generate tremendous heat which caused explosion due to temperature and pressure changes.

27. **Assertion** : The primitive atmosphere was reducing once i.e., without oxygen.

Reason : In the primitive atmosphere, oxygen was involved in forming ozone.

28. **Assertion**: Theory of chemical evolution proposed that life comes from pre-existing non-living organic molecules.

Reason: The primitive earth conditions led to production of organic molecules.

29. **Assertion** : The earliest organisms that appeared on the earth were non-green and presumably anaerobes.

Reason :The first autotrophic organisms were the chemoautotrophs that never released oxygen.

30. **Assertion**: The first cells used RNA as their hereditary molecule.

Reason: DNA evolved from RNA.

ANSWERS

1. c	2. a	3. a	4. c	5. d	6. a	7. c	8. a	9. a	10. c
11.b	12. a	13. d	14. b	**15. b**	**16. b**	**17. c**	**18.c**	**19. a**	**20. a**
21. c	**22. a**	**23. a**	**24. b**	**25. a**	**26. a**	**27. c**	**28. a**	**29. b**	**30. b**

Chapter-8: Human Health and Diseases

1. Assertion- Besides curdling of milk, LAB also improve its nutritional quality by increasing vitamin-D content.

   Reason- LAB stands for Lactic acid bacteria.

2. Assertion - Recurring chills and fever is a common symptom observed in patients suffering with Malaria.

   Reason - Haemozoin released due to rupture of RBCs is responsible for the chills.

3. Assertion - Maintenance of personal and public hygiene is very important for prevention and control of many infectious diseases.

   Reason - Personal and public hygiene is to be taken care of during spears of infectious diseases at global level.

4. Assertion - Local bodies should introduce Gambusia fishes in local ponds.

   Reason - This will hep control the growth of mosquito larvae.

5. Assertion - The yellowish fluid colostrum secreted by mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant.

   Reason - The foetus also receives some antibodies from their mother, through the colostrum.

6. Assertion - Antivenom injection is an example of passive immunity.

   Reason - The injection which is given to the patients, contain preformed antibodies against the snake venom

7. Assertion - Antibiotics are used to treat a number of diseases

   Reason - They inhibits the growth and chemical activities of pathogen without causing any harm to the host.

8. Assertion- Cyclosporin A is administered during organ transplant.

   Reason- It is a pain reliever.

9. Assertion- The toxin-producing genes of Bacillus thuringiensis is transferred through r- DNA technology into crop plants, which become resistant to insect pests.

   Reason-Bacillus thuringiensis is a bacterium whose spores are toxic to certain insect larvae.

10. Assertion- Rhizobium shows a symbiotic association with the roots of Pinus.

    Reason-Increase the absorption of inorganic minerals and water.

11. Assertion- Streptokinase is used as a clot-buster to remove clots in patients who have undergone myocardial infarctions.

Reason- Monascus purpureus is a yeast used commercially in its production

12. Assertion- Toddy is a traditional drink of Southern India.

    Reason-Swiss cheese is made by a bacterium Propionibacterium shermanii

13. Assertion- Ethanol is produced by yeast (Propionibacterium shermanii) on commercial scale.

    Reason- Wine and beer are produced without distillation.

14. Assertion- Anopheles mosquito is the pathogen of Malaria.

    Reason- All disease causing organisms are called Pathogens

15. Assertion- Innate immunity is also known as inborn immunity

    Reason- It is genetic and transmits from parents to their offsprings.

16. Assertion- All cancers are characterized by the uncontrolled growth and division of cells

    Reason-The benign tumors grow very rapidly, invading and damaging the surrounding normal tissues.

17. Assertion- To prevent own self form communicable diseases which spread by flies always keep food covered.

    Reason: Housefly act like one such carriers of disease causing microbes. The flies sit on the garbage and animal excreta. Pathogens stick to their bodies. When these flies sit on uncovered food they may transfer the pathogens. Whoever eats the contaminated food is likely to get sick.

18. Assertion- Beer and wine are called hard liquors while gin, rum, etc. are soft liquors.
    Reason: Beer and wine are made without distillation.

19. Assertion: Secondary treatment of sewage is also called biological treatment while primary treatment is called physical treatment.
    Reason: Primary sewage treatment depends only upon sedimentation properties of materials present in sewage and filteration.

20. Assertion- Antibody mediated response is called humoral immune response

    Reason- Antibodies are prepared by T lymphocytes.

21. Assertion- For determining the cause of allergy, the patient is exposed to or injected with very small doses of possible allergens

    Reason- The patients show allergic reaction due to release of histamine and serotonin by mast cells.

22. Assertion- AIDS-Acquired immunodeficiency syndrome produces a low count of defense cells

    Reason- This causes the body to loose immunity against other diseases

23. Assertion- Cancer is contagious and cells can spread from one Person to other.

    Reason- Cancer cells have lost the property of contact inhibition.

24. Assertion- Curiosity, need for adventure and excitement, and experimentation, constitute common causes, which motivate youngsters towards drug and alcohol use

Reason - Adolescence, is very vulnerable phase of mental and psychological development of an individual

25. Assertion- Those who take drugs intravenously are much more likely to acquire serious infections like AIDS and Hepatitis B.

    Reason- Both can be transmitted through sexual contact or infected blood.

26. Assertion- Malaria is caused by Protozoa

    Reason- Plasmodium is classified under Protozoa.

27. Assertion- Ringworms can be acquired by using towels, clothes or even the comb of infected individuals.

    Reason- Ringworm is a infectious disease.

28. Assertion- Cancerous cells protect normal cells.

    Reason- Cancerous cells produce interferons.

29. Assertion- Secondary response is faster than primary response

    Reason- Primary response protect from disease

30. Assertion- Final product of sewage treatment is methane and manure.

    Reason- Aerobic bacteria are used in biological sewage treatment.

Marking scheme										
1	D	6	A	11	C	16	C	21	A	26	A
2	A	7	A	12	B	17	A	22	B	27	A
3	C	8	C	13	D	18	D	23	D	28	A
4	A	9	A	14	B	19	A	24	A	29	B
5	A	10	D	15	A	20	C	25	A	30	B

Biotechnology Principles and Processes

ASSERTION AND REASONING

Each assertion is followed by a reason, mark your answer as A, B, C or D, where:
A) Both Assertion and reason are true and the reason is the correct explanation of Assertion
B) Both Assertion and Reason are true and Reason is not correct explanation of Assertion.
C) Assertion is true but Reason is false.
D) Assertion is false but Reason is true.

1. Assertion: Plasmids are double stranded extra-chromosomal DNA
   Reason: Plasmids are usually present in eukaryotic cells.

2. Assertion: Heat shock enables bacteria to take up recombinant DNA.
   Reason: DNA is hydrophilic.

3. Assertion: In gel electrophoresis, DNA fragments are separated.
Reason: DNA is negatively charged, so it moves towards anode under electric field.

4. Assertion: A gene from Bacillus thuringiensis is incorporated in plant genome to increase yield.
Reason: It is Bt toxin producing gene which kills larvae of insects

5. Assertion: Restriction enzymes EcoRI cut the strand of DNA to produce sticky ends.
Reason: Stickiness of the ends facilitates the action of the enzyme DNA polymerase

6. Assertion: In recombinant DNA technology, human genes are often transferred into bacteria (prokaryotes) or yeast (eukaryotes).
Reason: Both bacteria and yeast multiply very fast to form a huge population which express the desired gene.

7. Assertion: Restriction digestion is a process of cutting DNA by restriction enzyme.
Reason: DNA ligase joins two DNAs

8. Assertion: Genetic engineering requires both nucleases and ligases.
Reason: Ligases produce the nick in the recombinant DNA molecule.

9. Assertion: Restriction enzymes recognize palindromic sequence.
Reason: Palindromic sequences read same in both directions of the two strands.

10. Assertion: Restriction enzymes Hind II and Hpa are produced from two different genera of bacteria.
Reason: Hind II is produced from Haemophilus while Hpa is produce from Hematococcus.

11. Assertion: Restriction enzymes of different organisms that recognize the identical sequences are called isomers.
Reason: They are present only in eukaryotes.

12. Assertion: Restriction digestion is a process of cutting DNA by restriction enzyme.
Reason: DNA ligase joins two DNAs.

13. Assertion: Restriction endonucleases are also called ‘molecular scissors’.
Reason: When fragments generated by restriction endonucleases are mixed, they join together due to their sticky ends.

14. Assertion: Biotechnology deals with techniques of using live organism or enzymes from organisms to produce products and processes useful of humans.
Reason: In vitro fertilization is a part of biotechnology.

15. Assertion: rDNA technology is superior over hybridization.
Reason: rDNA technology allows us to isolate and introduce only one or a set of desirable gene without introducing undesirable genes into the target organism.

16. Assertion: Restriction endonuclease restricts the growth of bacteriophage in bacteria.
Reason: Restriction endonuclease add methyl groups to bacterial DNA.

17. Assertion: In EcoRI, the latter R is derived from the genus of bacteria.
Reason: EcoRI is the name of palindromic nucleotide sequences.

18. Assertion: In rDNA technology, the restriction enzymes, those produce sticky ends are commonly used.
Reason: Sticky ends facilitate the action of enzyme DNA ligase.

19. Assertion: Cloning vector should have selectable marker.
Reason: Selectable marker, helps in identifying and eliminating non-transformants and selectively permitting the growth of transformants.

20. Assertion: Retroviruses in animals have the ability to transform normal cells into cancerous cells.
Reason: Retroviruses have the ability to convert proto-oncogenes into oncogenes.

21. Assertion: Micro-injection technique is used to inject rDNA directly into the nucleus of an animal cell.
Reason: Gene-gun is used to transfer rDNA into plant cells.

22. Assertion: In case of PCR the new DNA synthesize on template DNA, one in continuous manner and other in discontinuous manner.
Reason: PCR is an in vivo process.

23. Assertion: In bioreactors the transforming cells are maintained in their physiologically most active log/exponential phase.
Reason: This type of culturing methods produces a larger biomass using higher yields of desired protein.

24. Assertion: Developing a DNA vaccine is a part of biotechnology.
Reason: Biotechnology uses live organism or enzyme form organisms to produce products and processes useful to humans.

25. Assertion: rDNA formation is a part of genetic engineering.
Reason: Genetic engineering include technique to alter chemistry of genetic material.

26. Assertion: A sexual reproduction is advantageous over asexual reproduction.
Reason: Sexual reproduction provides opportunities for variation, some of which is beneficial for individual as well as population.

27. Assertion: Alien DNA if linked to plasmid it can be cloned.
Reason: Plasmid contains ori.

28. Assertion: Restriction endonucleases are also known as molecular scissors.
Reason: It is used to cut DNA (Biomolecules) at specific site.

29. Assertion: In PCR Taq polymerase is used.
Reason: Taq is thermo stable DNA polymerase.

30. Assertion: In electrophoresis DNA is move towards anode.
Reason: DNA is +vely charged molecule.

ANSWERS									
01. c)	02. b)	03. a)	04. a)	05. c)	06. a)	07. b)	08. c)	09. b)	10. d)
11. c)	12. b)	13. b)	14. b)	15. a)	16. c)	17. d)	18. a)	19. a)	20. a)
21. b)	22. d)	23. a)	24. a)	25. a)	26. a)	27. a)	28. a)	29. a)	30. c)

ORGANISMS AND POPULATION

1. Assertion: Birth rate is an attribute of population
   Reason: Birth is an attribute of an individual
2. Assertion:Mediterranean orchid Ophrys employs 'sexual deceit' to get pollination done by a species of bee.
   Reason:One petal of its flower bears an uncanny resemblance to the female of the bee in size,colour and markings.
3. Assertion:Egrets always forage close to where the cattle are grazing
   Reason: Egrets are foraging with cattle
4. Assertion:Female mosquito is not considered a parasite
   Reason: It sucks human blood for reproduction
5. Assertion: Species of warblers living on the same tree shows resource partitioning
   Reason: Resource partitioning is the method to avoid competition
6. Assertion:InNorway rat the r is 0.015, and for the flour beetle it is 0.12
   Reason: r is dependent on birth and death of an individual
7. Assertion:Natality refers to the number of births during a given period in the Population
   Reason: Natality is an attribute of population
8. Assertion:Population density of tigers in our national parks and tiger reserves is often based on pug marks and faecal pellets
   Reason: Tigers leave deep pug marks
9. Assertion: The age pyramids generally show age distribution of males in a combined diagram
   Reason: Expanding age pyramid depicts declining population
10. Assertion: In nature, a given habitat has enough resources to support a maximum possible number, beyond which no further growth is possible.

Reason: Carrying capacity (K) is the maximum limit of a given habitat to support a population

Answers:

1	2	3	4	5	6	7	8	9	10
B	**A**	**C**	**B**	**A**	**B**	**B**	**C**	**D**	**B**

CH-ECOSYSTEM

1. **Assertion-**Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis.
Reason-A considerable amount of GPP is utilised by plants in respiration.

2. **Assertion-** The earthworm is referred to as the farmer's friend'.
Reason- They help in the breakdown of complex organic matter.

3. **Assertion- Humification** leads to accumulation of a dark coloured amorphous substance called **humus**
Reason- Being colloidal in nature it serves as a reservoir of nutrients.

4. **Assertion-** Decomposition is controlled by chemical composition of detritus.
Reason- Decomposition rate is quicker if detritus is rich in lignin and chitin.

5. **Assertion-**In an ecosystem,energy flow is cyclic and bidirectional
Reason-This is in accordance with first law of thermodynamics

6. **Assertion-** In an aquatic ecosystem, GFC is the major conduit for energy flow.
Reason- In a terrestrial ecosystem, a much larger fraction of energy flows through the detritus food chain than through the GFC

7. **Assertion-** When any organism dies it is converted to detritus
Reason- It serves as an energy source for decomposers.

8. **Assertion-** A given species may occupy more than one trophic level in the same ecosystem at the same time
Reason- A sparrow is a primary consumer when it eats seeds, fruits, peas, and a secondary consumer when it eats insects and worms

9. **Assertion-** The pyramid of biomass in sea is generally inverted .
Reason- The biomass of fishes far exceeds that of phytoplankton

10. **Assertion-** Saprophytes are not given any place in ecological pyramids.
Reason- They do not play a vital role in the ecosystem

ANSWER KEY-

1	B	2	A	3	B	4	C	5	D
6	B	7	A	8	B	9	A	10	C

CHAPTER 15

BIODIVERSITY AND CONSERVATION

1. Assertion: Passenger pigeon becomes extinct.
   Reason: It is due to over exploitation by humans

2. Assertion: India has more than 50000 genetically different strains of rice.
   Reason: India has approximately 1000 varieties of mango

3. Assertion: Sacred groves are examples of in situ conservation.
   Reason: It is a conservation of the whole ecosystem on site.

4. Assertion: Tropics have greater biological diversity.
   Reason: Tropical environments are more seasonal, less constant and unpredictable.

5. Assertion: There are 34 biodiversity hotspots in the world.
   Reason: The hotspots are also regions of accelerated habit loss.

6. Assertion: While analysing the species area relationship for a large area the slope of line is less steep.
   Reason: For frugivorous birds in the tropical forest of different continents, the slope is found to be 1.2.

7. Assertion: Sixth extinction presently in progress different from the previous episode.
   Reason: Difference is in the rate; current species extinction rates are estimated to be 100 to 1000 times faster than in the pre-human times.

8. Assertion: Ex situ conservation is carried out in biosphere reserves, national parks and sanctuaries
   Reason: Tribals and local people are involved in the maintenance of these protected areas.

9. Assertion: Diversity at species level is called species diversity.
   Reason: The western ghats have a greater amphibian species diversity than eastern diversity.

10. Assertion: A stable community shows much variation in productivity from year to year.
    Reason: It is not resistant to occasional disturbances.

ANSWER KEY-

1	2	3	4	5	6	7	8	9	10
a	b	a	c	b	d	a	d	a	d

NAME OF UNIT	VSA 1 MARK	SA 2 MARKS	LA 3 MARKS	CASE/PARAGRAPH BASED 4 MARKS	VLA 5 MARKS	WEIGHTAGE
REPRODUCTION	2(1)=2	2(2)=4	2(3)=6	1(4)=4	-	16
GENETICS AND EVOLUTION	3(1)=3	2(2)=4	3(3)=9	1(4)=4	-	20
BIOLOGY AND HUMAN WELFARE	4(1)=4	-	1(3)=3	-	1(5)=5	12
BIOTECHNOLOGY AND ITS APPLICATIONS	4(1)=4	-	1(3)=3	-	1(5)=5	12
ECOLOGY AND ENVIRONMENT	3(1)=3	1(2)=2		-	1(5)=5	10
	16	10	21	8	15	70

KENDRIYA VIDYALAYA SANGATHAN

ZIET MUMBAI

IN-SERVICE COURSE FOR BIOLOGY AND BIOTECHNOLOGY 2023-24

Blue Print

CLASS - XII SUB. - BIOLOGY

KENDRIYA VIDYALAYA SANGATHAN

ZIET MUMBAI

IN-SERVICE COURSE FOR BIOLOGY AND BIOTECHNOLOGY 2023-24

QUESTION PAPER

CLASS XII

BIOLOGY (044)

Maximum Marks: 70 **Time: 3 hours**

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.

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

<table>
<tr><td colspan="2">SECTION-A</td><td></td></tr>
<tr><td>Q.NO</td><td>QUESTION</td><td>MARKS</td></tr>
<tr><td>1.</td><td>Match the following list of microbes and their importance:
<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>A</td><td>Sacchromyces</td><td>1</td><td>Production of immunosuppressive agents</td></tr>
<tr><td>B</td><td>Monascus purpureus</td><td>2</td><td>Ripening of Swiss cheese</td></tr>
<tr><td>C</td><td>Trichoderma polysporum</td><td>3</td><td>Commercial production of ethanol</td></tr>
<tr><td>D</td><td>Propionibacterium</td><td>4</td><td>Production of blood</td></tr>
</table></td><td>1</td></tr>
</table>

	sharmanii		cholesterol-lowering agent	

Which of the following is the correct option?

	A	B	C	D
a	2	4	1	3
b	4	3	1	2
c	2	1	4	3
d	3	4	1	2

2. Match the column I with column II and choose the correct option. 1

Column I	Column II
a. Sporogenous tissue	1. Pollen grain
b. Nucellus	2. Microsporangium
c. Male gametophyte	3. Embryo sac
d. Female gametophyte	4. Megasporangium

(a) a-3, b-1,c-4, d-2 (b) a-2, b-4,c-3, d-1 (c) a-4, b-2,c-1, d-3 (d) a-2, b-4,c-1, d-3

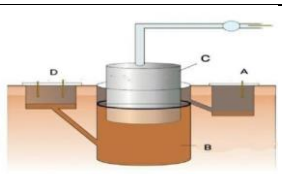
3. In the F2 generation of a Mendelian dihybrid cross the number of phenotypes and genotypes are 1
(a) phenotypes – 4; genotypes – 16
(b) phenotypes – 9; genotypes – 4
(c) phenotypes – 4; genotypes – 8
(d) phenotypes – 4; genotypes – 9

4. DNA is a polymer of nucleotides which are linked to each other by 3′→ 5′ phosphodiester bond. To prevent polymerisation of nucleotides, which of the following modifications would you choose? 1
(a) Replace purine with pyrimidines
(b) Remove/replace 3′ OH group in deoxyribose
(c) Remove/replace 2′ OH group with some other group in deoxyribose
(d) Both ‘b’ and ‘c’

5. Genotypic ratio of 1:2:1 is obtained in a cross between 1
(a) AB X AB
(b) Ab X Ab
(c) Ab X ab
(d) ab X ab

6. Read the following statements about male reproductive system and choose the incorrect statements from the given options. 1
(I) It is located in the pelvis region.
(II) The testes are situated outside the abdominal cavity within a pouch called scrotum.
(III) Each testis has about 350 testicular tubules.
(IV) Penis, the male external genitalia is made up of special tissues to facilitate insemination.
(a) I and III (b) III and IV (c) I and IV (d) Only III

7. Select the correct option among the following 1



(a) A – slurry, B – Digester, C – Gas Holder,D - Sludge
(b) A – sludge, C – Gas mixture, B – Slurry,D – Water + Dung
(c) A – sludge, B – Digester, C – Gas Holder, D – Slurry
(d)A – slurry, C – Gas mixture, B – Sludge,D – Water + Dung

8. Match the items in Column-I and Column- II and choose the correct answer. 1

	Column I		Column II
a	Ladybird	1	Methanobacterium
b	Mycorrhiza	2	Trichoderma
c	Biological control	3	Aphids
d	Biogas	4	Glomus

Which of the following is the correct option?

	A	B	C	D
a	1	4	3	2
B	3	4	2	1
C	4	1	2	3
D	3	2	1	4

9. An antibody cvonsists of 1

a. Two small light chains and two long heavy chains
b. Two long light chains and two small heavy chains
c. One small light chains and two long heavy chains
d. Two small light chains and one long heavy chains

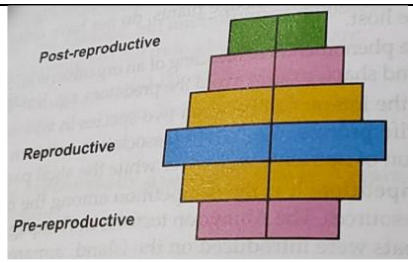
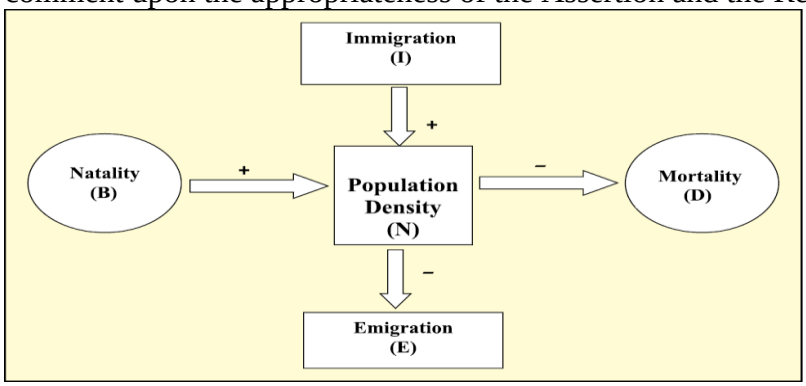
10. BOD stands for- 1

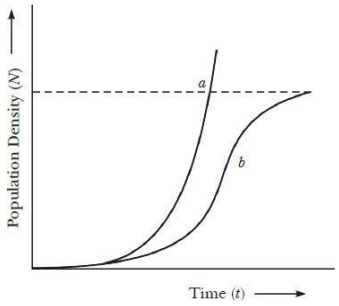
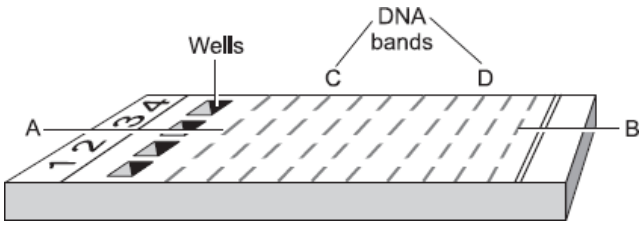
a) Biosynthesis of diphenol
b) Biochemical of demand
c) Biological oxygen degree
d) Biochemical oxygen demand

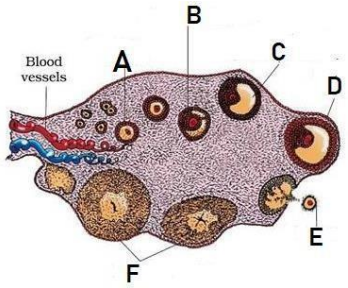
11. 1

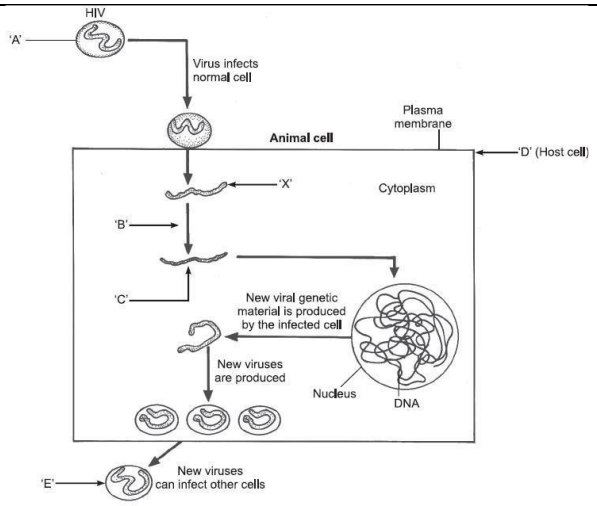
The figure shows DNA separated out, removed by :
(a) spooning (b) spooling (c) spilling (d) speeling

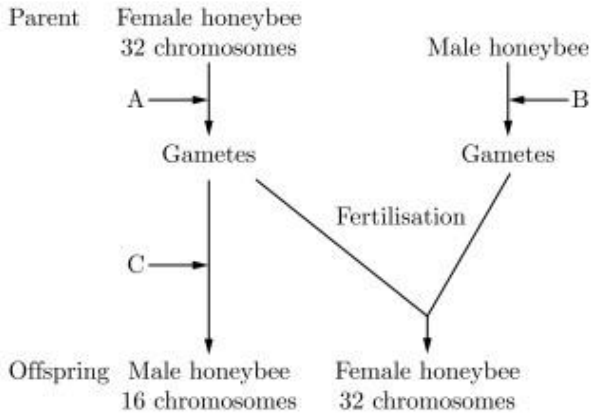
12. The status of the human population reflected in the human age pyramid given below is : 1

	 (a)Declining population (b)Stable population (c) Expanding population (d)Extinct population	
	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:** Pneumonia is caused by the infection of *Streptococcus pneumoniae*. **Reason:** *Streptococcus pneumoniae* bacteria infect respiratory passage.	1
14.	**Assertion**- Vector should have many recognition sites for commonly used restriction enzymes. **Reason**- Lot of recognition sites generate several fragments, which make gene cloning easy.	1
15.	Given below is a population density flowchart. Study the figure below and comment upon the appropriateness of the Assertion and the Reason.  **Assertion** –The density of a population in a given habitat during a given period, fluctuates due to changes in four basic processes. **Reason** - So if N is the population density at given time t, then density its density at time t+1 is- Nt+1=Nt+[(B+1)+(D+E)]	1
16.	**Assertion -** Tropical latitudes have greater biological diversity than temperate latitudes.	1

	Reason- Tropical rain forests remain relatively undisturbed for millions of years**.**	
	SECTION-B	
17.	**(*a*) How does a Chromosomal disorder differ from a Mendelian disorder?** **(b) Name any two chromosomal aberration associated disorders.** **List the characteristics of the disorders mentioned above that help in their diagnosis.**	1+1
18.	**(*a*) Name the scientist who called *t*RNA an adaptor molecule.** **(b)Draw a clover leaf structure of *t*RNA showing the following:** **(i) Tyrosine attached to its amino acid site.** **(ii) Anticodon for this amino acid in its correct site (codon for tyrosine is UCA).** **(c) What does the actual structure of *t*RNA look like?**	½+½+½+½
19.	**Cleistogamous flowers produce assured seed set even in the absence of pollinators. How?**	2
20	**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) In the absence of predators, which one of the two curves would appropriately depict the prey population?**  	1+1
21.	Expand ICSI. Under what conditions will the doctor advice it?	1+1
	SECTION-C	
22.	**Why is it essential to have a 'selectable marker' in a cloning vector?** **Study the diagram given below and answer the questions that follow:**  **(a) Why have DNA fragments in band 'D' moved farther away in comparison to those in band 'C'?** **(b) Identify the anode end in the diagram.** **(c) How are these DNA fragments visualized**?	1+1+1

23.	**a) Identify the given figure.** b) Name the initial cell from which this structure has developed. c) Draw the next mature stage and label the parts. 	1+1+1
24.	**(a) Write the conclusion drawn by Griffith at the end of his experiment with Streptococcus pneumoniae.** **(b) How did O. Avery, C MacLeod and M. McCarty prove that DNA was the genetic material? Explain.**	1.5+1.5=3
25.	**(a) A true breeding homozygous pea plant with green pods and axial flowers as dominant characters, is crossed with a recessive homozygous pea plant with yellow pods and terminal flowers. Work out the cross up to F2 generation giving the phenotypic ratios of F1 and F2 generation respectively.** **(b) State the Mendelian principle which can be derived from such a cross and not from monohybrid cross.**	2+1
26.	Observe the diagrammatic section view of ovary and answer the questions  (a) Write correct labelling of A, B, C and D are: (b) Which part represent corpus luteum.	2+1
27.	(a) Why is the collection of white winged moths and dark winged moths made in England between 1850 – 1920 considered a good example of natural selection ? (b) ‘‘Evolution is based on chance events in nature and chance mutations in organ isms.’’ Justify the statement.	1.5+1.5=3
28.	Study the diagram –	1+1+1

	 Study the diagram showing replication of HIV in humans and answer the following questions accordingly: (a) Write the chemical nature of the coat 'A'. (b) Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'. (c) Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body.	
	SECTION-D	
29.	Intrauterine devices are most widely accepted methods of contraception. This are used by female and are inserted by doctors are nurses in the uterus through vagina. However this devices are not recommended for those who eventually intend to conceive. **1. How does copper –t prevent contraception** a) Cu ions make uterus Unsuitable for implantation b) Cu ions make cervix hostile to the sperms c) Cu ions suppress sperm motility d) Cu ions inhibit ovulation **2. Which of the following iodine make uterus unsuitable for implantation** a) LNG 20 b) Multiload 375 c) Cu7 d) lippes loop **3. Identify the correct statement for IUDs** a. The slowly released synthetic progesterone in the body b. The increase phagocytosis of sperms within the uterus c. They block entry of sperms through the cervix d. Both (b) and (c) **4. Selected the correct matched pair** (a) Hormone releasing IUD - LNG 20 (b) Non-medicated IUD - Progestasert (c) Copper releasing IUD - Lippes loop (d) None of these.	1+1+1+1
30.	'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	1+1+1+1

	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). (c) Identify the type of sex determination in this case. (d)If the no. of chromosome in male honeybee is 48 and female honeybee is 32 than find no. of chromosome in their progeny which is form by fusion of gamets.	
	SECTION-E	
31.	Answer the following question with respect to recombinant DNA technology: a) Why is plasmid considered to be an important tool in rDNA technology? From where can plasmids be isolated? (Any two sources) b) Explain the role of 'ori' and 'selectable marker' in a cloning vector. c) "r-DNA technology cannot proceed without restriction endonuclease." Justify. **OR** a) Name the source from which insulin was extracted earlier. Why is this insulin no more in use by diabetic people? b) Explain the process of synthesis of insulin by Eli Lilly Company. Name the technique used by the company. c) How is the insulin produced by human body different from the insulin produced by the above mentioned company?	2+2=1 =5

<table>
<tr>
<td>32.</td>
<td>a) State how ex-situ conservation helps in protecting biodiversity. Name four types of ex-situ methods .
b)Explain the importance of sacred groves.
OR
Refer the table given below and answer the following questions.
Table : Types of Interaction
<table>
<tr><th>SPECIES A</th><th>SPECIES B</th><th>INTERACTION</th></tr>
<tr><td>+</td><td>+</td><td>P</td></tr>
<tr><td>-</td><td>-</td><td>Q</td></tr>
<tr><td>+</td><td>-</td><td>R</td></tr>
<tr><td>+</td><td>-</td><td>S</td></tr>
<tr><td>+</td><td>0</td><td>T</td></tr>
<tr><td>-</td><td>0</td><td>U</td></tr>
</table>
(a) Identify P, Q, R, S, T and U.
(b) (i) An orchid growing as an epiphyte on a mango branch is an example of which interaction?
(ii) Name the type of interaction seen between wasp and fig tree.
(c) Give one example of interaction ‘P’.</td>
<td>4+1

½*6=3
½*2=1
1</td>
</tr>
<tr>
<td>33.</td>
<td>(a) Choose any three microbes, from the following which are suited for organic farming, which is in great demand these days for various reasons. Mention one application of each one chosen. Mycorrhiza; Monascus; Anabaena; Rhizobium; Methanobacterium; Trichoderma.
(b) Explain the function of “anaerobic sludge digester” in a sewage treatment plant.
OR
(a) Patients who have undergone myocardial infarction are given clot buster. Mention the clot buster administered and its microbial source.
(b) A person recuperating from illness is advised to have curd regularly. Why?
(c) Bottled fruit juices bought from the market are clearer as compared to those made at home. Give reason.</td>
<td>3+2 = 5M

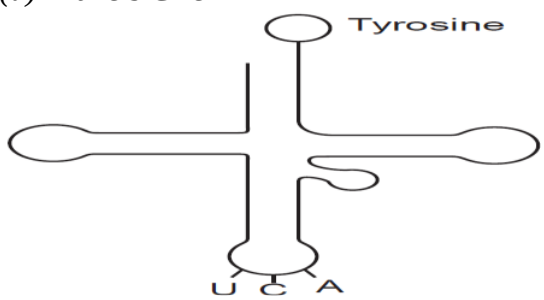
2+
2+
1=
5M</td>
</tr>
</table>

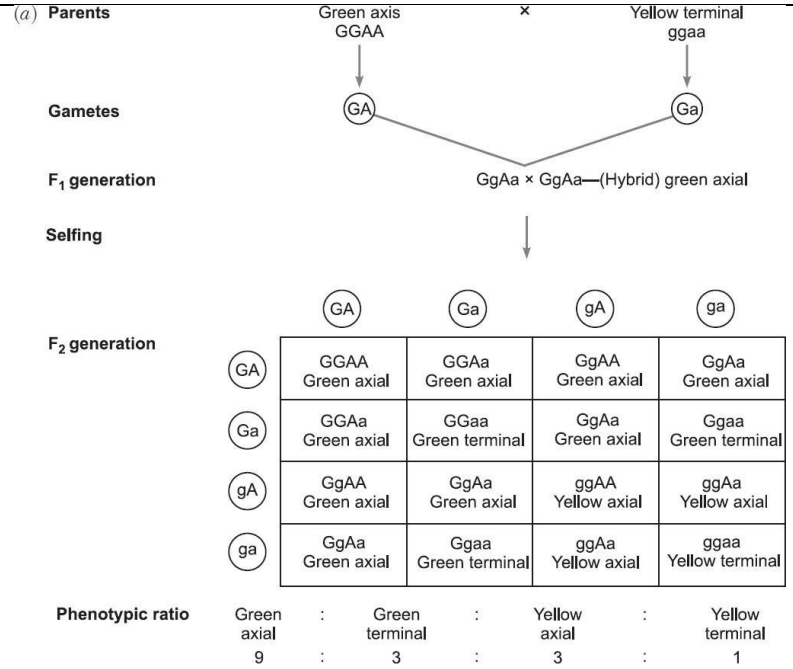
SAMPLE PAPER MARKING SCHEME

SUBJECT: BIOLOGY **CLASS: XI**

TIME: 3 Hours **M. M: 70**

Q.NO	ANSWER					MARKS
1		A	B	C	D	1

<table>
<tr><td></td><td><table><tr><td>d</td><td>3</td><td>4</td><td>1</td><td>2</td></tr></table></td><td></td></tr>
<tr><td>2</td><td>(d) a-2, b-4,c-1, d-3</td><td>1</td></tr>
<tr><td>3</td><td>(d) phenotypes – 4; genotypes – 9</td><td>1</td></tr>
<tr><td>4</td><td>(b) Remove/replace 3′ OH group in deoxyribose</td><td>1</td></tr>
<tr><td>5</td><td>(c) Ab X ab</td><td>1</td></tr>
<tr><td>6</td><td>(d) Only III</td><td>1</td></tr>
<tr><td>7</td><td>(c) A – sludge, B – Digester, C – Gas Holder, D – Slurry</td><td>1</td></tr>
<tr><td>8</td><td><table><tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>b</td><td>3</td><td>4</td><td>2</td><td>1</td></tr></table></td><td>1</td></tr>
<tr><td>9</td><td>(a) Two small light chains and two long heavy chains</td><td>1</td></tr>
<tr><td>10</td><td>(d) Biochemical oxygen demand</td><td>1</td></tr>
<tr><td>11</td><td>(b) spooling</td><td>1</td></tr>
<tr><td>12</td><td>(a)Declining population</td><td>1</td></tr>
<tr><td>13</td><td>(c) Ais truebut Ris false.</td><td>1</td></tr>
<tr><td>14</td><td>(c) Ais truebut Ris false.</td><td>1</td></tr>
<tr><td>15</td><td>(c) Ais truebut Ris false.</td><td>1</td></tr>
<tr><td>16</td><td>(a) Both Aand Raretrue and Ris thecorrect explanationofA</td><td>1</td></tr>
<tr><td>17</td><td>(a)
(i)
<table><tr><th>S. No.</th><th>Mendelian Disorder</th><th>Chromosomal Disorder</th></tr><tr><td>(i)</td><td>This disorder is mainly due to alteration or mutation in the single gene.</td><td>This disorder is caused due to absence or excess or abnormal arrangement of one or more chromosomes.</td></tr><tr><td>(ii)</td><td>This follows Mendel's principles of inheritance.</td><td>This does not follow Mendel's principles of inheritance.</td></tr><tr><td>(iii)</td><td>This may be recessive or dominant in nature</td><td>This is always dominant in nature.</td></tr><tr><td>(iv)</td><td>For example, haemophilia, sickle-cell anaemia.</td><td>For example, Turner's syndrome.</td></tr></table>(b) Two chromosomal aberration-associated disorders are Down's syndrome and Klinefelter's syndrome.
(i) Down's syndrome: The individuals have overall masculine development but theyexpress feminine development like development of breast, i.e., gynaecomastia. They are sterile.
(ii) Klinefelter's syndrome: The females are sterile as ovaries are rudimentary. Other secondary sexual characters are also lacking.</td><td>1+1</td></tr>
<tr><td>18</td><td>(a) Francis Crick
(b)
 
(c) The actual structure of tRNA looks like inverted L.</td><td>½+
½+
½+
½</td></tr>
<tr><td>19</td><td>Clestogamous flower is closed flower so only there is chance of self pollination (autogamy) which result in sure seed set.</td><td>2</td></tr>
</table>

20	(a) a-unlimited food and space b-limited food and space (b) Curve a	1+1
21	**Intra cytoplasmicsperm injection** (ICSI) It is another specialised procedure to form an embryo in the laboratory in which a sperm is directly injected into the ovum	1+1
22	(a) DNA fragments in band 'D' are smaller in size than fragments in band 'C'. Therefore, they moved faster and farther away. (b) The anode end is 'B'. (c) The separated DNA fragments can be visualised by staining the DNA with ethidium bromide followed by exposure to UV radiation.	1+1 +1
23	a) Globular Embryo (b) Zygot (c) Draw & label	1+1 +1
24	***(a)*** At the end of his experiments Griffith concluded that transformation of R strain by the heat-killed S strain indicated the presence of a transforming principle or genetic material. This transforming principle made the R strain virulent. ***(b)*** They purified biochemicals (proteins, DNA, RNA, etc.) from the heat-killed S cells. They discovered that DNA alone from S bacteria caused R bacteria to become transformed. They also discovered that protein-digesting enzymes (proteases) and RNA-digesting enzymes (RNases) did not affect transformation, so the transforming substance was not a protein or RNA. Digestion with DNase did inhibit transformation, suggesting that the DNA caused the transformation. They concluded that DNA is the hereditary material.	1.5 +1. 5=3
25	 **(b)** From the above cross law of independent assortment can be derived which states that when two pairs of traits are combined in a hybrid, segregation of one pair of character is independent of the other pair of characters.	2+1
26	(a) Oogonia, primary follicle,secondary follicle, graffian (b) F	2+1

27	a) During Pre-industrialisation white-winged moths survived due to white coloured lichens on trees, During post-industrialisation white-winged moths did not survive due to predation / predators could spot the moth against contrasting back ground, then the dark-winged or melanised moths survived, this showed that in a mixed population of white and dark winged moths those who can adapt better will survive b) excess use of herbicides /pesticides and antibiotics has resulted in selection of resistant varieties that developed due to chance mutation (in much lesser time scale)	1.5 +1. 5=3
28	(*a*) Coat 'A' is made up of protein. (b) The enzyme 'B' is reverse transcriptase, 'C' is viral DNA. (c) The host cell 'D' is macrophage.	1+1 +1
29	***(1) c (2) a (3) b (4) a***	1+1 +1+ 1
30	(a) 'A' Meiosis and 'B'- Mitosis (b) 'C'- Parthenogenesis- ovum develops into an individual without fertilisation. (c) Haplo-Diploid type of sex determination (d) 64	1+1 +1+ 1
31	a) Plasmids are autonomously replicating circular extra-chromosomal DNA which carry a foreign DNA segment into the host cell. Plasmids can be isolated from bacteria, yeast and plants. b) ori controls the copy numbers of the linked DNA. Selectable marker helps select the host cells which contain the vector (transformants) and eliminate the non-transformants. c) The restriction enzymes are called molecular scissors and are responsible for cutting DNA. If the desired DNA and the plasmid DNA are not cut at specific sites, they cannot be linked to form recombinant DNA . **OR** a) Earlier, insulin was extracted from pancreas of slaughtered cattle and pig. This insulin is not in use as some patients developed allergic reaction to this foreign protein. b) Eli Lilly used the following procedure for insulin synthesis using r-DNA technology: i) Two DNA sequences corresponding to A and B chains of insulin were prepared. ii) These sequences were then introduced in plasmids of E. coli. iii) The two insulin chains are produced separately. iv) The two chains are extracted and combined by creating disulphide bonds to form the assembled mature molecule of insulin. c) The pro-hormone produced in the human body has an extra stretch of Cpeptide	2+2 +1
32	Chapter-15 correct explanation **OR** (a) P — Mutualism Q — Competition R — Predation S — Parasitism T — Commensalism U —Amensalism (b) (i) Commensalism (Q) (ii) Mutualism (c) Nitrogen — fixing bacteria (Rhizobium) living in root nodules of legumes represent mutualism (P).	4+1 ½* 6=3 ½* 2=1 1
33	**(a)** Mycorrhiza: Fungal symbiont Absorbs phosphorus from soil. Anabaena: Fix atmospheric nitrogen and adds organic matter to the soil. Rhizobium: Fix atmospheric nitrogen (in leguminous plants). Methanobacterium: They digest cellulosic material and their product/spent slurry can be Used as a fertiliser. Trichoderma: Biocontrol agent for several plant pathogens. (Any three)	**3+2 = 5M**

	(b) Anaerobic sludge digester has anaerobic bacteria that digests the aerobic bacteria and fungi present in the sludge. During the digestion these bacteria produce mixture of gases such as methane, H_2S and CO_2 (biogas). OR **a.** *Streptokinase* is the clot buster and its microbial source is Streptococcus. **b.** Curd contains Lactic Acid Bacteria, which play beneficial role in checking disease-causing microbes. It is also a source of vitamin B12. **c.** Bottled fruit juices are clarified by pectinases and proteases which makes them clearer.	**2+** **2+** **1=** **5M**

XII BIOLOGY –SET 2

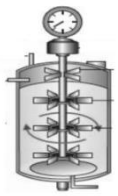
NAME OF UNIT	VSA 1 MARK	SA 2 MARKS	LA 3 MARKS	CASE/PARAGRAPH BASED 4 MARKS	VLA 5 MARKS	WEIGHT AGE
REPRODUCTION	3(1)=3	1(2)=2	2(3)=6	-	1(5)=5	16
GENETICS AND EVOLUTION	8(1)=8	1(2)=2	2(3)=6	1(4)=4	-	20
BIOLOGY AND HUMAN WELFARE	2(1)=2	1(2)=2	1(3)=3	-	1(5)=5	12
BIOTECHNOLOGY AND ITS APPLICATIONS	2(1)=2	1(2)=2	1(3)=3	-	1(5)=5	12
ECOLOGY AND ENVIRONMENT	1(1)=1	1(2)=2	1(3)=3	1(4)=4	-	10
	16	10	21	8	15	70

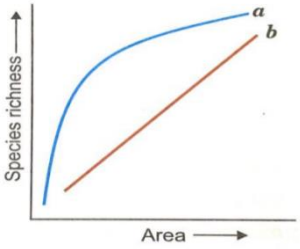
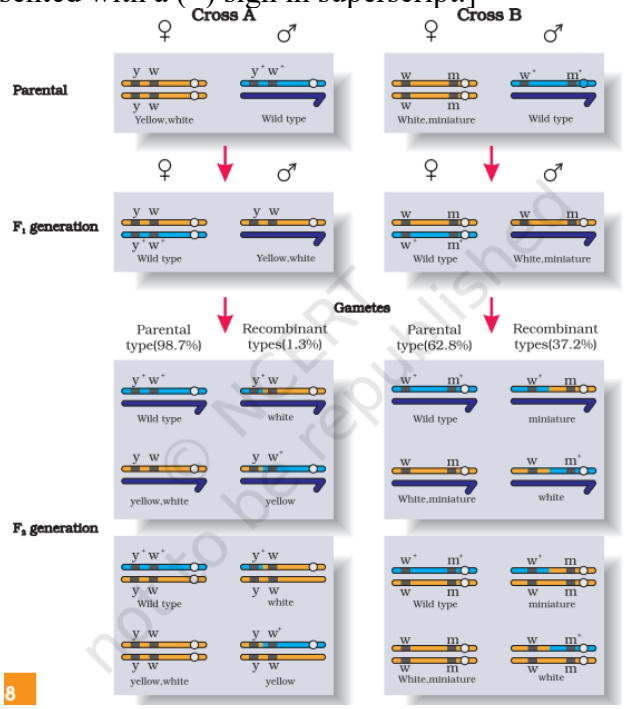
Class XII SET-2
Biology (Subject Code-044)
Maximum Marks: 70 Time: 3 hours

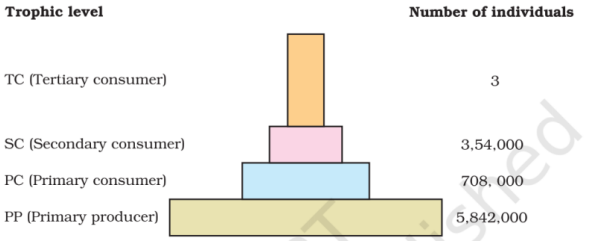
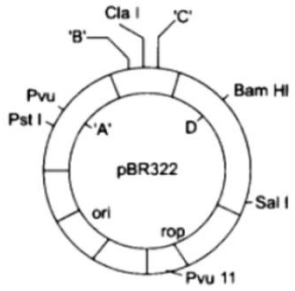
General Instructions:
(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based 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.

<table>
<tr><th>SNo.</th><th>Questions</th><th>marks</th></tr>
<tr><td>1</td><td>Aquatic plants like water hyacinth and water lily are pollinated by
(a) Bird
(b) insects and wind
(c) water
(d) none of the above</td><td>1</td></tr>
<tr><td>2</td><td>A wide range of contraceptive methods are presently available which are grouped into various categories. Match list I with list II :
LIST I — LIST II
A. Vasectomy — i) oral method
B. Coitus interruptus — ii) barrier method
C. Cervical caps — iii) surgical method
D. Saheli — iv) natural method
Choose the correct answer from the options given below:
a) A :iv B: ii C: i D: iii
b) A : iii B: i C: iv D:ii
c) A : iii B: iv C: ii D:i
d) A : ii B: iii C: i D:iv</td><td>1</td></tr>
<tr><td>3</td><td>The ploidy of spermatogonia, primary spermatocyte, secondary spermatocyte and spermatid is
(a) 2n, 2n, 2n, n
(b) n, 2n, 2n, n
(c) n, 2n, n, n
(d) 2n, 2n, n, n</td><td>1</td></tr>
<tr><td>4</td><td>Colour-blindness is a sex linked recessive trait in humans. A man with normal colour vision marries a woman who is colourblind. What would be the possible genotype of the parents, the son and the daughter of this couple.
Mother Father Daughter Son
<table>
<tr><th></th><th>Father</th><th>Mother</th><th>Son</th><th>Daughter</th></tr>
<tr><td>A</td><td>X^CY</td><td>XX</td><td>XY</td><td>X^CX</td></tr>
<tr><td>B</td><td>X^CY</td><td>X^CX</td><td>X^CY</td><td>X^CX</td></tr>
<tr><td>C</td><td>XY</td><td>X^CX</td><td>XY</td><td>X^CX</td></tr>
<tr><td>D</td><td>XY</td><td>X^CX^C</td><td>X^CY</td><td>X^CX</td></tr>
</table></td><td>1</td></tr>
<tr><td>5</td><td>A polycistronic structural gene is regulated by a common promoter and regulator gene in bacteria and is commonly termed as
(a) Codon (b) Operon (c) Genetic code (d) None of these</td><td>1</td></tr>
<tr><td>6</td><td>The most accepted line of descent in human evolution is
(a) Australopithecus → Ramapithecus → Homo sapiens → Homo habilis
(b) Homo erectus → Homo habilis → Homo sapiens
(c) Ramapithecus → Homo habilis → Homo erectus → Homo sapiens</td><td>1</td></tr>
</table>

<table>
<tr><td></td><td>(d) Australopithecus → Ramapithecus → Homo erectus → Homo habilis → Homo sapiens</td><td></td></tr>
<tr><td>7</td><td>In sea urchin DNA, which is double stranded, 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are :
(a) G 34%, A 24.5%, T 24.5% (b) G 17%, A 16.5%, T 32.5%
(c) G 17%, A 33%, T 33% (d) G 8.5%, A 50%, T 24.5%</td><td>1</td></tr>
<tr><td>8</td><td>Match the terms in Column I with their description in Column II and choose the correct option:
<table>
<tr><th>Column I</th><th>Column II</th></tr>
<tr><td>(a) Dominance</td><td>(i) Many genes govern a single character</td></tr>
<tr><td>(b) Codominance</td><td>(ii) In a heterozygous organism only one allele expresses itself.</td></tr>
<tr><td>(b) Codominance</td><td>(iii) In a heterozygous organisms both alleles express themselves fully.</td></tr>
<tr><td>(d) Polygenic inheritance</td><td>(iv) A single gene influences many characters.</td></tr>
</table>
Options:
<table>
<tr><th></th><th>(a)</th><th>(b)</th><th>(c)</th><th>(d)</th></tr>
<tr><td>(a)</td><td>ii</td><td>i</td><td>iv</td><td>iii</td></tr>
<tr><td>(b)</td><td>ii</td><td>iii</td><td>iv</td><td>i</td></tr>
<tr><td>(c)</td><td>iv</td><td>I</td><td>ii</td><td>iii</td></tr>
<tr><td>(d)</td><td>iv</td><td>iii</td><td>i</td><td>ii</td></tr>
</table></td><td>1</td></tr>
<tr><td>9</td><td>‘Swiss cheese' bears large holes due to the production of CO2 by which microbe?
(a) Lactobacillus
(b) Saccharomyces cerevisiae
(c) Propionibacterium shermanii
(d) Aspergillus niger</td><td>1</td></tr>
<tr><td>10</td><td>Select the correct order of processing of PCR:
a) Extension, primer annealing, denaturation
b) Primer annealing, denaturation, extension
c) Denaturation, primer annealing, extension
d) Denaturation, extension, primer annealing</td><td>1</td></tr>
<tr><td>11</td><td>Occasionally, a single gene may express more than one effect. The phenomenon is called
(a) Multiple allelism
(b) Polymorphism
(c) Pleiotropy
(d) Polygeny.</td><td>1</td></tr>
<tr><td>12</td><td>Important attributes belonging to a population but not to an individual are :
(i) Birth rate and death rate
(ii) Male and female
(iii) Birth and death
(iv) Sex-ratio
Select the correct option from the given options:
(a) (ii) only
(b) (i) only
(c) (ii) and (iii)
(d) (i) and (iv)</td><td>1</td></tr>
<tr><td></td><td>Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer thesequestions selecting the appropriate option given below:</td><td></td></tr>
</table>

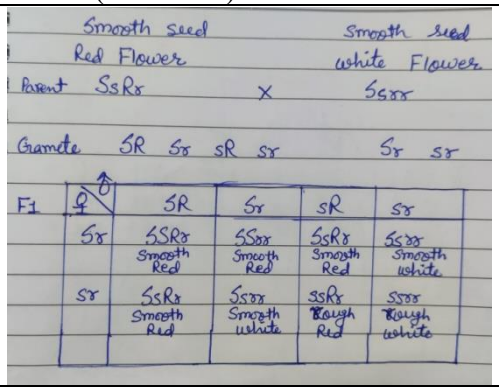
<table>
<tr><td></td><td>A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true.</td><td></td></tr>
<tr><td>13</td><td>Assertion: Cystic fibrosis is Mendelian disorder .
Reason: Tuners syndrome is chromosomal disorder</td><td>1</td></tr>
<tr><td>14</td><td>Assertion (A) : The genes on a chromosome are physically linked.
Reason (R) : The number of linkage groups in an organism is equal to their haploid number of chromosomes.</td><td>1</td></tr>
<tr><td>15</td><td>Assertion: Greater is BOD of waste water, more is its polluting potential.
Reason: BOD is a measure of organic matter present in water.</td><td>1</td></tr>
<tr><td>16</td><td>Assertion: Transgenic animals are made that carry genes which makes them more sensitive to toxic substances than non transgenic animals.
Reason: Toxicity testing in such animals will allow us to obtain result in less time.</td><td>1</td></tr>
<tr><td>17</td><td>Write the function of each of the following :
(i) Middle piece in human sperm
(ii) Luteinising hormone in human male</td><td>1+1</td></tr>
<tr><td>18</td><td>A smooth seeded & red – flowered pea plant (SsRr) is crossed with smooth seeded & white flowered pea plant (Ssrr). Determine the phenotypic & genotypic ratio in F1 progeny?</td><td>1+1</td></tr>
<tr><td>19</td><td>Identify (i) to (vi) in the following table.
<table>
<tr><th>Name of disease</th><th>Causal organism</th><th>Symptom</th><th>Mode of transmission</th></tr>
<tr><td>Common cold</td><td>Rhinovirus</td><td>i</td><td>ii</td></tr>
<tr><td>Chikungunya</td><td>iii</td><td>iv</td><td>Through female Aedes mosquito</td></tr>
</table></td><td>½*4=2</td></tr>
<tr><td>20</td><td>Name the type of bioreactor shown below. Write the purpose for which it is used.
  </td><td>1+1</td></tr>
<tr><td>21</td><td>(a) What is ‘r’ in the population equation given : dN/dt = rN
(b) How does the increase and decrease in the value of r affect the population size.</td><td>1+1</td></tr>
<tr><td>22</td><td>Draw a labeled diagram of the embryonic stage that gets implanted in the human uterus. State the functions of the two parts labeled.</td><td>2+1</td></tr>
<tr><td>23</td><td>(i) Suggest any two methods of ARTs which can be used for males with low sperm count.
(ii) Describe any one method of Assisted Reproductive Technology where both husband and wife are producing functional gametes but wife is still unable to conceive.</td><td>1.5+1.5</td></tr>
<tr><td>24</td><td>Draw a longitudinal section of the pistil from a flowering plant, where pollination has occurred.
Label the following:
(a) Stigma showing germinating pollen grains. (b) Style
(c) Pollen tube reaching the micropyle of the ovule.
(d) Embryo sac (e) Components of the egg apparatus.</td><td>½*6=3</td></tr>
<tr><td>25</td><td>State Hardy-Weinberg principle and list four factors that affect it.</td><td>1+2</td></tr>
<tr><td>26</td><td>Trace the stages of life cycle of the parasite from the point of entry into human body till the time another mosquito bites this person.</td><td>3</td></tr>
<tr><td>27</td><td>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 only.</td><td>3</td></tr>
</table>

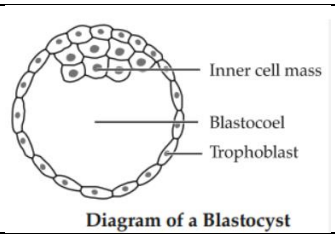
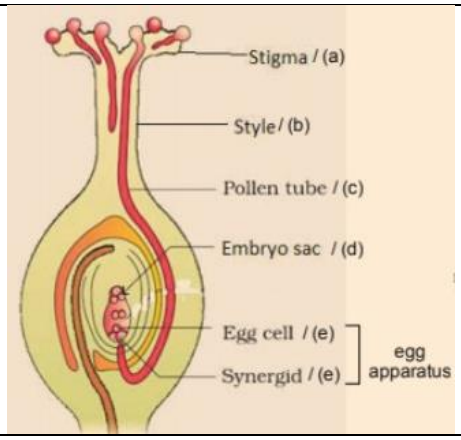
	OR DNA being hydrophilic cannot pass through the cell membrane of a host cell. Explain how does recombinant DNA get introduced into the host cell to transform the later.	
28	The given graph alongside shows species-area relationship. Write the equation of the curve 'a' and explain.  	1+2
29	During a study on the inheritance of two genes, the teacher asked students to perform an experiment. The students crossed white-eyed, yellow-bodied female Drosophila with a red-eyed, brown-bodied male Drosophila (i.e., wild). They observed that progenies in the F2 generation had 1.3 percent recombinants and 98.7 percent parental type combinations. The experimental cross with results is shown in the given figure.[Note: Dominant wild-type alleles are represented with a (+) sign in superscript.]  (i) By conducting the given experiment, the teacher can conclude that A. Genes for eye color and body color are linked B. Genes for eye color and body color show complete linkage C. Linked genes remain together and are inherited (a) A and B only (b) B only (c) A and C only (d) A, Band C (ii) Teacher asked to conduct an experiment on Drosophila because (a) the male and female flies are easily distinguishable (b) it completes its life cycle in about two weeks	1+1+ 1+1

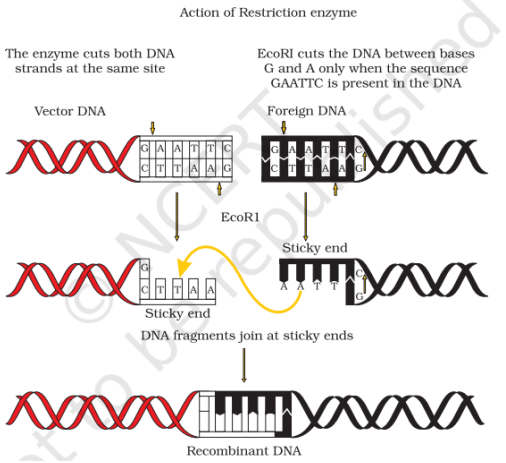
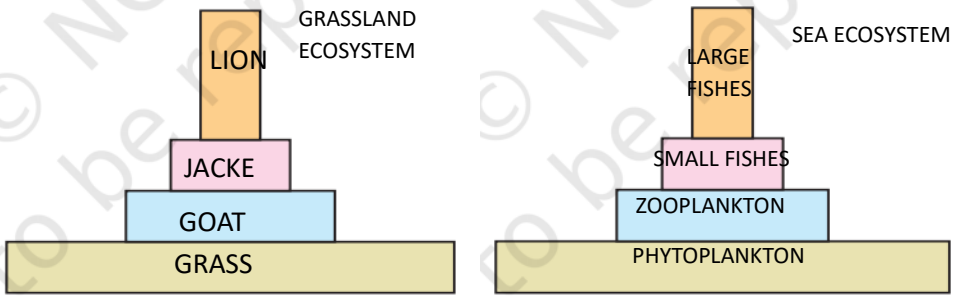
	(c) a single mating could produce a large number of progeny flies (d) all of these. (iii) Genes white-eyed and yellow-bodied located very close to one another on the same chromosome tend to be transmitted together and are called (a) allelomorphs (b) linked genes (c) identical genes (d) recessive genes (iv) Which of the following will not result in variations among siblings? (a) Independent assortment of genes (b) Crossing over (c) Linkage (d) Mutation OR Percentage of recombination and distance between the genes shows (a) a direct relationship (b) an inverse relationship (c) a parallel relationship (d) no relationship	
30	 (i) Identify the type of pyramid. (ii) Study the pyramid and depict it for grassland ecosystem. **OR** Study the pyramid and depict it for sea ecosystem. (iii) What would be the shape of pyramid of biomass in the above case and why? (iv) Draw a pyramid of energy for above ecosystems.	1+1+ 1+1
31	A) Draw a labeled diagram of the embryonic stage that gets implanted in the human uterus. State the functions of the two parts labeled. (B) What is the function of acrosome and middle piece in human sperm. **OR** A)Write the properties of an ideal contraceptive. B) How are non-medicated IUDs different from hormone releasing IUDs? Give examples.	3+2 2+3
32	Observe the diagram of E. coli vector shown below: i) Identify the selectable markers A' and ' D' in the diagram of E coli vector shown below. ii) Give the function of 'ori' other than it's function as 'origin of replication' iii) Give the role of 'rop'. iv) How is the coding sequence of Alpha- galactosidase considered a better marker than the ones identified by you in the above diagram. Explain.  **OR** i) How is the mature insulin different from pro-insulin secreted by pancreas in human? ii) Explain how was human functional insulin produced by rDNA technology? iii) Why is the functional insulin produced by rDNA technology considered better than the ones used earlier by the diabetic patient?	1+1+ 1+2 1+2+ 2

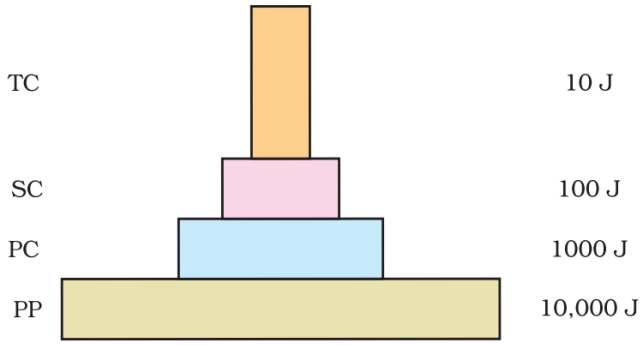
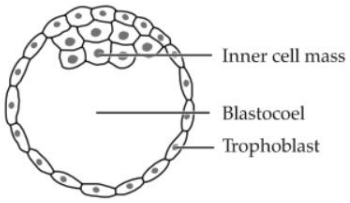
33	(i) If a patient is advised anti-retroviral drug, name the possible infection he/ she is likely to be suffering from. Name the causative organism. (b) How do vaccines prevent subsequent microbial infection by the same pathogen? (c) How does a cancerous cell differ from a normal cell? **OR** (a) Describe how does the application of the fungi to the agricultural farm increases the farm output? (b)Why is Rhizobium categorized as a 'symbiotic bacterium'? How does it act as a biofertilizer?	2+1+ 2 2+3

MARKING SCHEME
Sample Question Paper 2023-24
Class XII

Biology (Subject Code-044)		
1	(b). insects and wind	1
2	(c) A : iii B: iv C: ii D:i	1
3	(d) 2n, 2n, n, n	1
4	D | XY | X^CX^C | X^CY | X^CX	1
5	(b) Operon	1
6	(c) *Ramapithecus → Homo habilis → Homo erectus → Homo sapiens*	1
7	(c) G 17%, A 33%, T 33%	1
8	(b) ii iii iv i	1
9	(c) *Propionibacterium shermanii*	1
10	c) Denaturation, primer annealing, extension	1
11	(c) Pleiotropy	1
12	(d) (i) and (iv)	1
13	B. Both A and R are true and R is not the correct explanation of A.	1
14	C. A is true but R is false.	1
15	B. Both A and R are true and R is not the correct explanation of A.	1
16	A. Both A and R are true and R is the correct explanation of A	1
17	(i) The middle piece possesses numerous mitochondria, which produce energy for the movement of tail that facilitate sperm motility essential for fertilisation. (ii)Rapid secretion of LH leading to its maximum level during the mid-cycle called LH surge induces rupture of Graafian follicle and thereby the release of ovum (ovulation).	1+1
18	 Smooth seed & red flower =3 Smooth seed & white flower =3 Rough seed & red flower =1 Rough seed & white flower =1	1+1
19	Ans. i) Nasal congestion/discharge/sore throat/cough/headache ii) Droplets released during cough or sneeze iii) Alphavirus iv) Fever/joint pain/muscle pain/ headache	½*4=2
20	Simple stirred tank bioreactor. It is used to obtain foreign gene products in large quantities.	1+1
21	(a) 'r' is ' intrinsic rate of natural increase' (b) Increase in 'r' means population is increasing and decrease in the value of *r* means population is decreasing.	1+1
22	(i)	2+1

	 Diagram of a Blastocyst (ii) The trophoblast layer then gets attached to the endometrium and the inner cell mass gets differentiated as the embryo.	
23	(i) Artificial Insemination and ICSI and be done in cases of Infertility with low sperm count. (ii) *In* IVF followed by embryo transfer (ET) popularly known as test tube baby programme, ova from the wife/donor (female) and sperms from the husband /donor (male) are collected and are induced to form zygote under simulated conditions in the laboratory. The zygote or early embryos (with upto 8 blastomeres) could then be transferred into the fallopian tube (ZIFT–zygote intra fallopian transfer) and embryos with more than 8 blastomeres, into the uterus (IUT – intra uterine transfer), to complete its further development. Embryos formed by in-vivo fertilisation (fusion of gametes within the female) also could be used for such transfer to assist those females who cannot conceive. (any one)	1.5+1.5
24		½*6=3
25	The principle says that allele frequencies in a population are stable and is constant from generation to generation. Sum total of all the allelic frequencies is 1. Five factors which affect Hardy-Weinberg equilibrium are gene migration or gene flow, genetic drift, mutation, genetic recombination and natural selection. (any 4)	1+2
26	Sporozoite injected with bite of infected mosquito. ↓ Sporozoite reach liver through blood. ↓ Parasite reproduce asexually in liver cells and burst out of the cell into blood. ↓ Parasite reproduce asexually in RBC. ↓ Parasite burst out of RBC every 3-4 days releasing haemozoin which causes fever and chill. ↓ Sexual stage Gametocyte develop within RBC ↓ Gametocytes transferred to mosquito when it bites.	3

27	 OR Recombinant DNA is introduced into the host cell by the following methods: (i) Heat shock method: In this method, DNA is treated with a specific concentration of a divalent cation, such as calcium, which increases the efficiency with which DNA enters the bacterium through pores in its cell wall. The rDNA is forced into the cell by incubating the cell with rDNA on ice, followed by placing them at 42°C (heat shock) and then putting them back on ice. (ii) Micro-injection: In this method, the rDNA is directly injected into the nucleus of an animal cell. (iii)Gene gun/Biolistics: In this method, cells are bombarded with high velocity micro-particles of gold or tungsten coated with DNA.	3
28	a-S=CA^Z within a region species richness increased with increasing explored area, but only up to a limit. The relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola . On a logarithmic scale, the relationship is a straight line described by the equation log S = log C + Z log A where S= Species richness A= Area Z = slope of the line (regression coefficient) C = Y-intercept	1+2
29	(i) C (ii) D (iii) B (iv) C or A	1+1+1+1
30	(i) It's a pyramid of number (ii) Grassland or sea ecosystem  (iii) The shape of the pyramid in above cases would be inverted because the biomass of the successive trophic levels would be higher as go upward.	1 1 1

	 (iv) **1,000,000 J of Sunlight**	1
31	 (A) The trophoblast layer then gets attached to the endometrium and the inner cell mass gets differentiated as the embryo. (B) Acrosome contains hydrolytic enzymes helps to break down outer layers of ovum. Middle piece contains mitochondria that helps sperm mobility in the female reproductive tract. OR A) i. User friendly, no side effect, easily available, no interference with sexual desire, reversible and cost effective(any four) A) Non-medicated IUDs - Lippes loop, Copper releasing IUDS (CuT, Multiload 375), these increase phagocytosis of sperms within the uterus and release copper ions which suppress sperm motility and fertilizing capacity of sperm. Hormone-releasing IUDs – Progestasert, LNG-20 -These make the uterus unsuitable for implantation and the cervix hostile to sperm.	3+2 2+3
32	(i) Ampicillin Resistance D- Tetracycline Resistance (ii) 'ori' is also responsible for controlling the copy number of the linked DNA. (iii) ROP - It codes for the proteins involved in the replication of the plasmid. (iv) A recombinant DNA is inserted within the coding sequence of an enzyme, β-galactosidase. This results into inactivation of the gene for synthesis of this enzyme, which is referred to as insertional inactivation. The presence of a chromogenic substrate gives blue coloured colonies if the plasmid in the bacteria does not have an insert. Presence of insert results into insertional inactivation of the β-galactosidase gene and the colonies do not produce any colour, these are identified as recombinant colonies. OR (i) Form (A) is proinsulin and form (B) is Mature nsulin. Proinsulin contains an extra stretch called c peptide which is absent in mature insulin. (ii) The Eli Lilly company prepared two sequences that correspond to the A and B peptide chains of the human insulin and introduces them to the plasmid of *E.coli* to produce insulin chains, Chain A and B were produced separately .Then they were combined by creating a disulphide bonds to form human insulin. (iii) Earlier used insulin was extracted from slothered animals which creates allergy in patients.	1+1+1+2 1+2+2
33	a) AIDS is caused by the HIV (Human Immuno Deficiency Virus). (b) Vaccines prevent microbial infections by initiating production of antibodies against these antigens to neutralize the pathogenic agents during later actual infection.	2+1+2

	The vaccines also generate memory – B and T-cells that recognize the pathogen quickly on subsequent exposure. (c) Normal cells show a property called “contact inhibition” by virtue of which contact with other cells inhibits their uncontrolled growth. Cancer cells appear to have lost this property. OR - (a)Fungi form symbiotic association with the roots of higher plants called mycorrhiza, eg. Glomus. The fungal hyphae absorb phosphorus from soil and pass it to the plant. Mycorrhiza shows the following benefits: (i)Resistance to root-borne pathogens. (ii) Tolerance to salinity and drought. (iii) Overall increase in plant growth and development. Due to increased availability of phosphorus there is an increase in farm output. (b) Rhizobium is present in the root nodules of leguminous plants. They have a symbiotic relationship in which the bacterium obtains food and shelter from the plant and the plant gets fixed nitrogen in return. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plant as a nutrient.	2+3

Blue Print

SAMPLE PAPER

Subject: Biology **Class - XII**

Sl. No.	**Unit**	**SECTION A (1 Mark)**	**SECTION B (2 Marks)**	**SECTION C (3 Marks)**	**SECTION D (4 Marks) *CSB**	**SECTION E (5 Marks)**	**Marks**
1.	Reproduction	2(1)	2(2)	2(3)	1(1x4)*CSB		16
2.	Genetics and evolution	3(1)	3(2)	2(3)		1(5)	20
3.	Biology and human Welfare	4(1)		1(3)		1(5)	12
4.	Biotechnology and its applications	4(1)	-	1(3)		1(5)	12
5.	Ecology and environment	3(1)		1(3)	1(1x4)*CSB		10
TOTAL =		16(1)	5(2)	7(3)	2(4)	3(5)	33(70)

SAMPLE PAPER-1

CLASS- XII

Biology(044)

Time : 3 hrs. 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. In albuminous seeds, food is stored in _____ and in non albuminous seeds, it is stored in _____.
   (a) endosperm, cotyledons (b) cotyledons, endosperm
   (c) nucellus, cotyledons (d) endosperm, radicle
2. Which one of the following events is correctly matched with the time period in a normal menstrual cycle ?
   (a) Release of egg : 5th day
   (b) Endometrium regenerates : 5 – 10 days
   (c) Endometrium secretes nutrients for implantation: 11 – 18 days
   (d) Rise in progesterone level : 1 – 15 days
3. Rajesh and Mahesh have defective haemoglobin due to genetic disorders. Rajesh has too few globin molecules while Mahesh has incorrectly functioning globin molecules. Identify the disorder they are suffering from.

	Rajesh	**Mahesh**
(a)	**Sickle cell anaemia-an autosome linked recessive trait**	**Thalassemia-an autosome linked dominant trait**
(b)	**Thalassemia- an autosome linked recessive blood disorder**	**Sickle cell anaemia-an autosome linked recessive trait**
(c)	**Sickle cell anaemia-an autosome linked recessive trait**	**Thalassemia- an autosome linked recessive blood disorder**
(d)	**Thalassemia- an autosome linked recessive blood disorder**	**Sickle cell anaemia-an autosome linked dominant trait**

4. **Taylor conducted the experiments to prove semi-conservative mode of chromosome replication on-?**

(a). *Vicia faba* (b). *Vinca rosea* (c). *E.coli*
(d). *Drosophila*

5. In higher vertebrates, the immune system can distinguish between its own cells and foreign cells. If this property is lost due to genetic abnormalities, and it attacks its own cells, then it leads to

(a). Activated immunity (b). Graft rejection

(c). Autoimmune disease (d). None of the above

6. Which of the following is not a casual organism for ringworm?
(a). *Microsporum* (b). *Trichophyton*

(c). *Epidermophyton* (d). *Macrosporum*

7. **The free-living fungus Trichoderma can be used for**
(a) Killing insects **(b) Biological control of plant diseases**
(c) Controlling butterfly caterpillars **(d) Producing antibiotics**

8. Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?

5′_____GAATTC_____3′

3′_____CTTAAG_____5′

(*a*) Replication completed (*b*) Deletion mutation

(*c*) Start codon at the 5′ level (*d*) Palindromic sequence of base pairs

9. **GEAC stands for**
(a) Genome Engineering Action Committee
(b) Ground Environment Action Committee
(c) Genetic Engineering Approval Committee.
(d) Genetic and Environment Approval Committee

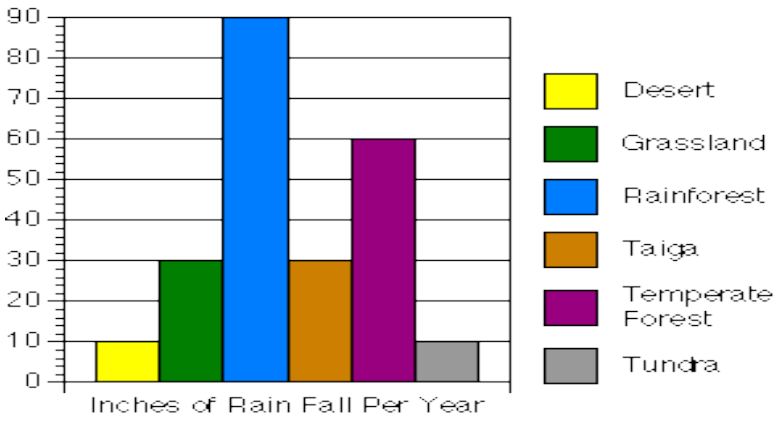
10. Identify the **incorrectly** matched pair:

(a)	Humulin	First therapeutic rDNA product approved for human use
(b)	RNAi	Silencing of mRNA with the help of dsRNA
(c)	Rosie	Transgenic sheep producing alpha 1antitrypsin
(d)	Golden rice	Vitamin A enriched rice variety

11. **Amensalism is an association between two species where**
(a) One species is harmed and other is benefitted
(b) One species is harmed and other is unaffected
(c) One species is benefitted and other is unaffected

(d) Both the species are harmed.

12. Identify the biome that is not correctly matched with the physical parameters (mean annual temp/precipitation) given in corresponding Column II and Column III:



	Biomes	Temp. (oC)	Rainfall (cm)
(a)	Tropical forest	20 to 25	130-430
(b)	Arctic and Alpine	-12 to 2	10-125
(c)	Coniferous forest	-5 to 5	100-200
(d)	Temperate Forest	8 to22	50-225

In the following questions (13 to 16) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choice.

(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(c) Assertion is correct statements but reason is wrong statement.

(d) Assertion is wrong statements but reason is correct statement.

13. **Assertion :**Excessive use of herbicides and pesticides has no effect on resistant varieties of microbes.
Reason : Pathogenic bacteria are appearing in very short period of time because of chemical resistance.

14. **Assertion :**Baculoviruses control growth of many insects and arthropods.
Reason : Lady bird and *Trichoderma* are used as biocontrol agents.

15. **Assertion** – *E.coli* having *pBR322* with DNA insert at *Bam*H1 site cannot grow in medium containing tetracycline.
Reason- Recognition site for *Bam*H1 is present in tet^r region of *pBR322*.

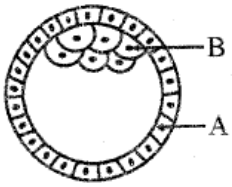
16. **Assertion :**Nile Perch introduced into Lake Victoria in east Africa lead to extinction of many species of Cichlid fish.
Reason : When alien species are introduced in a region, they become invasive and cause extinction of indigenous species.

SECTION B

17. Differentiate between Spermiogenesis and spermiation.

OR

Study the figure given below and answer the questions that follows.



(i) Name the stage of human embryo the figure represents.
(ii) Identify A and B.

18. Identify the given diagram. What it contains and is used for?

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

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

20. Study the diagrammatic representation of S.L. Miller's experiment given below and

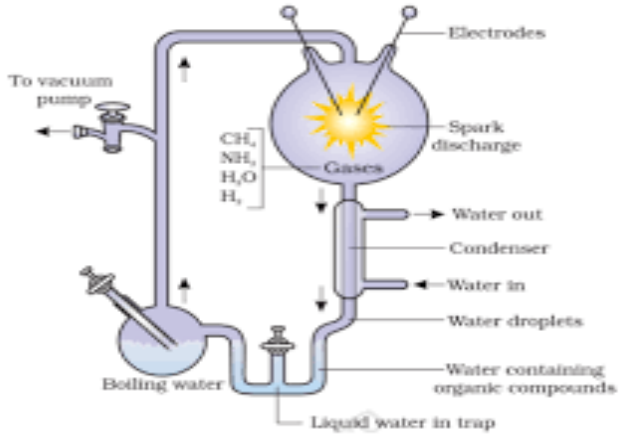


Fig: The apparatus set up by Miller and Urey to simulate conditions in the atmosphere of the primitive earth

answer the questions that follow:

(a) How did S.L. Miller create the conditions which existed before the origin of any life on Earth.

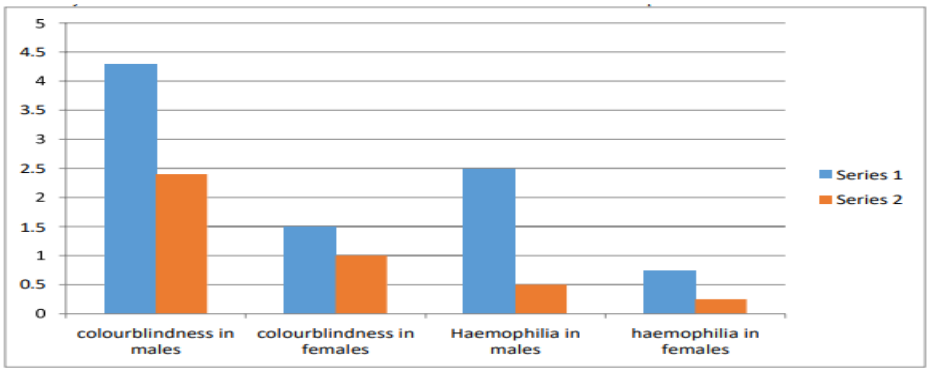
(b) Mention the kind of evolution his experiment supports.

21. Differentiate between the genetic codes given below:

(a) Unambiguous and Universal (b) Degenerate and Initiator

OR

The chances of colour blindness about 8 % in males and only about 0.4 % in females. Another sex linked recessive disease, which shows its transmission from unaffected carrier female to some of the male progeny has been widely studied. In this disease a single protein that is a part of the cascade of proteins involved in the clotting of the blood is affected. Due to this in an affected individual a simple cut will result in nonstop bleeding.



Note :- in each group bar 1 represent the individuals of less than 12 years of age. And bar 2 represent the individuals of more than 12 years of age.

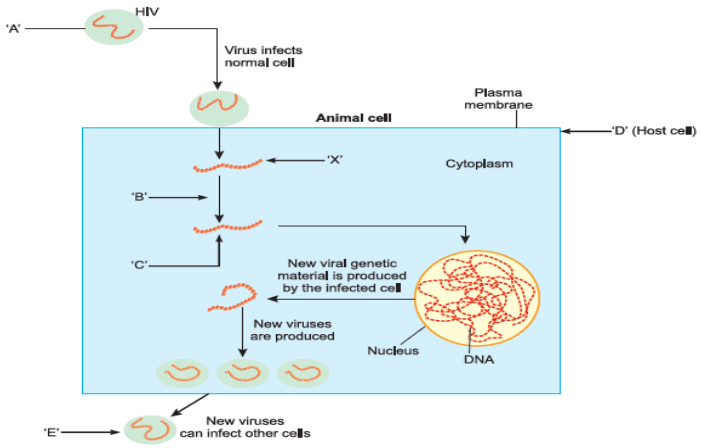
GRAPH : DEPICTS THE VIABILITY OF INDIVIDUALS WITH X LINKED MENDELIAN DISORDERS

(*a*) State the cause and symptoms of colour-blindness in humans.

(*b*) Statistical data has shown that 8% of the human males are colour-blind whereas only 0.4% of females are colour-blind. Explain giving reasons how is it so.

SECTION C

22. Study the diagram showing replication of HIV in humans and answer the following questions accordingly:



(*i*) What type of virus causes AIDS? Name its genetic material.

(*ii*) Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'.

(*iii*) Name the type of cells the AIDS virus enters into after getting in the human body.

23. Write the specific location and the functions of the following cells in human males:
(i) Leydig cells (ii) Sertoli cells (iii) Primary spermatocyte.

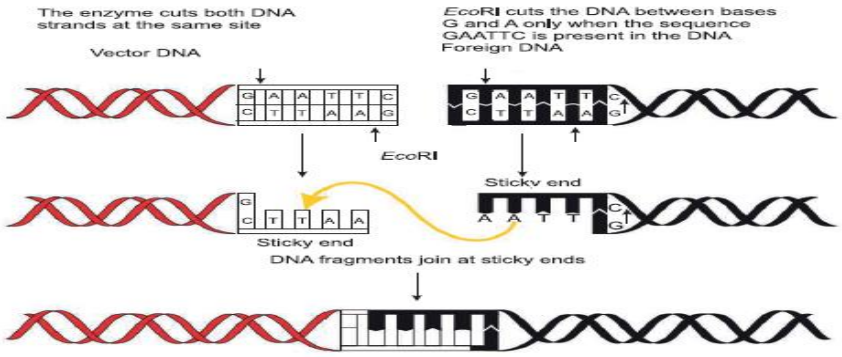
24. It is said that "Males in Honey bees neither have fathers nor sons but have grandfathers and grandsons". Explain this statement with suitable cross.

25. Study the diagram given below and answer the questions that follow:

(*i*) What is *Eco*RI?

(*ii*) How is the action of exonuclease different from that of endonuclease?

(*iii*) How are 'sticky ends' formed on a DNA strand? Why are they so called?



26. List the different anthropogenic actions, and explain how have they led to evolution.

27. Your school has been selected by the Department of Education to organize and host an interschool seminar on "Reproductive Health – Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing." Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

OR

A large number of married couples the world over are childless. It is shocking to know that in India the female partner is often blamed for the couple being childless.

(a) Why in your opinion the female partner is often blamed for such situations in India?

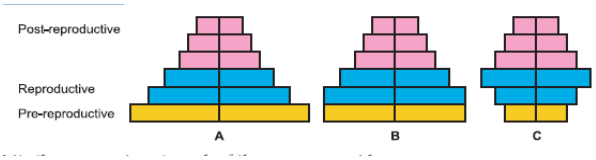
(b) State any two reasons responsible for the cause of infertility.

(c)Suggest a technique that can help the couple to have a child where the problem is with the male partner.

28. Draw a pyramid of biomass and pyramid of energy in sea. Give your comment on the type of pyramids drawn.

SECTION D

Q. 29 Study the three different age pyramids for human population given below and answer the questions that follow:



(*i*) Write the names given to each of these age pyramids.

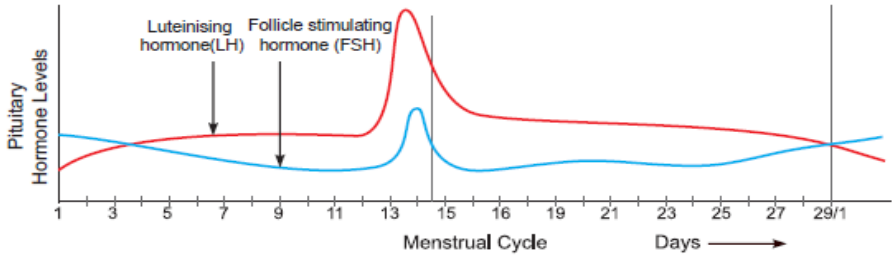
(*ii*) What would be the growth rate pattern when the resources are unlimited?

(*iii*) Mention the one which is ideal for human population and why.

OR

(iii) Define Birth rate and death rate.

30. Study the graph given below and answer the questions that follow:



(*i*) What is the importance of LH surge?

(*ii*) Identify the ovarian phases during the menstrual cycle.

(a) 5th day to 12th day of the cycle. (b) 14th day of the cycle.

(*iii*) Menstrual cycles are absent during pregnancy. Why?

OR

(iii). What will happen when egg is not fertilized?

SECTION E

31. The following table shows certain diseases, their causative organisms and symptoms. Fill the gaps.

S. No.	Name of the Disease	Causative organism	Symptoms
(i)	Typhoid	**A**	High fever, weakness, headache, stomach pain, Constipation.
(ii)	Pneumonia	*Streptococcus pneumonia*	**B**
(iii).	**C**	*Rhino viruses*	Nasal congestion and discharge, sorethroat, cough, headache
(iv)	Filariasis	***D***	Inflammation in lower limbs.
(v)	E	*Antamoeba histolitica*	Stool with blood and mucus, constipation, Abdominal pain

OR

Fill the gaps of column B on the basis of information provided in column A

S.no.	Column A	Column B
(i)	stage of malarial parasite that enters into human body	A
(ii)	Asexual cycle of of malarial parasite takes place in	B
(iii)	Chemical that causes chill and fever	C
(iv)	malarial parasite that causes most malignant malaria	D
(v)	Fertilisation of gametes of malarial parasite takes place in	E

32. Answer the following questions.

(a) What is biopiracy?

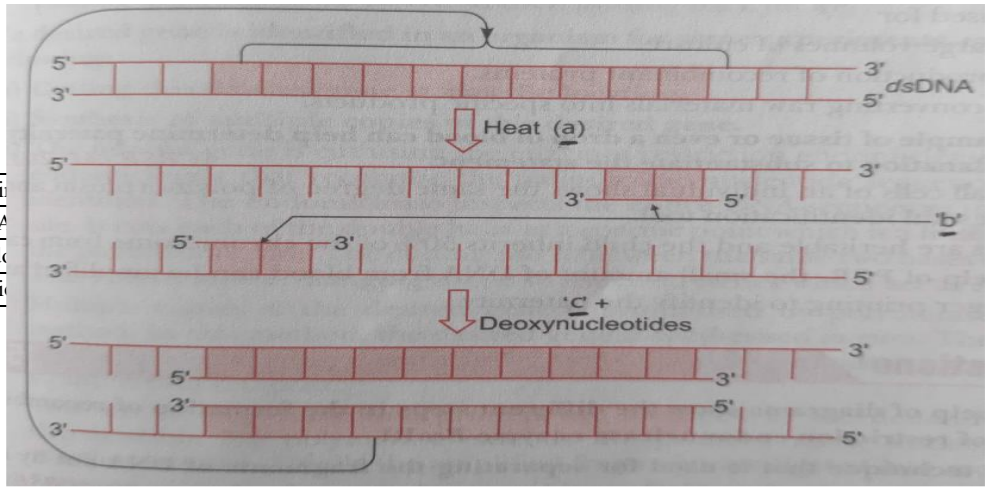
(b) What is patent?

(c)Discuss the controversies in India regarding Patent and Biopiracy taking example of Turmeric and Basmati rice.

(d) State the initiative taken by the Indian Parliament towards it.

OR

A schematic representation of polymerase chain reaction (PCR) upto the extension stage is given below. Answer the questions that follow.



(a) Name the process 'a'.
(b) Identify 'b'.
(c) Identify 'c'
(d) What is the importance of 'c' in PCR?
(e) Write the uses of PCR in biotechnology.

Q.33 How did Alfred Hershey and Martha Chase arrive at the conclusion that DNA is the genetic material?

OR

In a series of experiments with Streptococcus and mice F. Griffith concluded that R-strain bacteria had been transformed. Explain.

MARKING SCHEME

SAMPLE PAPER-I 2023-24

CLASS XII (BIOLOGY)

TIME 3 HOURS **MM 70**

	Section – A	
1.	(a) endosperm, cotyledons	1
2.	(b) Endometrium regenerates : 5 – 10 days	1
3.	(b)	1
4.	(a) *Vicia faba*	1
5.	(c). Autoimmune disease	1
6.	(d). *Macrosporum*	1
7.	**(b) Biological control of plant diseases**	1

8.	(*d*) Palindromic sequence of base pairs	1
9.	**(c) Genetic Engineering Approval Committee**	1
10.	(c)	1
11.	**(b) One species is harmed and other is unaffected**	1
12.	(c)	1
13.	(d) Assertion is wrong statements but reason is correct statement.	1
14.	(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.	1
15.	(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.	1
16.	(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.	1
	Section B	
17.	Spermiogenesis- Spermatids transform into spermatozoa Spermiation- Release of sperm from the sertoli cell. (1X2=2 Marks) **OR** (i) Blastocyst (ii) A-Trophoblast, B- Inner cell mass (iii) The trophoblast layer gets attached to endometrium and later forms extra-embryonic membrane namely chorionic villi.	2 ½ 1 ½
18.	Implant It contains progestogens or progestogen-estrogen combination. It inhibits ovulation and implantation of embryo.	½ ½ 1
20.	(a) Conditions were created by electric discharge (high temperature) in a closed flask containing CH_4, NH_3, H_2, water vapours = 1⁄2 × 2 b) chemical evolution = 1	2

21. (*a*) Colour-blindness is a sex-linked recessive disorder. — 2

Its symptoms are failure to discriminate between red and green colour.

(*b*) Since males have only one X chromosomes, hence one gene for colour blindness, so if present

in any one parent will always be expressed, whereas in female it will be expressed only ifit is present on both the X chromosome or when both parents are carrying gene for colourblindness

OR

(a) **Unambiguous**: One codon codes for only one amino acid = ½ (b)**Degenerate:** More than one codon coding for the same amino acid. = ½	**Universal**: Genetic code / codons are(nearly) same for all organisms / from bacteria to human = ½ **Initiator:** Start codon / AUG = ½

22 (*i*) Retrovirus causes AIDS. RNA is its genetic material. — 3

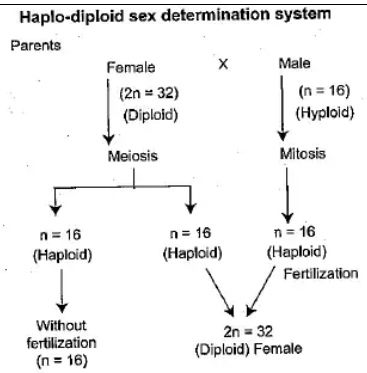
(*ii*) The enzyme 'B' is reverse transcriptase, 'C' is viral DNA.

(*iii*) Monocyte s and helper T-lymphocytes.

23. — 3

Cells	Location	Function
(*i*) Leydig cells	Interstitial space	Synthesis and secretion of testicular hormones called androgens.
(*ii*) Sertoli cells	Seminiferous tubules	Provide nutrition to the germ cells.
(*iii*) Primary spermatocyte	Inner wall of seminiferous tubules	Undergo meiotic divisions to form secondary spermatocyte and then haploid sperms.

24

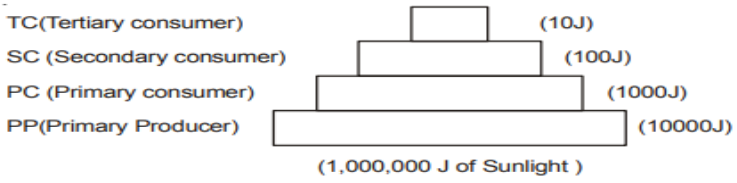


In Honey bees, the male progeny develops from the unfertilized eggs. The eggs are haploid and carry only one set of the chromosomes. These are known as drones or male honey bees. The queens and worker bees develop from the fertilized honey bee eggs, which have two sets of chromosomes and act as diploid eggs.

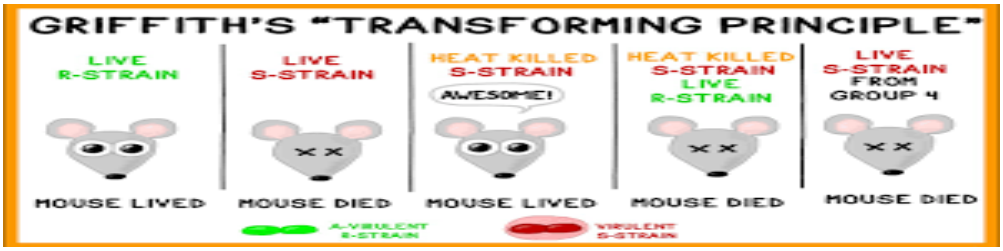
Section C

25. (*i*) *Eco*RI is a restriction endonuclease enzyme. — 3

(*ii*) Exonucleases cleave the DNA molecules at their ends whereas endonucleases cleave DNAmolecules internally.

	(*iii*) Restriction enzymes cut the strands of the DNA, a little away from the centre of the palindromicsites, but between the same two bases on opposite strands. This leaves sticky single strandedposition at the ends. These overhanging stretches are aids. These are named so because theyform hydrogen bonds with their complementary cut counterparts very easily.	
26.	Excessive use of herbicides / pesticides / antibiotics, have resulted in the selection of pest resistant / antibiotic resistant varieties, in much lesser time / time scale of months or years and not centuries (example from industrial melanism / effect on DDT on mosquito / any other to be accepted) [1 + 1 + 1 = 3 Marks]	3
27.	1. The issue of puberty and adolescence need to be addressed effectively with the respective age group because many changes take place in the body during adolescence of which they are supposed to be aware of. 2. To bring in awareness about theirreproductive health and its effect on their physical, emotional and social being. 3. To address the increase in sex abuse and sex crimes in our country 4. Myths and misconceptions related to reproductive issues Note: (any other related or relevant argument with reasons may be accepted) **OR** (a) Female partner is blamed due to social mind set / inequality of sexes / lack of awareness / male dominated society / any other relevant point (Any two) (b)Physical (abnormality in reproductivesystem), congenital, immunological or psychological (Any two) (c)Intra cytoplasmic sperm injection (ICSI) / artificial insemination (AI) / Intra uterine insemination (IUI)	3
28.	 Pyramid of biomass in sea = 1  Pyramid of energy in sea = 1 The pyramid of biomass in sea is inverted = ½ The pyramid of energy in sea is upright = ½ [3 Marks]	3

29	(*i*) A — Expanding pyramid B — Stable pyramidC — Declining pyramid (*ii*) Exponential. (*iii*) Stable pyramid is ideal for human population because it maintains the stability in all population phases. **OR** Correct definition of each.	
30	(*i*) LH surge is essential for the events leading to ovulation. (*ii*) (*a*) 5th day to 12th day of the cycle: Follicular phase (Proliferative phase). (*b*) 14th day of the cycle: Ovulatory phase (release of ovum) followed by luteal phase. (*iii*) The high levels of progesterone and estrogens during pregnancy suppress the release of gonadotropins required for the development of new follicles. Therefore, new cycle cannot be initiated. **OR** (iii). If fertilization does not occur, the endometrium, coupled with blood and mucus from the vagina and cervix (the lower, narrow part of the uterus located between the bladder and the rectum) make up the menstrual flow (also called menses) that leaves the body through the vagina.	
31	A -Salmonella typhi B-High fever, chills, headache, cough, lips and finger nails turn grey. C- common cold D- Wuchereriabancrofti/ W. malayi E-Amoebic dysentry. **OR** A -sporozoites B-Liver/ RBC C- Haemozoin D- Plasmodium falciperum E-intestine of female anapheles mosquito.	
32	(a) Patent is exclusive rights granted by a state to an inventor for a limited period of time in exchange for a public disclosure. (b) Turmeric –in 1955 US patent office granted patent for 'use of turmeric in wound healing' but the same is used in India for centuries-patent was revoked on objection raised by Indian Authorities. / Basmati rice -same in case of basmati in 1997. (c) To solve problems related to biopiracy and patent Indian parliament has recently cleared the second amendment of the Indian Patents Bill. **OR** (a) Denaturation process (b)Primers (c)*Taq* polymerase (d)Taq polymerase is a thermostable enzyme and remains active during high temperature required for denaturation and extension. (e) To amplify small segment of DNA/ to make multiple copies of a small fragment of DNA. (1 mark each)	

33	Hershey and Chase conducted their experiment on bacteriophage and proved that DNA is the genetic material. (i) They grew some bacteriophage virus on a medium that contained radioactive phosphorus (P32) and some in another medium with radioactive Sulphur (S35) respectively. (ii) Viruses grown in the presence of radioactive phosphorus (P32) contained radioactive DNA. (iii) Similar viruses grown in presence of radioactive Sulphur (S35) contained radioactive protein. (iv) Both the radioactive viruses were allowed to infect E. coli separately. (v) Soon after infection the bacterial cells were gently agitated in blender to remove viral coats from the bacteria. (vi) The culture was also centrifuged to separate the viral particle from the bacterial cell. (vii)It was observed that only radioactive P 32 was found associated with the bacterial cell and S 35 was only in the surrounding medium and not in the bacterial cell. (viii) The result clearly indicates that only DNA and not protein coat entered the bacterial cell and this proves that DNA is the genetic material that is passed from virus to bacteria and not protein. OR Fig 6.5 NCERT page no. 102 **OR** F. Griffith (1928), conducted an experiment with Streptococcus pneumoniae (bacterium causing pneumonia). He observed two strains of this bacterium, one forming a smooth shiny colony (S-type) with capsule, while other forming rough colonies (R-type) without capsule. When live S-type cells were injected into the mice, mice died due to pneumonia. When live R-type cells were injected into the mice, mice survived. When heat killed S-type cells were injected into the mice, mice survived and there were no symptoms of pneumonia. When heat killed S-type cell were mixed with live R-type cells and injected into the mice, the mice died due to unexpected symptoms of pneumonia.  	

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NAME OF UNIT	MCQ(1 MARK)	AR type (1 MARK)	SA(2 MARKS)	SA(3 MARKS)	CASE/COMPETENCY BASED (4 MARKS)	LA (5 MARKS)	WEIGHTAGE
REPRODUCTION	2 (2)	1(1)	1(2)	2(6)		1 (5)	16
GENETICS AND EVOLUTION	2 (2)	1(1)	1(2)	2(6)	1 (4)	1 (5)	20
BIOLOGY AND HUMAN WELFARE	3(3)		1(2)	1(3)	1 (4)	-	12
BIOTECHNOLOGY AND ITS APPLICATIONS	1 (1)	1(1)	1(2)	1(3)	-	1 (5)	12
ECOLOGY AND ENVIRONMENT	4 (4)	1(1)	1(2)	1(3)	-	-	10
TOTAL	12 (12)	4(4)	5 (10)	7 (21)	2 (8)	3 (15)	33 (70)

SAMPLE PAPER
Class -12th
Subject –Biology

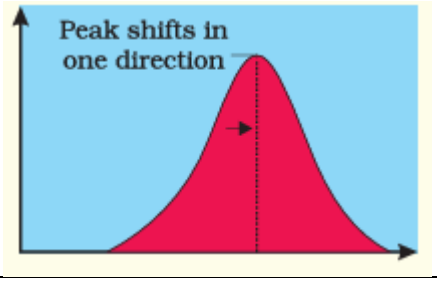
Max Marks: 70

Time: 3 hours

General Instructions: 1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. 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.
4. 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.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section –A

Q.No.s	Questions	Marks
1	During the formation of pollen grain formation, two cells are formed vegetative and generative. What is the ploidy of vegetative cell? (a) n (b) 2n (c) 3n (d) 4n	1
2	Flowers which are invariably autigamous as there is no chance for cross pollination (a) Cleistogmous (b) Chasmogamous (c) Xenogamous (d) Geitonogamy	1
3	How many codons code for an amino acid (a) 1 (b) 2 (c) 3 (d) 4	1
4	The process of mineralization by microorganism help in the release of (a) Inorganic nutrient from humus (b) both organic and inorganic nutrients from detritus (c) Organic nutrients from humus (d) Inorganic nutrient from detritus and formation of humus	1

5	 Which type of natural selection depicted in given representation- (a) Disruptive (b) Directional (c) Stabilising (d) Extensive	1
6	Which one of the following is NOT a functional unit of ecosystem (a) Energy flow (b) Decomposition (c)Productivity (d) Startification	1
7	In electrophoresis , DNA will migrate towards (a) Movement towards Cathode (b) Movement towards Anode (c) Move away from Cathode (d) Move away from Cathode	1
8	Which one of the following ecosystem service provided by natural ecosystem by (a) cycling of nutrient (b) prevention of soil erosion (c) pollution absorption and reduction of the threat of global warming (d) all the above	1
9	Which of the following is prepared without distillation? (a) Whisky (b) Brandy (c) Beer (d) Rum	1
10	Nita wants to remove the nucleotide from the ends of DNA in her experiment. Which type of Restriction enzyme is used by her from the followings: - (a) Exonuclease (b) Endonuclease (c) Endokinase (d) Exokinase	1
11	Isolated protoplast from two different varieties of plants-each having a desirable character, can be fused to get hybrid protoplast. These hybrids are called as (a) Genetically modified organisms (b) Somatic hybrids (c) Neo hybrids (d) Explants	1

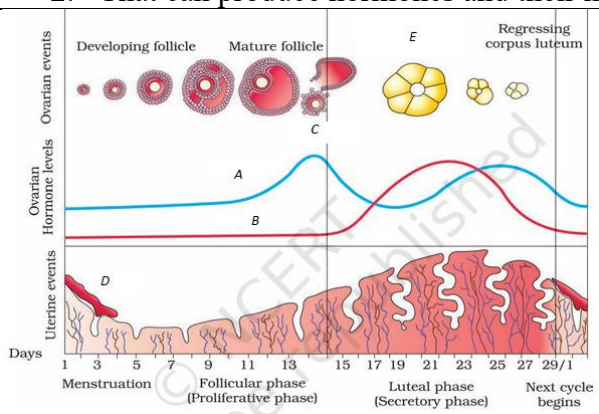
12	What type of ecological pyramid would be obtained with the following data Secondary consumer -120g Primary consumer -60g Primary producer -10g (a) Pyramid of energy (b) inverted Pyramid of biomass (c) upright Pyramid of biomass (d) upright Pyramid of numbers	1
	Question No. 13 to 16 consist of two 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:Endosperm is nutritive tissue and it is triploid. Reason:Endosperm is formed by the fusion of secondary nucleus to second male gamate. It is used by developing embryo. 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.	1
14	Assertion:The polymerase chain reaction is used in DNA amplification Reason:The ampiciline Resistance gene is used as a selectable marker to check transformation. 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.	1
15	Assertion:Waste such as plastic,paper,vegetables or fruit peel,which are generated in our house daily are biodegradable. Reason:Biodegradable wastes can be broken down into simpler ,harmless substance in nature in due course of time by the biological processes such as action of microorganisms. 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.	1
16	Assertion:Diaphragm and cervical are barrier made up of rubber . Reason:They block the entry of sperm through cervix. 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.	1

Section -B

17	Placenta acts as an endocrine tissue. Justify	2

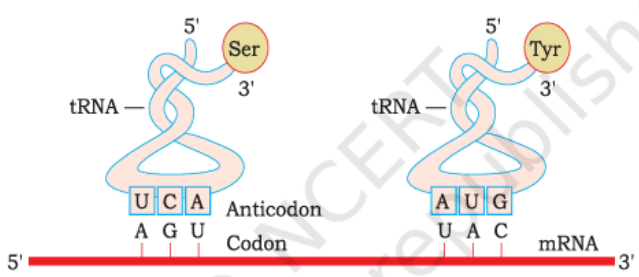
18	a) Write two closely related genes and the chromosomes that control α –Thalassemia. b) Differentiate between Thalassemia and sickle cell anaemia on the basis of their effects on globin molecules of hemoglobin.	2
19	Name the group of viruses responsible for causing AIDS humans. Why these viruses so named ?	2
20	Draw the labeled diagram of simple stirred bioreactor?	2
21	With the help of below mentioned food chain answer the following questions: X ⟶ Y ⟶ Z 1.Identify the Primary consumer. 2.What would be direction of flow of energy in this food chain? Or What is gross primary productivity. Calculate the Respiratory loss if Net primary productivity is 2000gC/m^2 /Year and GPP is 4000 g C/m^2 /Year	2

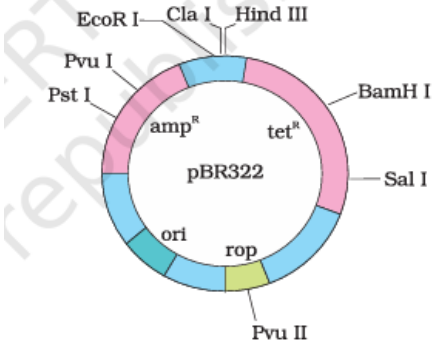
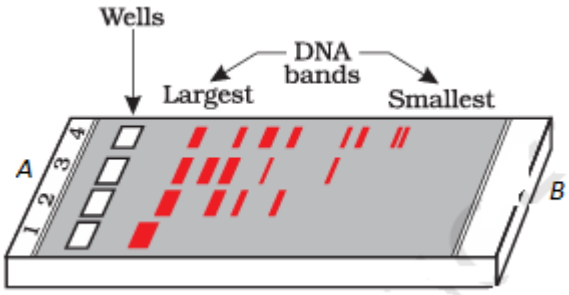
Section -C

22	A biologist see the the following cells in the cross section of ovary:- Oogonia, primary oocyte, ovum and corpus luteum. From these cells identify the following: - 1. Cells which are haploid 2. That can produce hormones and their names.	3
23	 With the help of this figure identify A,B,C,D,E,F	3
24	"A very small sample of tissue or even a drop of blood can help in determine paternity" .Provide the scientific explaination to substaintitae the statement .	3
25	Define the Hardy Weinberg principal and factors affecting the Hardy Weinberg equilibrium.	3
26	State the true and false from these statements and justify your answer- 1. BOD is main feature of sewage treatment. 2. Lichen is the type of mutual relation between algae and fungi in which both benefitted to each other.	3
27	(a) How is mature insulin different from pro-insulin secreted by pancreas in humans? (b) Explain how human functional insulin produced using r-DNA technology. Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patient? Or	3

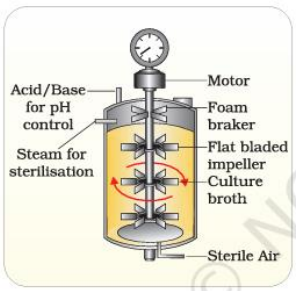
	(a) How do Bt-cotton plant protect itself from certain insects without use of any insecticide chemicals? (b) Name the source bacteria for cry gene and tell why do Bt-toxin not kill the bacteria itself?	
28	1.Rivet popper hypothesis proposed by Stanford ecologist Paul Ehrlich. Explain its importance in functional ecosystem. Or "The Evil Quartet ' is the sobriquet". Explain with reference to losses of biodiversity.	3

Section -D

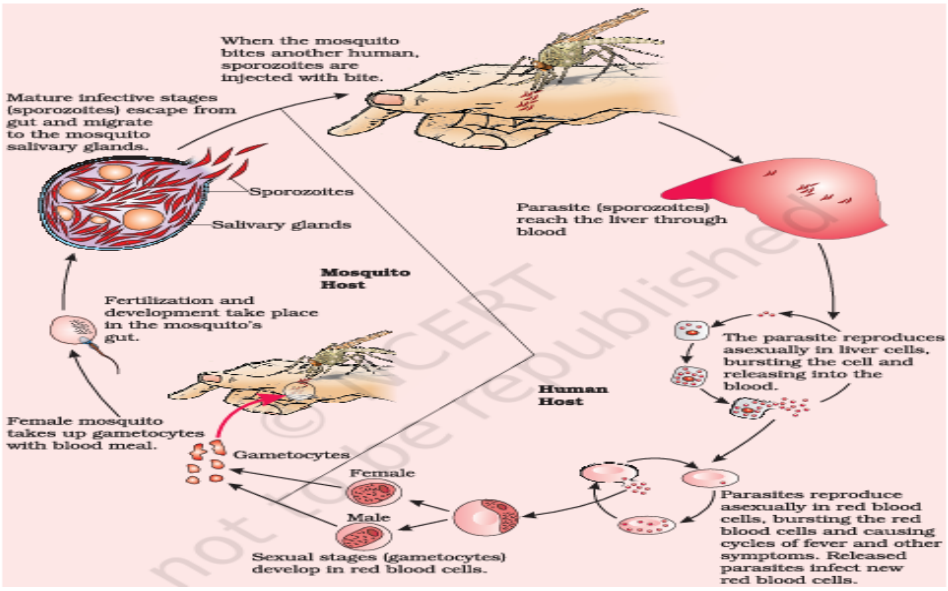
29	Malarial parasite, Plasmodium complete its life-cycle in two host. Draw its complete life cycle and explain various stages it. It follows through It's life. **Or** 1.Cancer is one of the most dreaded disease of humans. Explain contact inhibition and metastasis with respect to the disease. 2. Name the group of genes which have been identified in normal cells that could lead to the cancer and how they do so. 3.Name any two techniques which are useful to detect cancer of internal organs. 4.Why are the Cancer patient often give α - interferon as a part of the treatment.	2+2=4
30	Given below the diagram of tRNA molecule:-  Answer the question based on above diagram 1.Why is the charging of tRNA is essential in translation 2.Where does translation takes place in bacterial ribosome. 3.Name the scientist who called tRNAan adaptor molecule.	4
31	A women has certain quarries as listed below, before starting contraceptive pills .Answer them 1.What do contraceptive pills contain and how do they act as contraceptives? 2.What schedule should be followed for taking these pills? 3.List the advantage of using "*saheli*" as a contraceptive. **Or** 1.What is RCH Program of government to improve the reproductive health of the people. 2.Within what age group sexually transmitted diseases are reported to be very high. Mention three practice to avoid them.	2+1+2=5 3+2=5
32	1. A non-hemophilic couple was informed by the doctor that there is a possibility of a hemophilic child be born to them. Explain the basis on	3+2=5

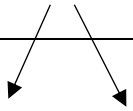
	which the doctor conveyed this information. Give the genotypes and the phenotypes of the all the possible children who could be born to them. 2. Name the disorder give the karyotype and symptoms where a human male suffer from as a result of an additional X chromosomes. **Or** 1.Identify giving reasons the salient features of their record by studying the following nucleotide sequences of mRNA stand and the polypeptide translated from it AUG UUU UCU UUU UUU UCU UAG Met-Phe-Ser-Phe-Phe-Ser 2.Calculate the lenghth of DNA of bacteriophage lambda that has 48502 base pairs?	
33	 1. With the help of above diagram write down the function of the following 1.Ori 2.amp^R 3.Hind III 4.rop 2.Expalin Insertional inactivation with the help of example. Or Ravi was doing gel electrophoresis to purify DNA fragments .Given below is the sketch of the observations of the experiment performed by him.  1.At which end he would have loaded the samples and where? 2.Analysis the reason for different positions taken up by DNA bands. 3.Eloborate the steps he would have followed to visualise DNA bands.	5

Marking scheme

Q.NO	Answer	Marks
	Section A	
1	n	1
2	Cleistogamous	1
3	3	1
4	(a) Inorganic nutrient from humus	1
5	C stabilising	1
6	(d) Startification	1
7	B Movement towards Anode	1
8	(d) all the above	1
9	C -Beer	1
10	A Exonuclease	1
11	b Somatic hybrids	1
12	(b) inverted Pyramid of biomass	1
13	Both A and R are true and R is the correct explanation of A.	1
14	b)Both A and R are true and R is not the correct explanation of A.	1
15	d) A is false but R is true.	1
16	B) Both A and R are true and R is not the correct explanation of A.	1
	Section B	
17	It secreate following hormoones:- 1.Hcg 2.Hpl 3.Oestrogen 4.Progesterone	2
18	A) HBA 1 and HBA 2gene and chromosome 16 B) Thalesamia is a quantitive problem of synthesising too few globin molecules but in sickle cell qualitative problem of synthesising an incorrectly functional globin	2
19	-Retroviruses -They have genetic material as RNA and can synthesise DNA on RNA template by reverse transcriptase.	2
20		2
21	1.Y is primary consumer 2.Energy flow is from x to Y to z	2

	Or GPP is rate of production of organic matter during photosynthesis. GPP-R=NPP 4000-R=2000 R=2000 g C/m^2 /Year	
	Section C	
22	1. Ovum is haploid. 2. Corpus luteum produce progesterone essential for maintenance of endometrium.	3
23	A-ESTROGEN B-PROGETERONE C-OVULATION D. Menses E-Developing corpus luteum	3
24	(i) DNA from all cells of an individual shows the same degree of polymorphism and therefore becomes a useful identification tool. (ii) (ii) Polymorphs are heritable and the child inherits 50% of the chromosome from each parent. (iii) With the help of PCR the small amount of DNA from blood can be amplified and be used in DNA finger printing to identify the paternity.	3
25	Definition of Hardy Weinberg principal .$P^2+2PQ+Q^2=1$ Factors:- 1.Gene migration 2.gene mutation.3. recombination 4. Gene flow5. Natural selection	3
26	1.True .As the BOD is measure of organic matter present in the water .Greater the BOD of waste water more is its polluting potential. 2. True. Algae help in providing food and fungus provide shelter to algae.	3
27	a) Difference b) Preparation of insulin- Insulin from animal source cause allergies whereas recombinant human insulin is identical with the human insulin. Or a) Bt-toxin present in the plant get activate in presence of alkaline PH of insect gut and create pores in epithelial cells which lead to swelling &lysis of the cells eventualy lead to death of the insect. b) 1.Source-Bacillus thurigiensi bacteria 2. As the toxin exist as inactive protoxin	3
28	In an airplane (ecosystem) all parts are joined together using thousands of rivets (species). If every passenger travelling in it starts popping a rivet to take home (causing a species to become extinct), it may not affect flight safety (proper functioning of the ecosystem) initially, but as more and more rivets are removed, the plane becomes dangerously weak over a period of time. Furthermore, which rivet is removed may also be critical. Loss of rivets on the wings (key species that drive major ecosystem functions) is obviously a more serious threat to flight safety than loss of a few rivets on the seats or windows inside the plane. Steps ½ * 6 = 3	3

29	 Or 1.Contact inhibition is the property of normal cells in which contact with other cells inhibits their uncontrolled growth. Metastasis is the property in which tumour cells reach distant sites in the body, through blood. 2. Proto oncogenes or Cellular oncogenes. These genes when activated under certain condition could lead to oncogenic transformation of the cells. 3. Biopsy/radiography/CT/MRI (Any two) 4. α-interferon activates immune system and destroys the tumour.	4
30	(i) Charging of tRNA is essential for ribosome to recognise it and convert the genetic code into protein (ii) Peptide bond formation takes place in the ribosome. (iii) Francis Crick	4
31	1. Contraceptive pills contain progestogen or progestogen-estrogen combination. They act by either of the following way: (i) inhibit ovulation (ii) inhibit implantation (iii) alter quality of cervical mucus to prevent or retard entry of sperms. 2. Contraceptive pills should be taken daily for a period of 21 days starting within first five days of menstrual cycle (to be repeated after a gap of 7 days). 3. Advantages of Saheli: (i) It is non-steroidal (ii) It is taken only once a week (iii) It has high contraceptive value (iv) It has less side effects. **Or** 1. The basic aims of the RCH programmes are creating public awareness regarding reproductionrelated aspects population growth and providing facilities to build up a healthy society with added emphasis on the health of mother and child. 2. In the age group of 15–24 years, STDs are reported to be very high. Following are the three practices to avoid them: (i) Abstain sexual contact with unknown partners or multiple partners. (ii) Always use condoms during coitus. (iii) In case of any doubt, medical help should be taken for early detection.	2+1+2=5 2+3=5
32	1. Parents genotype XY XX^H	3+2=5



Gamate X Y X X^H

F1 GENERATION

	X	X^H
X	XX(normal female)=1	X X^H (female carrier)=1
Y	XY(normal male)=1	X^HY(hemophilic male)=1

2. Klinefelter's syndrome. The karyotype is 44 + XXY. Symptoms are:
(i) Sex of the individual is masculine but possesses feminine characters.
(ii) Gynaecomastia, i.e., development of breasts.
(iii) Poor beard growth and often sterile.
(iv) Feminine pitched voice.

Or

1.

(i) The codon is a triplet. e.g., AUG, UUU, etc, are triplets
(ii) (ii) One codon codes for only one amino acid, hence it is unambiguous and specific. e.g., UUU codes for serine, AUG for methionine, etc.
(iii) (iii) AUG has dual function as it codes for methionine and it also acts as initiator codon. AUG is seen at the beginning of the polypeptide chain.
(iv) (iv) UAG does not code for any amino acid hence is called stop codon and leads to end of translation. No amino acid is coded by UAG in the polypeptide chain given.

3. Distance between two consecutive base pairs = 0.34×10^{-9} m
The length of DNA in bacteriophage lambda = $48502 \times 0.34 \times 10^{-9}$ m
= 16.49 × 10–6 m

33	1.Ori –replication starts, amp^R –ampicillin antibiotic resistance gene , Hind III-restriction site 2.Inactivation of gene for the synthesis of enzyme.(complete with example) Or 1.Near end A 2.As per size and sieving effect large molecules move slowly and small DNA fragments moves faster. 3.staining-ethidium bromide-UV radiation –coloured bands of DNA.	5

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CLASS 12(SAMPLE PAPER)																	
SUBJECT : BIOLOGY							M.MARKS :70										
S.No	Unit/lesson	KNOWLEDGE AND UNDERSANDING					APPLICATION					ANALYSE,EVALUATE					**Total**
		1 Mark	2 Marks	3 Marks	4 Marks	5 Marks	1 Mark	2 Marks	3 Marks	4 Marks	5 Marks	1 Mark	2 Marks	3 Marks	4 Marks	5 Marks	
UNIT VI																	
1	Reproduction.	2(1)		1(3)			1(1)	1(2)						1(3)		1(5)*	16
UNIT VII																	
2	Genetics and Evolution	1(1)	1(2)		1(4)		1(1)		1(3)		1(5)*	1(1)		1(3)			20
UNIT VIII																	
3	Biology and Human welfare	1(1)		1(3)*			1(1)	1(2)				1(1)			1(4)		12
UNIT IX																	
4	Genetics and Evolution	1(1)	1(2)			1(5)*			1(3)			1(1)					12
UNIT X																	
2	Ecology and Environment	2(1)	1(2)				2(1)		1(3)			1(1)					10
	TOTAL																**70**

SAMPLE PAPER

CLASS XII **BIOLOGY** Time: 3 Hours

Max. Marks: 70

General Instructions:

(i) *All questions are compulsory.*

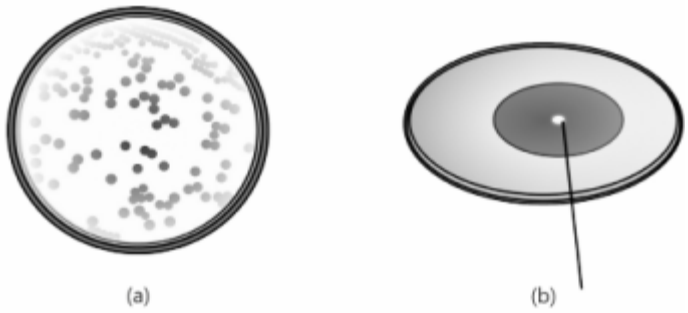
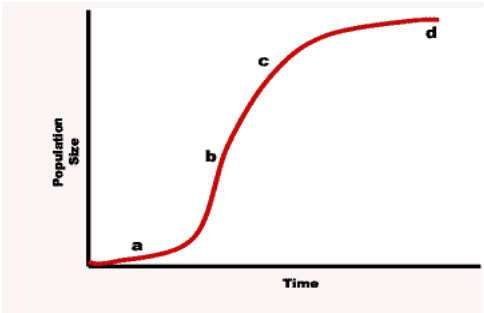
(ii) *The question paper has five sections and 33 questions. All questions are compulsory.*

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

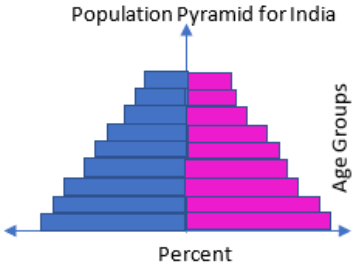
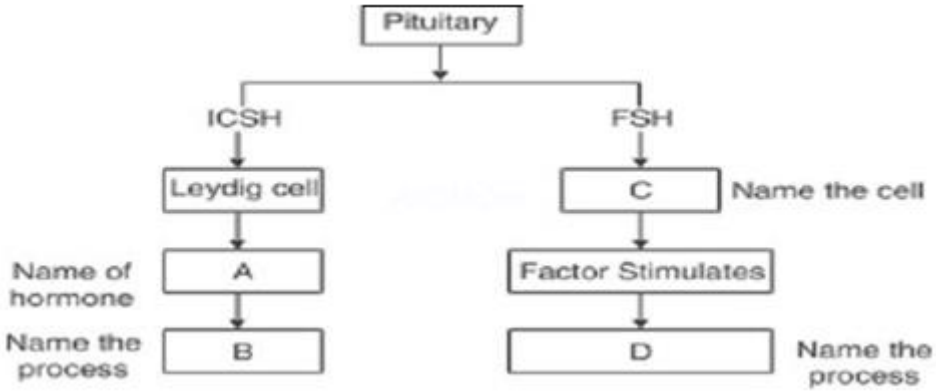
(iv) *There is no overall choice. However, internal choices have been provided in somequestions. A student has to attempt only one of the alternatives in such questions.*

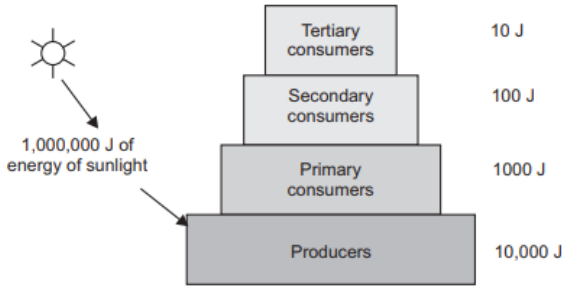
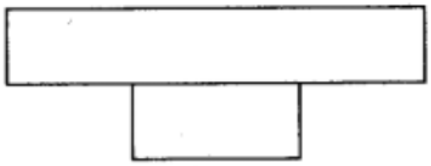
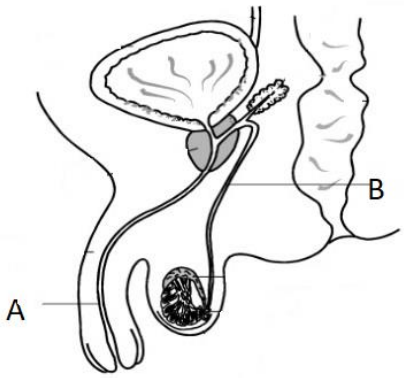
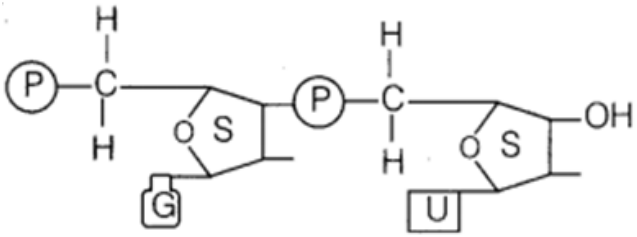
(V)*Wherever necessary, neat and properly labeled diagrams should be drawn.*

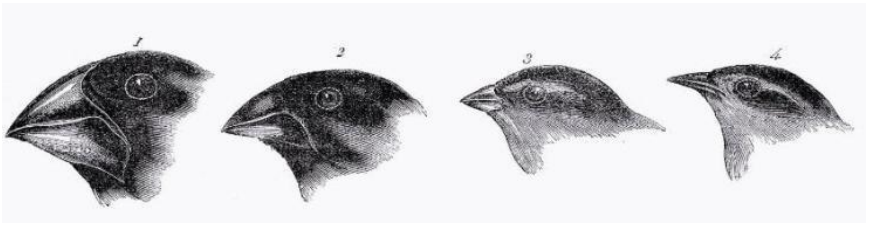
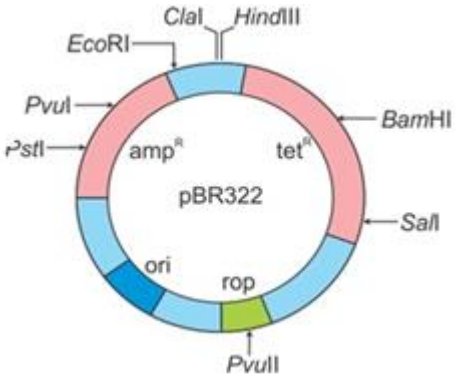
	SECTION A	
Q. No	Question	Marks
1	A specialised procedure to form an embryo in the laboratory in which sperm is directly injected into the ovum is (a) IUT (b) IUI (c) ICSI (d)ZIFT	1
2	What is true about "Saheli" ? (i) Developed at the CDRI, Lucknow (ii) Contains a steroidal preparation (iii) "Once-a-weak" pill (iv) Many side effects (v) High contraceptive value (vi) Very few side effects (vii) Low contraceptive value (a) (i), (ii), (iii), (v), (vi) (b) (i), (iii), (v), (vi), (vii) (c) (i), (ii), (iii), (iv), (v) (d) (i), (iii), (v),(VI)	1
3	The net electric charge on DNA and histones is (a)both positive (b) both negative (c) negative and positive respectively (d)zero	1
4	According to Hugo de Vries speciation is due to (a)accumulation of small variations (b) intraspecific breeding (c)inter specific breeding (d) saltation	1
5	Humoral immunity is associated with (a) T-cells (c) macrophages (b) B-cells (d) both (a) and (b)	1

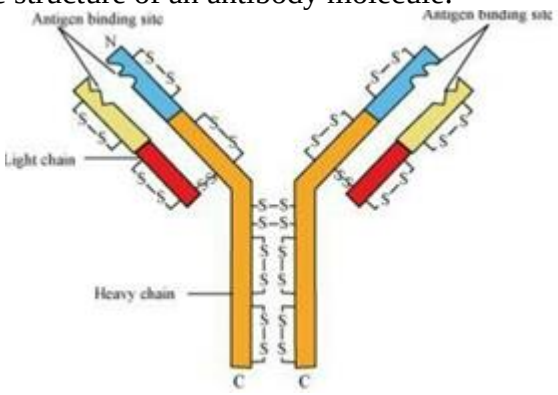
6	The injection given against the snake venom contains (a) antigenic proteins (b) preformed antibodies (c) attenuated pathogen (d) all of these.	1
7	Identify the colonies labelled as a and b  (a) a-Fungal; b-Bacterial (b) a-Bacterial; b-Fungal (c) a-Algal; b-Viral (d) a-Fungal; b-Algal	1
8	In an experiment, recombinant DNA bearing ampicillin-resistance gene is transferred into E.coli cells. The host cells are then cultured on a medium containing ampicillin. The result will be (a) both transformants and non-transformants cannot survive. (b) both transformants and non-transformants can survive. (c) transformants only and not the non-transformants can survive. (d) transformants cannot survive, but non-transformants cannot.	1
9	At which point in the graph shown below would there be zero population growth(dN/dt=0)  (a) a (b) b (c) c (d) d	1

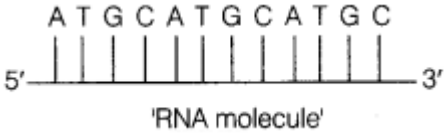
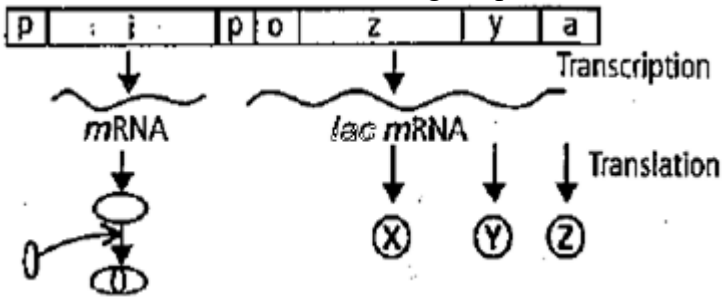
10	A population has more young individuals compared to the older individuals. What would be the status of the population after some years? (a) It will decline (b) It will stabilize (c) It will increase (d) It will first decline and then stabilize	1
11	Major conduit of energy in land and aquatic ecosystem is transferred through and _____ *and* _____ *respectively.* *(a) GFC, DFC,* *(b) PFC, GFC* *(c) DFC, GFC* *(d) GFC, GFC*	1
12	**Which of the following is not an in situ technique?** **(**a) Cryopreservation (b) National parks (c) Sanctuaries (d) Sacred forests	1
	Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer thesequestions 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:** An angiospermous flower represents the modified condensed shoot which performs the function of sexual reproduction. **Reason:** The fertile leaves of the shoot become modified into microsporophylls and megasporophylls which bear ovules and anthers respectively.	1
14	**Assertion:** A good example of multiple alleles is ABO blood group system. **Reason:** When I^A and I^B alleles are present together in ABO blood group system, they both express their own types.	1
15	Assertion: Using biotechnology human insulin can be produced into bacterial cells. Reason: To produce human insulin the A, B and C polypeptides of the human insulin are produced in the bacterial cells, separately extracted and combined by creating disulfide bonds.	1
16	Assertion:Population pyramid (graphically) depicts the rate at which population will grow in future. Reason:A triangular population pyramid depicts population size is stable.	1

		
	SECTION B	
17	**Given below is an incomplete flow chart showing influence of hormone on gametogenesis in male, observe the flow chart carefully and fill in the blank A, B, C and D.** 	2
18	In Mendel's breeding experiment on garden pea, the offspring of F_2 generation are obtained in the ratio of 25% pure yellow pod, 50% hybrid green pods and 25% green pods State (i) which pod colour is dominant (ii) Workout the cross.	2
19	A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease. (i) Write what did the doctor inject into the patient's body? (ii) How do you think this injection would protect the patient against the disease?	2
20	Explain the role of the following in biotechnology (i) Restriction endonuclease (ii) Gel-electrophoresis	2
21	Why the pyramid of energy is always upright? Explain.	2

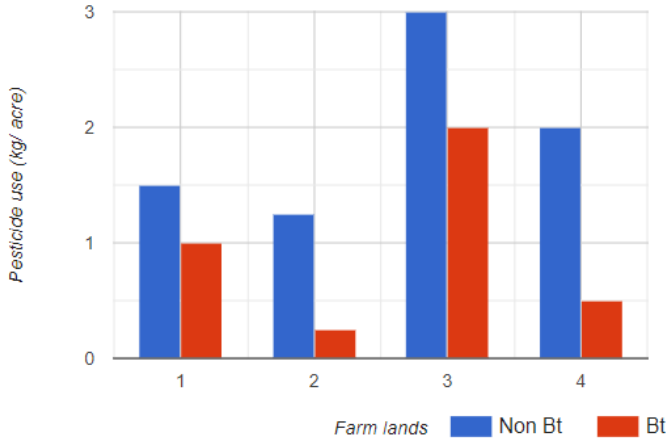
	 Or Identify the type of given ecological pyramid and give one example each of pyramid of number and pyramid of biomass in such cases 	
	SECTION C	
22	 I) Label the parts A and B II) When do the oogenesis and the spermatogenesis initiate in human females and males, respectively?	3
23	Flowering plants have developed many devices to discourage self-pollination and to encourage cross-pollination. Explain three such devices.	3
24	Answer the questions based on the dinucleotide shown below.  (i) Name the type of sugar guanine base is attached to. (ii) Name the linkage connecting the two nucleotides. (iii) Identify the 3′ end of the dinucleotide. Give a reason for your answer.	3

25	 Explain the interpretation of Charles Darwin who observed a variety of small black birds on Galapagos Islands.	3
26	Name the cells that act as HIV factory in humans when infected by HIV. Explain the events that occur in the infected cell. Or (i) Name the protozoan parasite that causes amoebic dysentery in humans. (ii) Mention two diagnostic symptoms of the disease. (iii) How is this disease transmitted to others?	3
27	Explain the importance of(a) ori, (b)amp^R and (c) rop in the E.coli vector shown below: 	3
28	Since the origin of life on earth, there were five episodes of mass extinction of species. (i) How is the 'Sixth extinction', presently in progress, different from the previous episodes? (ii) Who is mainly responsible for 'Sixth Extinction'? (iii) List any two points that can help to overcome this disaster outside.	3
	SECTION D	
	Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart	
29	Watson-Crick gave the semi-conservative mode of DNA replication.	4

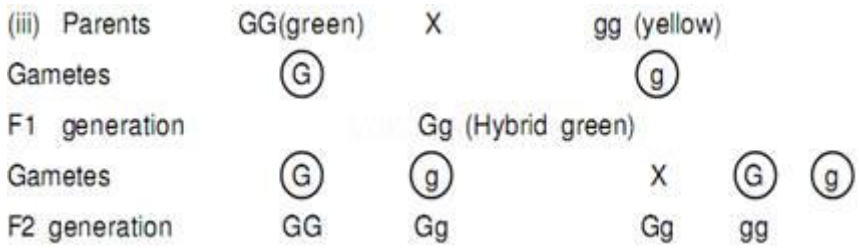
	 Answer the questions based on the given diagram: a)In a nucleus , the number of RNA nucleoside triphosphate is ten times more than the number of DNA nucleoside triphosphate, still only DNA nucleotides are added during the DNA replication, and not the RNA nucleotides. Why? b) Name the enzyme and state its property that is responsible for continuous and discontinuous replication of the two strands of a DNA molecule. c) Name the enzyme involved in the continuous replication of DNA strand. Mention the polarity of the template strand. Or c) Which property of DNA double helix led Watson and Crick to hypothesise semi-conservative mode of DNA replication? Explain.	
30	Given below is the structure of an antibody molecule.  a) A boy of ten years had chicken pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible. b) Why is secondary immune response more intense than the primary response in humans? c) Some allergens trigger sneezing and wheezing in human beings. What causes this type of response by the body? Or c)Why is an antibody represented as' H_2 L_2'?	4

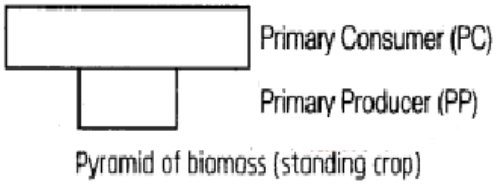
	SECTION E	
31	Explain the events in a normal woman during her menstrual cycle on the following days (i) Pituitary hormone levels from 12 days. (ii) Uterine events from 13-15 days. (iii) Ovarian events from 16-23 days. Or (i) Describe the formation of mature female gametophyte within an ovule in angiosperms. (ii) Describe the structure of cell that guides the pollen tube to enter the embryo sac.	5
32	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.  'RNA molecule' or Observe the representation of genes involved in lac operon given below: (a)Identify the region where the repressor protein will attach normally. b)Under certain conditions repressor is unable to attach at this site. Explain c) If repressor fails to attach to the said site what products will be formed in X,Y &Z and write the functions of these gene products.  	5
33	Gene manipulation is a fast emerging science. It started with development of recombinant DNA molecule. It is named variously as DNA manipulation biotechnology, recombinant DNA technology and genetic engineering. This technology, that mostly involves cutting and pasting of desired DNA fragments, is based on two important discoveries in bacteria, i.e., presence of plasmid in bacteria and restriction endonucleases. The science of recombinant DNA technology took birth when Cohen and Boyer (1973) were able to introduce a piece of gene containing foreign DNA into plasmid of E.coli. a)How are recombinant vectors created? b) Why is only one type of restriction endonuclease required for creating one recombinant vector? c)How can the following be made possible for biotechnology experiments? i)Isolation of DNA from bacterial cell. ii)Reintroduction of recombinant DNA in a bacterial cell. Or GM crops especially Bt crops are known to have higher resistance to pest	5

attacks. To substantiate this an experimental study was conducted in 4 different farm lands growing Bt and non Bt cotton crops.The farm lands had same dimensions, fertility and were under similar climatic conditions. The histogram below shows the usage of pesticides on Bt crops and non Bt cropsin these farm lands.

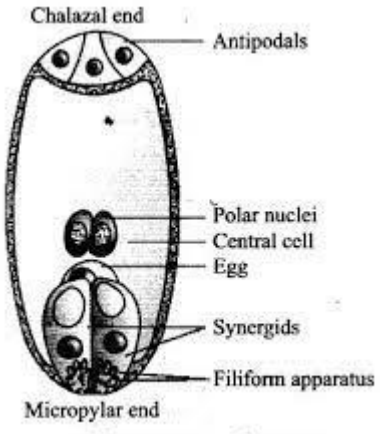


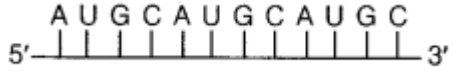
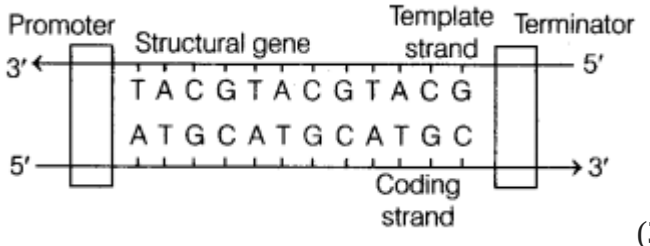
a) Which of above 4 farm lands has successfully applied the concepts of Biotechnology to show better management practices and use of agrochemicals? If you had to cultivate which crop would you prefer (Bt or Non Bt) and why?
b) Cotton Bollworms were introduced in another experimental study on the above farm lands wherein no pesticides was used. Explain what effect would a Bt and Non Bt crop have on the pest.

	MARKING SCHEME CLASS XII BIOLOGY (044)	
1	c	1
2	d	1
3	c	1
4	d	1
5	b	1
6	b	1
7	b	1
8	c	1
9	d	1
10	c	1
11	c	1
12	a	1
13	c	1
14	b	1
15	c	1
16	c	1
17	A = Testosterone; B = Spermatogenesis C = Sertoli cells; D Spermiogenesis	2
18	I)Green pod colour is dominant  Phenotypic ratio 3 : 1 Genotypic ratio 1 : 2 : 1	1/2x 4
19	(i) The doctor must have injected the tetanus vaccine into the patient.(1) (ii) The vaccine injection stimulates the body to make antibodies against the tetanus toxin.(1)	2
20	(i) Restriction endonucleases These are the bacterial enzymes that cut dsDNA into fragments after recognising and binding to the specific nucleotide sequences, known as recognition site. These enzymes are used to form recombinant molecules of DNA, composed of DNA from different sources.(1/2+1/2) (ii) Gel-electrophoresis is the technique which allows the separation and visualisation of fragments of DNA on an agarose gel matrix. Since, the DNA fragments are negatively charged molecules, they separate and move towards	2

	the anode (+ ve) under the influence of an electric field. DNA fragments are separated on the basis of their size through the sieving effect provided by the gel.(1/2+1/2)	
21	Pyramid of energy is always upright because when energy flows from a particular trophic level to the next trophic level, some energy is always lost as heat at each step.(1) Each bar in the energy pyramid indicates the amount of energy present at each trophic level in a given time.(1) Or Given ecological pyramid represents the inverted pyramid of biomass wherein small standing crop of phytoplanktons supports large standing crop of zooplankton.(1)  Pyramid of biomoss (standing crop) Pyramid of number is inverted in tree ecosystem and that of biomass in pond ecosystem.(1)	2
22	A Urethra (1) B Vasdeference (1) Oogenesis initiates during foetal or embryonic stage in females, whereas spermatogenesis in males starts at puberty.(1)	1+1 +1
23	i) Unisexuality- Flowers are unisexual, so that self-pollination is not possible. (ii) Anthers and stigmas mature at different times in a bisexual flower for preventing self-pollination.(1) (a) Anthers mature earlier than stigma of the same flower. e.g. sunflower, Salvia. (b) Stigmas mature earlier, so that they get pollinated before the anthers of the same flower develop pollen grains, e.g. Mirabilis jalapa, Gloriosa.(1) (iii) The third device to prevent self-pollination is self-incompatibility. (1)	3
24	i) Pentose sugar or deoxyribose sugar.(1) (ii) Two nucleotides are linked through 3′-5′ phosphodiester linkage to form a dinucleotide.(1) (iii) The ribose sugar has a free 3′ – OH group which is referred to as 3'end of the polynucleotide chain.(1)	3
25	i) Darwin found the variations in the beaks of small black birds on Galapagos Island due to their adaptation to different food habits. (1) ii) Darwin explained (a) All the varieties must have evolved within the same island itself. The original finches were seed-eating. From them, some arose with altered beaks as insectivorous and some as vegetarian finches.(1) (b) This process of evolution of different species in a given geographical area starting from a point and radiating to other habitats is called adaptive radiation.(1)	3

26	After infecting the human body, the HIV gains entry into macrophages.(1) Events occurring in these cells are as follows RNA genome of the virus replicates to form viral DNA by enzyme reverse transcriptase.(1) Viral DNA gets incorporated into the macrophage DNA and directs the infected cells to produce new viruses. Macrophages continue to produce virus particles and thus called HTV factory.(1) Or The disease amoebic dysentery or amoebiasis is caused by an intestinal parasite, Entamoeba histolytica, which is found in the large intestine of human. Transmitting agent is housefly, which acts as mechanical carrier. It transmits the parasite from faeces of infected person to the food.(1+1) Symptoms include constipation, abdominal pain and cramps, stools with excess mucous and blood clots.(1)	3
27	(a)Ori :Ori is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within the host cells.It is also responsible for controlling the copy number of the linked DNA.(1) (b)Amp^R : The ligation of alien DNA is carried out at a restriction site present in any antibiotic resistance gene.(1) (c) rop:It codes for the proteins involved in the replication of the plasmid.(1)	3
28	i) The current species extinction rate is estimated to be 100-1000 time faster than in the pre-human era.(1) (ii) All activities performed by human beings for survival and maintenance of their lifestyle.(1) (iii) Point that can help to overcome this disaster are as follows Preventing habitat loss and fragmentation. Checking overexploiting. Preventing alien species invasion. Preventing coextinction. Conservation/protection of species.(any two points)(1/2+1/2)	3
29	a) DNA polymerase is highly specific to recognize only deoxyribonucleoside triphosphates. Therefore it cannot hold RNA nucleotides.(1) b) DNA dependent DNA polymerase.It catalyses polymerization in 5'------>3' direction only.(1) c) DNA polymerase is involved in continuous replication of DNA strand.The polarity of template strand is 3'---------->5' .(2) Or c)The two strands of DNA show complementary base pairing.This property led to suggest semi conservativemechanism of DNA replication in which one strand of parent is conserved while the other complementary strand formed is new.(2)	4
30	a)The boy when encounters a pathogen for the first time ,his body produces antibodies that results in the memory of the first encounter, to protect the body in future.(1) b) Presence of antibodies developed during primary response which is of low intensity.(1) c)The exaggerated response of the immune system to certain antigens present	4

	in the environment is the cause of this type of response.(2) Or c)Each antibody molecule has four polypeptide chains.The two smaller chains are called light chains while the two longer chains are called heavy chains. Therefore an antibody is represented as H_2L_2.(2)	
31	(i) The period of 8-12 days after the onset of menstruation is the follicular phase. During this phase, GnRH from hypothalamus stimulates anterior pituitary to release FSH and LH. FSH stimulates the ovarian follicles to secrete oestrogen, which in turn stimulates the proliferation of the endometrium of the uterine wall. This causes the endometrial lining to thicken.(2) (ii) The uterine events between day 13 and 15 are governed by the high LH and FSH levels. The endometrium is intact due to the effect of these gonadotropin hormones and also prepares itself for pregnancy, if fertilisation occurs.(2) (iii) During 16-23 days, ruptured Graafian follicle gets converted into corpus luteum in the ovary. It starts secreting progesterone which maintains the endometrium, necessary for the implantation of fertilised ovum followed by other events of pregnancy.(1) Or i) The functional megaspore undergoes mitosis to form 2 nuclei, , forming a 2-nucleate embryo sac. Further, mitotic divisions lead to the formation of 4-nucleate and 8-nucleate stages of the embryo sac. After the 8-nucleate stage, cell walls are laid down and a typical female gametophyte or embryo sac is formed. Among the eight nuclei, six are enclosed by cell wall and organised into cells, while the remaining two nuclei (polar nuclei) are situated above the egg apparatus in a large central cell. Out of the six cells, three are grouped at the micropylar end and constitute the egg apparatus made up of two synergids and one egg cell. The other three cells are located at the chalazal end and are called antipodals. Thus, a typical angiosperm embryo sac after maturity is 8-nucleate and 7-celled. (ii) The egg apparatus present towards the micropylar end, comprises of two synergids and an egg cell. These synergids possess special cellular thickenings at their micropylar tip and called filiform apparatus. This filiform apparatus guides the pollen tube to enter into embryo sac.(6x1/2)  **The mature embryo sac** (2m)	5

32	The process of copying genetic information from one strand of DNA into RNA is called 'transcription'. Transcription is catalysed by 'DNA dependent RNA polymerase'.(1) The RNA molecule given in question should be  As RNA have uracil in place of thymine.(1) For given RNA, the transcription unit will be  (3) Or a) Operator region O (1) b) In the presence of an inducer lactose repressor is unable to attach.(1) z -B galactosidase –breaks lactose into galactose and glucose.(1) y -Permease –increase the permeability of the cell to lactose.(1) a- Transacetylase—catalyses the transacetylation of lactose into its active form.(1)	5
33	a)The construction of rDNA is done by linking a gene encoding antibiotic resistance with a plasmid. Plasmid DNA act as vectors to transfer the piece of DNA attached to it. (1 m) b)When cut by same enzyme the resultant DNA fragments have the same sticky ends, which can be joined together using DNA ligases.(2 m) i)By treating cell with lysozyme (1m) ii)Microinjection /gene gun (1m) or (a)Farm land II has successfully applied the concept of biotechnology. (1/2) I would prefer Bt crop because the use of pesticide is highly reduced for Bt crops. (1+1/2) b)In Bt cotton a cry gene has been introduced from bacterium Bacillus thuringiensis (Bt) causes synthesis of a toxic protein. This protein becomes active in the alkaline gut of bollworm feeding on cotton punching holes in the lining causing death of the insect (2) However a non Bt crop will have no effect on the cotton bollworm and the yield of cotton will decrease. (1)	5

BIOLOGY (044)

Maximum Marks: 70 **Time: 3 hours**

UNIT	SECTION-A MCQ(1x16 =16MKS)	SECTION –B (2x5=10MKS)	SECTION-C (3x7=21 MKS)	SECTION-D (CASE-BASED 4x2= 8 MKS)	SECTION-E (3x5=15mks)	TOTAL
UNIT-VI Reproduction.	3*1=3	1*2=2	3*3=9		1*5=5	**19 (7)**
UNIT-VII Genetics and Evolution	6*1=6	1*2=2	1*3=3		1*5=5	**16 (9)**
UNIT-VIII Biology and Human welfare	2*1=2	1*2=2	1*3=3		1*5=5	**5 (6)**
UNIT-IX Biotechnology	4*1=4	1*2=2	1*3=3	1*4=4		**13 (7)**
UNIT-X Ecology	1*1=1	1*2=2	1*3=3	1*4=4		**10(4)**
TOTAL	16(16)	10(5)	21(7)	8(2)	15(3)	**70 (33)**

SAMPLE PAPAER

Biology (044)

Class XII| 2023–24

Max Marks: 80 **Time: 3 hours**

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 markseach; 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 somequestions. 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

Q.Nos.	Questions	Marks
1	The outermost and innermost wall layers of microsporangium in an anther are respectively: a. Endothecium and tapetum b. Epidermis and endodermis c. Epidermis and middle layer d. Epidermis and tapetum	1
2	From the statements given below choose the option that are true for a typical female gametophyte of a flowering plant: i. It is 8-nucleate and 7-celled at maturity ii. It is free-nuclear during the development iii. It is situated inside the integument but outside the nucellus iv. It has an egg apparatus situated at the chalazal end (a) i and iv, (b) ii and iii (c) i and ii (d) ii and iv	1

3	Which of the following statements is correct about the role of regulatory proteins in transcription in prokaryotes? A. They only increase expression B. They only decrease expression C. They interact with RNA polymerase but do not affect the expression D. They can act both as activators and as repressors	1
4	Mother and father of a person with 'O' blood group have 'A' and 'B' blood group, respectively. What would be the genotype of both mother and father? A. Mother is homozygous for 'A' blood group and father is heterozygous for 'B'. B. Mother is heterozygous for 'A' blood group and father is homozygous for 'B'. C. Both mother and father are heterozygous for 'A' and 'B' blood group, respectively. D. Both mother and father are homozygous for 'A' and 'B' blood group, respectively.	1
5	Match the scientists listed under column 'I' with ideas listed column 'II'. Column I Column II A. Darwin — i. abiogenesis B. Oparin — ii. use and disuse of organs C. Lamarck — iii. continental drift theory D. Wagner — iv. evolution by natural selection A. A-i; B-iv; C-ii; D-iii B. A-iv; B-i; C-ii; D-iii C. A-ii; B-iv; C-iii; D-i D. A-iv; B-iii; C-ii; D-i	1
6	The most accepted line of descent in human evolution is: A. Australopithecus → Ramapithecus → Homo sapiens → Homo habilis B. Homo erectus → Homo habilis → Homo sapiens C. Ramapithecus → Homo habilis → Homo erectus → Homo sapiens D. Australopithecus → Ramapithecus → Homo erectus →Homo habilis → Homo sapiens.	1
7	Which of the following statements does NOT hold true for restriction enzyme? A. It recognises a palindromic nucleotide sequence B. It is an endonuclease C. It is isolated from viruses D. It can produce the same kind of sticky ends in different DNA molecules	1

8	Person having genotype $I^A I^B$ would show the blood group as AB. This is because of: A. Pleiotropy B. Co-dominance C. Segregation D. Incomplete dominance	1
9	The vitamin whose content increases following the conversion of milk into curd by lactic acid bacteria is: A. vitamin C B. vitamin D C. vitamin B12 D. vitamin E.	1
10	Which of the following steps are catalysed by *Taq* DNA polymerase in a PCR reaction? A. Denaturation of template DNA B. Annealing of primers to template DNA C. Extension of primer end on the template DNA D. All of the above	1
11	The first clinical gene therapy was given in 1990 to a 4-year old girl with _____ (ADA) deficiency. This enzyme is crucial for the immune system to function. What is the full form of ADA? A. Adenosine deoxyaminase B. Adenosine deaminase C. Aspartate deaminase D. Arginine deaminase	1
12	Decomposition is largely an oxygen-requiring process. The rate of decomposition is controlled by chemical composition of detritus and climatic factors. Now among the following, where do you think the process of decomposition would be the fastest? A. Tropical rain forest B. Antarctic C. Dry arid region D. Alpine region	1

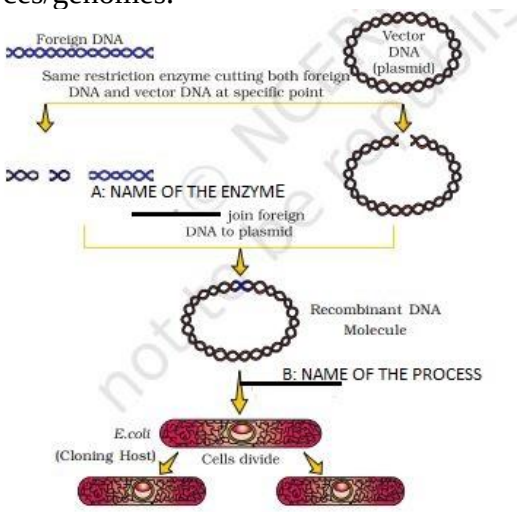
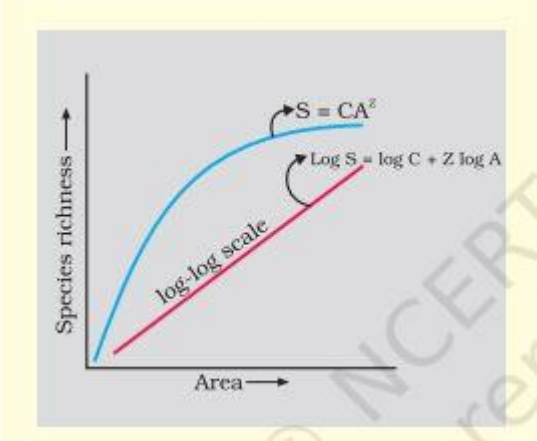
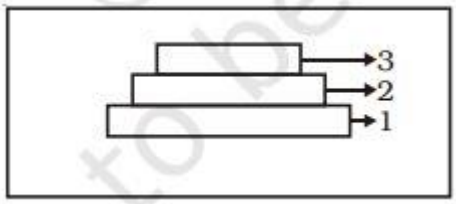
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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.

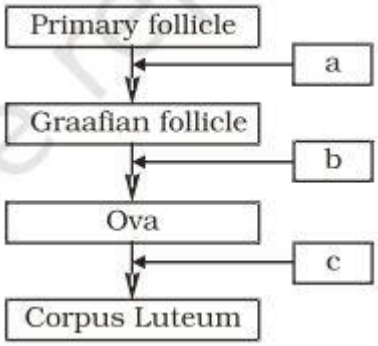
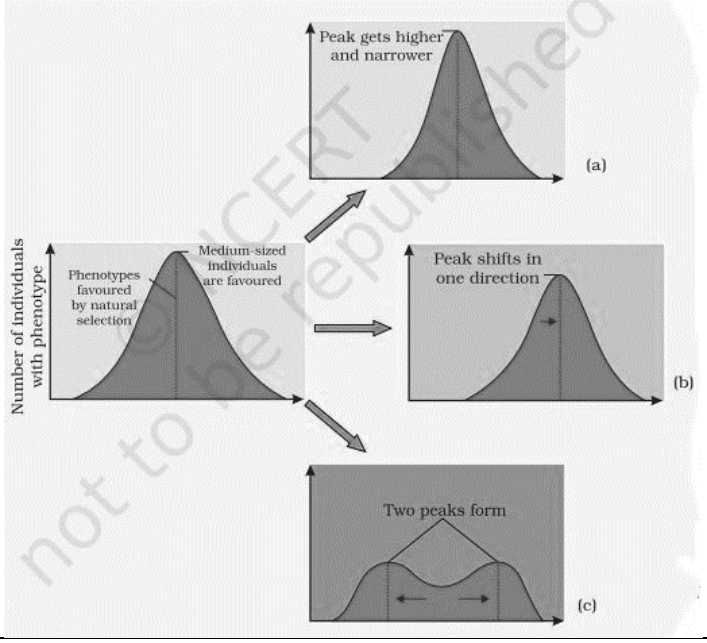
13	Assertion: Chasmogamous flowers require pollinating agents. Reason: Cleistogamous flowers do not expose their sex organs.	1
14	Assertion : In a monohybrid cross, F1 generation indicate dominant characters. Reason : Dominance occurs only in heterozygous state.	1
15	Assertion : Yeasts such as *Saccharomyces cerevisiae* are used in baking industry. Reason : Carbon dioxide produced during fermentation causes bread dough to rise by thermal expansion.	1
16	Assertion: 'Cry' proteins are named so because they are crystal proteins. Reason: In alkaline environment of insect midgut 'Cry' proteins are solubilized and then release toxic core fragments after proteolytic action.	1

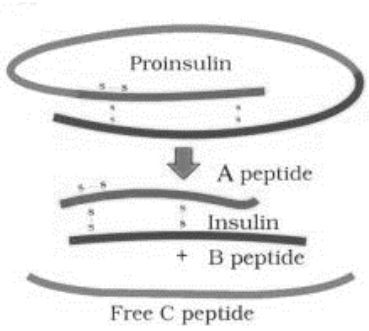
Section B

<table>
<tr><td>17</td><td>Corpus luteum in pregnancy has a long life. However, if fertilisation does not take place, it remains active only for 10-12 days. Explain.</td><td>2</td></tr>
<tr><td>18</td><td>If a father and son are both defective in red-green colour vision, is it likely that the son inherited the trait from his father? Comment.</td><td>2</td></tr>
<tr><td>19</td><td>The following table shows certain diseases, their causative organisms and symptoms. Fill the gaps.
<table>
<tr><th>Name of the Disease</th><th>Causative Organism</th><th>Symptoms</th></tr>
<tr><td>(i) Ascariasis</td><td>Ascaris</td><td>_____</td></tr>
<tr><td>(ii) _____</td><td>Trichophyton</td><td>Appearance of dry, scaly lesions on various parts of the body</td></tr>
<tr><td>(iii) Typhoid</td><td>_____</td><td>High fever, weakness, headache, stomach pain, constipation.</td></tr>
<tr><td>(iv) Pneumonia</td><td>Streptococcus pneumoniae</td><td>_____</td></tr>
</table></td><td>2</td></tr>
</table>

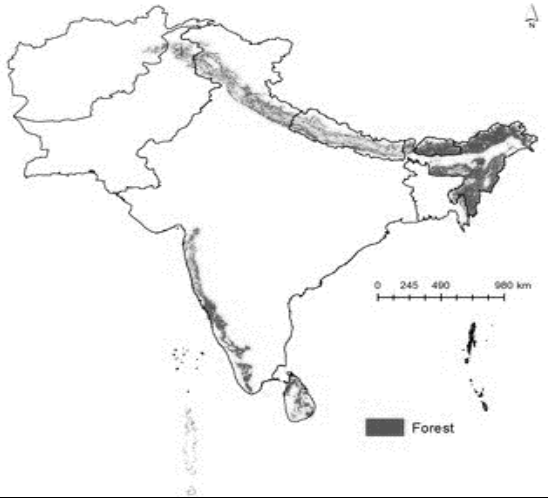
20	Restriction endonucleases are used in genetic engineering to form 'recombinant' molecules of DNA, which are composed of DNA from different sources/genomes.  Fig: Diagrammatic representation of recombinant DNA technology a) Identify A and B. b) Apart from the above figure where would find the usage of A.	2
21	Shown below is a figure	2
	 a) Identify the curve. b) How is it that when a very large area is considered the slope is steeper than that for smaller areas?	2
	OR  a) Label the three tiers 1, 2, 3 given in the above age pyramid. **b)** What type of population growth is represented by the above age pyramid?	

Section C

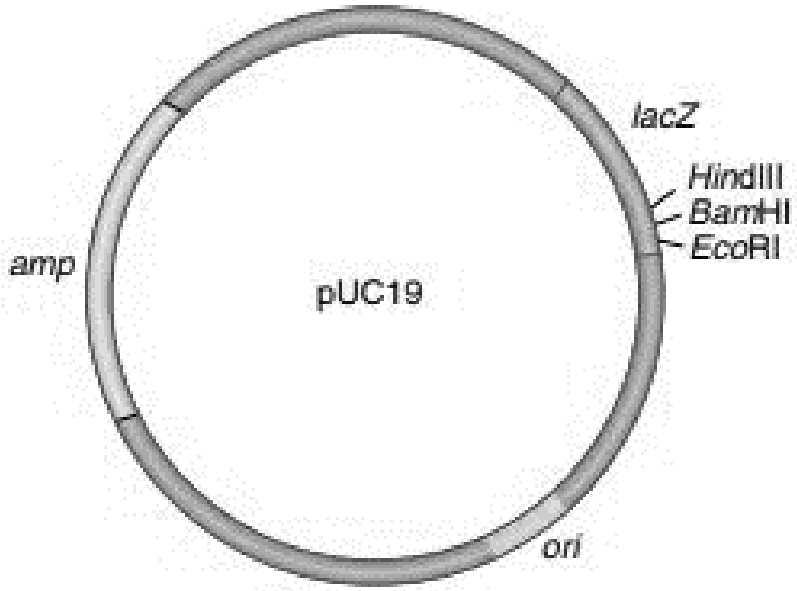
22	Given below is a flow chart showing ovarian changes during menstrual cycle.  a) Fill in the spaces giving the name of the hormones / source responsible for the events shown. b) Name the source of the a, b and c hormones.	3
23	A couple is trying to conceive and start a family by using GIFT, A type of ART. (a) Suggest two possible situations that the couple is facing? (b) Can gametes be transferred to the uterus to achieve the same result? Why or Why not?	3
24	Intentional or voluntary termination of pregnancy before full term is called medical termination of pregnancy (MTP) or induced abortion. (a) Mention two cases where MTP is done? (b) What is the safe period for MTP?	3
25	Study the following picture and answer the questions: a) Identify **a,b** and **c** in the picture. b) Name the phenomenon and state its importance in evolutionary processes.  	3

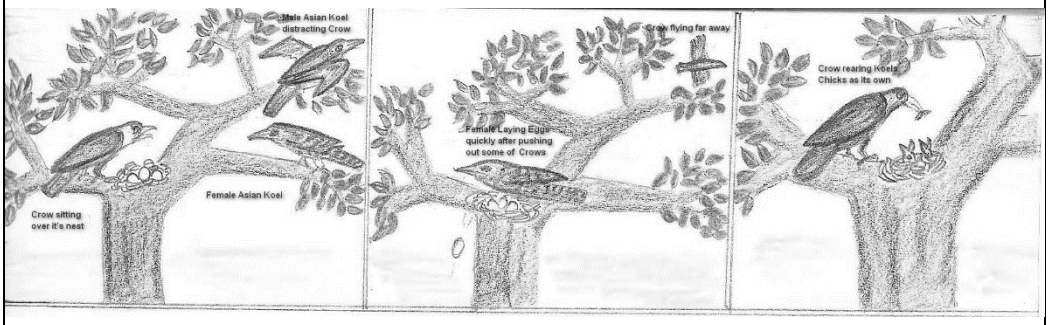
26	a) What are flocs? b) What do you mean by BOD? c) How do flocs reduce BOD?	3
27	Insulin is a hormone made by specialised areas within the pancreas called islets of Langerhans. Doctors use this hormone to treat diabetes when the body cannot make enough insulin on its own. Earlier insulin was extracted from pancreas of slaughtered animals like cattle and pigs. In 1983, Eli Lilly an American company developed the first commercially produced human insulin. Study the diagram carefully and answer the questions that follows:  a) Why is insulin extracted from pancreas of slaughtered animals no more in use by diabetic people? b) How did Eli Lilly Company synthesize human insulin? **OR** The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. a) What is the significance of ADA deficiency? b) Apart from gene therapy, what are the other ways to treat people ADA deficiency?	3
28	The map below shows the biodiversity hotspots in India. a) Explain the term biodiversity hotspots . b) How much land area in percentage do the biodiversity hotspots occupy globally?	3

c) What are sacred groves?



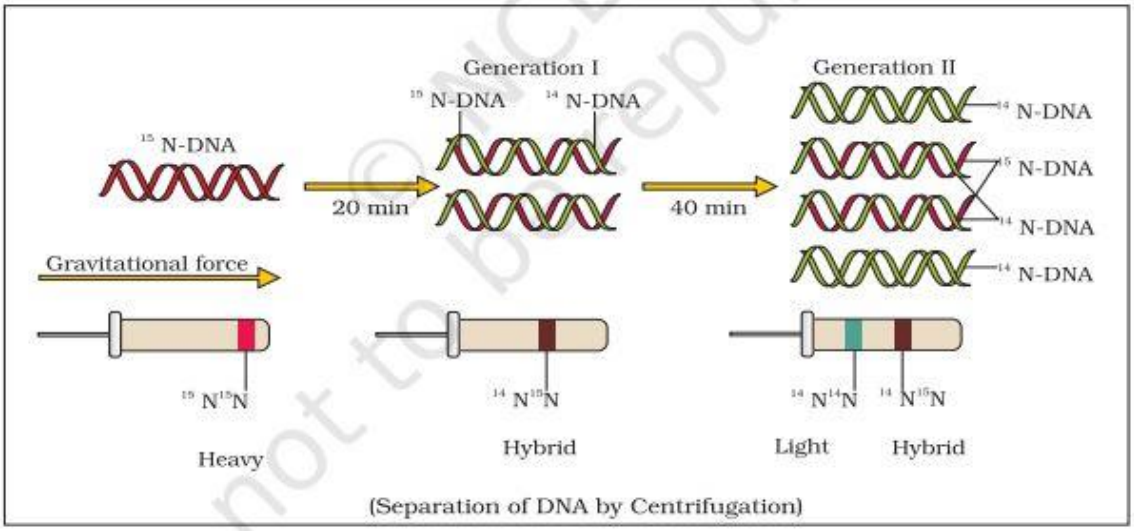
Section D

29	Many different types of DNA molecules can serve as vectors, provided they have certain properties. The most important property is self-replication; once in a cell, a vector must be capable of replicating. Any DNA that is inserted in the vector will be replicated in the process. Thus, vectors serve as vehicles for the replication of desired DNA sequences Shown below a vector called pUC19  a) What kind of vector is it? b) What are the advantages of circular vector over open chain ones? Or What are the advantages of small vectors over large vectors? **c)** Name the selectable marker in above diagram and how would screening of transformants be done here?	4

30	Given below is a depiction of a phenomenon:  a) Name the phenomenon with the species involved. b) What special adaptation does *Cuscuta* has as parasite. c) In accordance with their life styles, parasites evolved special adaptations. Mention any two such adaptations seen in parasites. **OR** Another example of commensalism is the interaction between sea anemone that has stinging tentacles and the clown fish that lives among them. Identify the type of ecological interaction and what happens in the interaction.	4

Section E

31	One of your neighbours is suffering from itching, fluid discharge, slight pain and swelling in the genital region. (a) What do you think the disease he is suffering from? (b) Absence or less significant early symptoms and the social stigma deter some infected persons to consult a doctor. Mention its consequences (any two). (c) Mention any two preventive measures. **OR** Diagnostic reports of four patients having infertility problem are given below. A. Suggest suitable Assisted Reproductive Technology (ART) for each problem. (a) A female cannot produce an ovum, but can provide suitable environment for fertilization and further development. (b) A male who is unable to inseminate the female but sperm count is normal. (c) A male who has poor sperm count. (d) Fusion of gamete and zygote formation does not occur within the body of female. B. Some techniques commonly used for infertility treatment are given below. Read them carefully and answer the question.	5

	ZIFT, GIFT, ICSI, IUI, IVF (a) Expand any two abbreviations. (b) Distinguish between ZIFT and GIFT. (c) Write the common term used to denote the techniques given above.	
32.	(a) Name the stage in the cell cycle where DNA replication occurs. (b) Explain the mechanism of DNA replication. Highlight the role of enzymes in the process. **OR** Observe the given diagram and answer the following questions: (a) Describe the experiment shown in the below diagram? (b) Write the conclusion which arrived after this experiment.  (Separation of DNA by Centrifugation)	5

KENDRIYA VIDYALAYA SANGATHAN

BLUE PRINT

SAMPLE PAPER II- CLASS XII (BY GROUP 06)

NAME OF UNIT	MCQ(1 MARK)	AR type (1 MARK)	SA(2 MARKS)	SA(3 MARKS)	CASE/COMPETENCY BASED (4 MARKS)	LA (5 MARKS)	WEIGHTAGE
REPRODUCTION	2 (2)	1(1)	1(2)	2(6)	-	1 (5)	16
GENETICS AND EVOLUTION	3 (3)	1(1)	2(4)	1(3)	1 (4)	1 (5)	20
BIOLOGY AND HUMAN WELFARE	2(2)	1(1)	-		1 (4)	1 (5)	12
BIOTECHNOLOGY AND ITS APPLICATIONS	2 (2)	-	2(4)	2(6)	-	-	12
ECOLOGY AND ENVIRONMENT	3 (3)	1(1)	-	2(6)	-	-	10
TOTAL	12 (12)	4(4)	5 (10)	7 (21)	2 (8)	3 (15)	33 (70)

KENDRIYA VIDYALAYA SANGATHAN

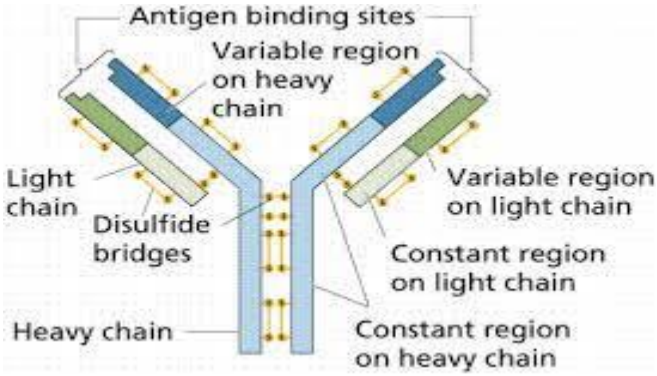
(SAMPLE PAPER-2)

CLASS: XII
BIOLOGY

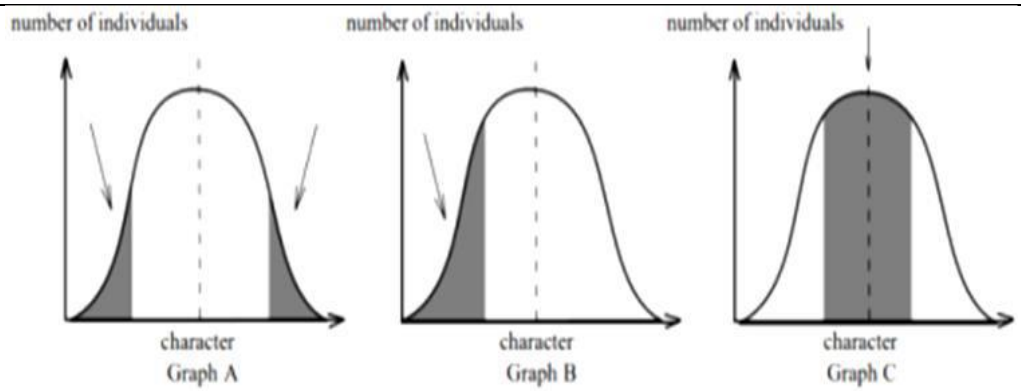
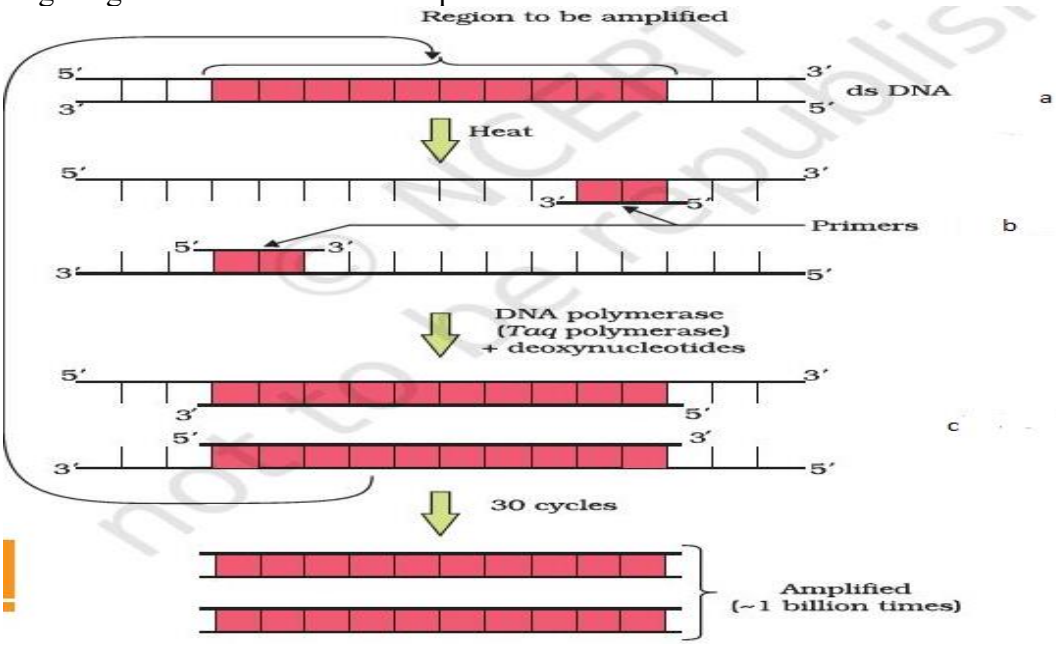
MAXIMUM MARKS: 70 **TIME ALLOWED: 3 HRS**

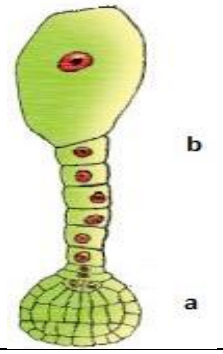
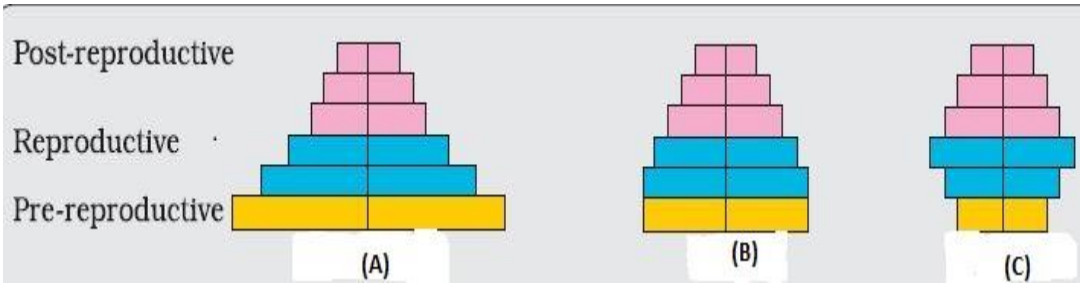
General Instructions:
(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based 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 must attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat, and properly labelled diagrams should be drawn.

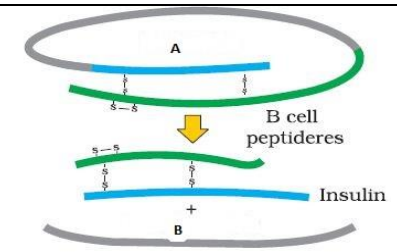
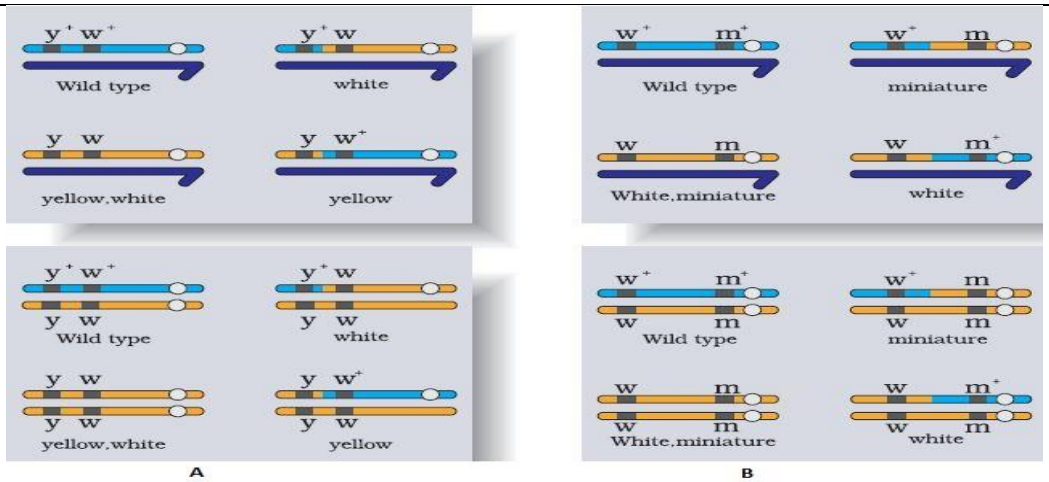
SECTION: A		
Q NO.	**QUESTIONS**	**MARKS**
1	Which of the following statement confirm the law of dominance (a) Alleles do not show any blending and both characters recovered as such in F2 generation (b) It is the conclusion of a dihybrid cross (c) 3:1 ratio in F2 generation (d) Alleles of a pair segregate from each other such that gamete receives only one of the two factors	**1**
2	Evolutionary convergence is development of a (a) common set of functions in groups of different ancestry (b) dissimilar set of functions in closely related groups (c) common set of structures in closely related groups (d) dissimilar set of functions in unrelated groups.	**1**
3	An infertile couple was advised to undergo in vitro fertilisation by the doctor. Out of the options given below, select the correct stage for transfer to the fallopian tube for successful results? (a) Zygote only (b) Zygote or early embryo upto 8 blastomeres (c) Embryos with more than 8 blastomeres (d) Blastocyst Stage	**1**
4	Match column I with column II and select the correct option from the given codes. **Column I** **Column II** A. Sigma factor (i) 5'– 3' B. Capping (ii) Initiation C. Tailing (iii) Termination D. Coding strand (iv) 5' end (v) 3' end (a) A-(iii), B-(v), C-(iv), D-(ii) (b) A-(ii), B-(iv), C-(v), D-(i) (c) A-(ii), B- (iv), C-(v), D-(iii) (d) A-(iii), B-(v), C-(iv), D-(i)	**1**
5	Match column I with column II and select the correct option from the codes given below. **Column I** **Column II**	**1**

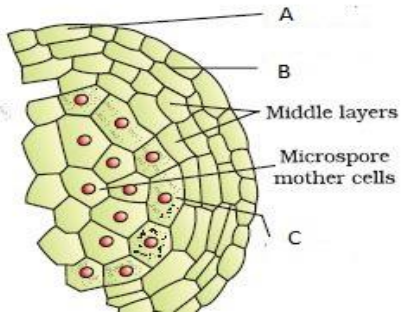
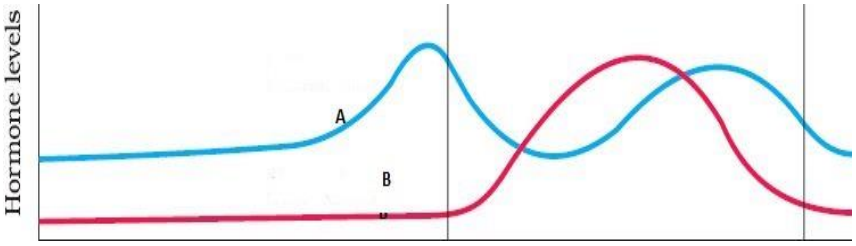
	A. Hyaluronidase (i) Acrosomal reaction B. Corpus luteum (ii) Embryonic development C. Gastrulation (iii) Progesterone D. Colostrum (iv) Mammary gland (a) A-(iii), B-(ii), C-(iv), D-(i) (b) A-(i), B-(iii), C-(ii), D-(iv) (c) A-(iii), B-(ii), C-(i), D-(iv) (d) A-(i), B-(ii), C-(iii), D-(iv)	
6	Match column I with column II and select the correct option from the given codes. **Column I** **Column II** A. Methanogens (i) BOD B. Fermentors (ii) Methane rich fuel gas C. Organic waste in water (iii) Production of methane D. Biogas (iv) Large vessels for growing microbes (a) A-(ii), B-(iv), C-(iii), D-(i) (b) A-(iv), B-(iii), C-(ii), D-(i) (c) A-(ii), B-(i), C-(iv), D-(iii) (d) A-(iii), B-(iv), C-(i), D-(ii)	**1**
7	Observe the following diagram-  i)Each antibody molecule has four disulphide chains. ii) an antibody is represented as H2L2. iii) antibodies are found in the blood iv) Different types of antibodies are produced outside our body. Identify the correct pair from the options given below- a) i&ii b) iii & iv c) ii &iii d) i& iv	**1**
8	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	**1**
9	C-peptide of human insulin is (a) removed during maturation of pro-insulin to insulin (b) responsible for the formation of disulphide bridge (c) a part of mature insulin molecule (d) responsible for its biological activity	**1**
10	An urn shaped population age pyramid represents (a) growing population (b) static population (c) declining population (d) extinct population	**1**
11	Select the option that correctly identifies A, B and C in the given table. **Organism** **Trophic level** **Food chain**	**1**

	Eagle A Grazing Earthworm Primary consumer B Frog C Grazing (a) A-Top carnivore, B-Detritus, C-Secondary consumer (b) A-Top carnivore, B-Detritus, C-Primary consumer (c) A-Secondary consumer, B-Grazing, C-Secondary consumer (d) A-Scavanger, B-Grazing, C-Producer	
12	Which of the following is an example of ex situ conservation? (a) Sacred Groves (b) National Park (c) Biosphere Reserve (d) Seed Bank	**1**
	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 middle piece of sperm is called as power house of the sperm. **Reason:** The numerous mitochondria coiling around axial filament produce energy for the movement of the tail.	**1**
14	**Assertion**: Human Genome Project was a mega project launched to find out the complete DNA sequence of human genome. **Reason**: It was possible only with the help of genetic engineering techniques to isolate and clone any piece of DNA and fast techniques for determining DNA sequences	**1**
15	**Assertion**: Wine and beer are produced by distillation of the fermented broth. **Reason**: Different types of alcoholic drinks are obtained only by fermentation, always followed by the distillation process**.**	**1**
16	**Assertion**: A stable community shows much variation in productivity from year to year. **Reason**: It is not resistant to occasional disturbances.	**1**
	SECTION: B	
17	State the agent(s) which helps in pollinating the following plants. Explain the adaptations in these plants to ensure pollination: (a) Corn (b) Water hyacinth	**2**
18	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) What will be the genotype in males suffering from this disease?	**2**
19	The graphs below show three types of natural selection. The shaded areas marked with arrows show the individuals in the population which are not selected. The dotted vertical lines show the statistical means	**2**

	 a) What names are given to the types of selection shown in graphs A, B and C. b) After the selection has operated for several generations in the above populations, graphically illustrate the probable results indicated in Graph B.	
20	A schematic representation of polymerase chain reaction (PCR) upto the extension stage is given below. Answer the questions that follow:  (i) Identify a,'b'& c. (ii) Mention the importance of "b" in PCR	**2**
21	Expand GEAC. State its main objectives	**2**
	SECTION:C	
22	(a) What are the early symptoms of STDs(any2) (b) List any four complications that may arise due to STDs if not treated early.	**3**
23	(a) Identify the structure. (b) Label a and b.	**3**

	(c) What will be the fate of both.?  	
24	The DNA packaging in eukaryotes is carried out with the help of lysine and arginine rich basic proteins called histamine. The unit of compaction is nucleosome. (a) What would happen if histones were to be mutated and made rich in aspartic and glutamic acid in place of basic amino acids such as lysine and arginine? (b) What is the role of non-histone chromosomal proteins in DNA packaging? **OR** (a)A DNA segment has a total of 1000 nucleotides, out of which 240 are adenine containing nucleotides. How many pyrimidines bases this DNA segment possesses? (b)which rule governs to solve the above problem.	**3**
25	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.	**3**
26	 **(**a) What is an age pyramid? (b) Identify -A, B and C. (c) How does analysis of age pyramids can provide inputs for long term planning strategies?	**3**
27	(a)Which organism in biotechnology is described as natural genetic engineer? (b) Why is it called so? (c) How this property is used in the preparation of Transgenic plant?	**3**
28	Observe the above diagram and answer the following questions- (a) Identify A and B. (b) How insulin is different from Humulin? Which technology is used in the preparation of Humulin by Eli Lily company?	**3**

		
	SECTION:D	
29	Manish went to his hometown located in the countryside along with his parents during his summer vacations. His grandparents' house is surrounded by farmland from all sides. Lots of crops were growing nearby and Manish was very excited to visit the crop fields. He seeked permission from his mother to play in the farmland along with his friends and then went to play in the fields. On returning home he had running nose, watering eyes and continuous sneezing which was very frequent. The symptoms worsened with time. Based on the above information answer the following questions: (a) What could be the possible reason for Manish's condition? (b) How can allergy be diagnosed in a person? (c) Name the type of allergy that Manish developed. (d) Find out the reasons for developing allergic reactions?	**4**
30	 Observe the above F_2 generation Results of two dihybrid crosses conducted by Morgan and answer the following questions- (i)What do the above crosses 'A' and 'B' illustrate? (ii) What does (+) sign in superscript represent? (iii)How is the strength of linkage between **y** and **w** is different than **w** and **m**. (iv)What is the strength of linkage with increase in age?	**4**
	SECTION: E	
31	Read the graph given above and correlate the uterine events that take place according to the hormonal levels on (i)Identify 'A' and 'B'. (ii) Specify the source of the hormone marked in the diagram.	**5**

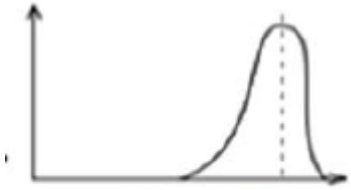
	(iii) Give reason why A peaks before B. (iv) Compare the role of A and B. (v) Under which condition will the level of B continue to remain high on the 28th day?  OR  (a) Identify the diagram and labelA, B& C. (b) Mention the function of B& C. (c) What is the ploidy of A,B&C? (d) How many pollen grains will be released from 100 microspore mother cell?	
32	Answer the following question regarding Griffith experiment (a) Name the bacteria with which the experiment was done. (b) What do you mean by the R-Strain and S-Strain? (c) Did the mice developed the disease when he injected the heat killed S Strain to the mice? (d) Among the two strains which one is Virulent?? (e) What was the finding of his experiment? OR (a) Explain the process of amino acylation of tRNA. Mention its role in translation. (b) At what site in the ribosome will the tRNA bind? Name the enzyme responsible for this binding? (c) How do ribosomes in the cells act as factories for protein synthesis?	**5**
33	(a) Describe how does the application of the fungi to the agricultural farm increases the farm output? (b)Why is Rhizobium categorized as a 'symbiotic bacterium'? How does it act as a biofertilizer? OR	**5**

	Name the infective stage of *Plasmodium* that is introduced into the human body when a mosquito bites him/her. b) Trace the stages of life cycle of the parasite from the point of entry into human body till the time another mosquito bites this person.	

BIOLOGY THEORY (044)

MARKING SCHEME(SAMPLE PAPER-2)

SECTION: A		
Q NO.	**QUESTIONS**	**MARKS**
1	**C**	**1**
2	**A**	**1**
3	**B**	**1**
4	**B**	**1**
5	**B**	**1**
6	**D**	**1**
7	**C**	**1**
8	**D**	**1**
9	**A**	**1**
10	**C**	**1**
11	**A**	**1**
12	**D**	**1**
	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	**A**	**1**
14	**B**	**1**
15	**D**	**1**
16	**D**	**1**
SECTION: B		
17	(i) wind-the corn cob – the tassels which represent the stigma and style wave in the wind to trap pollen grains.	**2**

	(ii) insects or wind-the flower emerge above the level of water & are pollinated by insects or wind as in most of the land plants.	
18	**(i)**X= Down's syndrome , cause- inheritance of extra 21st chromosome **(ii)**genotype of male= 45 +XY	**½X4=2**
19	a) A -stabilising; B - directional; C - disruptive  **Graph B** **Directional**	**1+1**
20	i)(a)denaturation, b) annealing c) extension ii) anneling temperature is crucial for the attachment of 2 primers **.**	**1+1**
21	Genetic Engineering Approval Committee **Objectives-**to validity of GM research and the safety of introducing GM-organisms for public services	**1+1**
	SECTION:C	
22	a)itching,fluid discharge, slight pain, swellings, etc., in the genital region(any2) b)pelvic inflammatory diseases(PID), abortions, still births, ectopic pregnancies	**1+2**
23	(a)globular embryo (b)A= Embryo, B= suspensor (c) suspensor pushes the embryo to touch endosperm,embryo becomes the future plant.	**1+1+1**
24	(a) If histone proteins were rich in acidic amino acids instead of basic amino acids then they may not have any role in DNA packaging in eukaryotes as DNA is also negatively charged molecule. The packaging of DNA around the nucleosome would not happen. Consequently, the chromatin fibre would not be formed. (b) The packaging of chromatin at higher level requires non-histone chromosomal proteins (NHC) **OR** a)According to Chargaff's rule, ratio of purines to pyrimidines is equal, i.e. A + G = C + T The number of adenine (A) is equal to the number of thymine (T). A = 240(given) Therefore, T = 240 Also, the number of guanine (G) is equal to cytosine (C). Thus, G + C = 1000 – [A + T] G + C = 1000 – 480= 520 Hence, G = 260, C = 260 The number of pyrimidine bases, i.e. C + T= 240 + 260 = 500 b) Chargaff's rule	**1+1+1**
25	The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake. The environmental damage caused and threat posed to our native species by invasive weed species like carrot grass (*Parthenium*), *Lantana* and water hyacinth (*Eicchornia*). The introduction of the African catfish *Clarias gariepinus* for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.	**1+1+1**

	OR *in situ and ex situ* *in situ* – protection of organisms in their natural habitats Ex- protected areas, sacred groves, Biosphere reserves *ex situ*- protection of organisms outside their habitat under special human care EX- zoo, gene bank	
26	**(a)** If the age distribution (per cent individuals of a given age or age group) is plotted for the population, the resulting structure is called an age pyramid **(b**(A) Expanding, (B) stable or (C) declining **(c)** Age pyramids can provide us the inputs to find ways to control population size in case of an expanding population. eg- family planning measures.	**1+1+1**
27	(a)*Agrobacterium tumefaciens* **(b)** It helps the molecular biologists to deliver genes of interest into a host plant and helps to get viable transgenic plants. (c) The tumor inducing (Ti) plasmid of *Agrobacterium tumifaciens* has now been modified into a cloning vector which is no more pathogenic to the plants but is still able to use the mechanisms to deliver genes of our interest into a variety of plants.	**½+1+1½**
28	(a) A- Proinsulin, B- C-Peptide (b) insulin is synthesised naturally as a prohormone from beta cells of islets of langerhans. Humulin is human insulin prepared synthetically (c) r-DNA technology	**1+1+1**
SECTION:D		
29	(a) Allergy (b)Allergy can be diagnosed in a person due to thePresence of large amount of IgE antibodies in the blood. (c) Pollen allergy (d)Allergic reactions is due to chemicals like histamine and serotonin from mast cells.	**1+1+1+1**
30	(a) Cross A shows crossing between gene y and w; Cross B shows crossing between genes w and m. (b) (+) sign in superscript represent dominant wild type alleles (c) The strength of linkage between y and w is higher than w and m. (d) increases	**1+1+1+1**
SECTION: E		

31	(i)A is Estrogen and B is Progesterone **(ii)** Estrogen secretes from ovarian follicles and Progesterone secretes from corpus luteum**.** (iii) As follicular phase takes place before luteal phase during the follicular phase of the cycle the secretion of estrogen peaks due to the developing follicles which release the hormone. Progesterone is produced during the later stages of the cycle from the corpus luteum. (iv) Estrogen enhances and maintains the mucous membrane that lines the uterus. Whereas progesterone prepares the endometrium for the potential pregnancy after ovulation. It also triggers the lining to thicken to accept a fertilized egg. (v) If an egg is fertilized by sperm and conception occurs then secretion of progesterone remaincontinues as it is needed for thickening of endometrium lining. **OR** (a) A= Epidermis,B= Endothecium,C= Tapetum (b) Function of B- dehiscence of pollen grains & function of C is to provide nutrition for the developing pollengrains (c) Ploidy of A,B&C are 2n each. (d) 400 pollengrains	**1x5=5** **OR** **1½+1+2½**
32	(a) *Streptococcus pneumonia* (b) Rough & Smooth strain (c) No Mice Live (d) Smooth (e) Transforming principle is transferred from heat killed S strain has enabled the R strain to synthesize a smooth polysaccharide coat and become virulent. OR (a)Amino Acid + ATP + tRNA → Aminoacyl-tRNA + AMP + PP. This is an essential step as only activated amino acids are carried to the site of protein synthesis by their respective tRNA. (b)P- Site, amino acyl RNA-Synthetase (c) By translating the genetic code transcribed in mRNA into an amino acid sequence. Ribosomes use cellular accessory proteins, soluble transfer RNAs, and metabolic energy to accomplish the initiation, elongation, and termination of peptide synthesis	**1x5=5** **OR** **2+1+2**
33	(a)Fungi form symbiotic association with the roots of higher plants called mycorrhiza, eg. Glomus. The fungal hyphae absorb phosphorus from soil and pass it to the plant. Mycorrhiza shows the following benefits: (i) Resistance to root-borne pathogens. (ii) Tolerance to salinity and drought. (iii) Overall increase in plant growth and development. Due to increased availability of phosphorus there is an increase in farm output. (b) Rhizobium is present in the root nodules of leguminous plants. They have a symbiotic relationship in which the bacterium obtains food and shelter from the plant and the plant gets fixed nitrogen in return. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plant as a nutrient. **OR**	***3+2***

	a) Sporozoite. b) Sporozoite injected with bite of infected mosquito. ↓ Sporozoite reach liver through blood. ↓ Parasite reproduce asexually in liver cells and burst out of the cell into blood. ↓ Parasite reproduce asexually in RBC. ↓ Parasite burst out of RBC every 3-4 days releasing haemozoin which causes fever and chill. ↓ Sexual stage Gametocyte develop within RBC ↓ Gametocytes transferred to mosquito when it bites.	***1+4***

KENDRIYA VIDYALAYA SANGATHAN

ZIET MUMBAI

CLASS XII (BY GROUP 06)

BLUE PRINT SAMPLE PAPER 1

KENDRIYA VIDYALAYA SANGATHAN

NAME OF UNIT	MCQ (1 MARK)	AR type (1 MARK)	SA(2 MARKS)	SA(3 MARKS)	CASE/COMPETENCY BASED (4 MARKS)	LA (5 MARKS)	WEIGHTAGE
REPRODUCTION	2 (2)	1(1)	1(2)	2(6)		1 (5)	16
GENETICS AND EVOLUTION	2 (2)	1(1)	1(2)	2(6)	1 (4)	1 (5)	20
BIOLOGY AND HUMAN WELFARE	3(3)		1(2)	1(3)	1 (4)	-	12
BIOTECHNOLOGY AND ITS APPLICATIONS	1 (1)	1(1)	1(2)	1(3)	-	1 (5)	12
ECOLOGY AND ENVIRONMENT	4 (4)	1(1)	1(2)	1(3)	-	-	10
TOTAL	12 (12)	4(4)	5 (10)	7 (21)	2 (8)	3 (15)	33 (70)

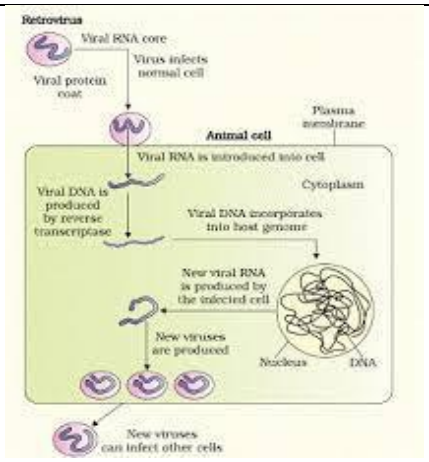
SAMPLE PAPER 1

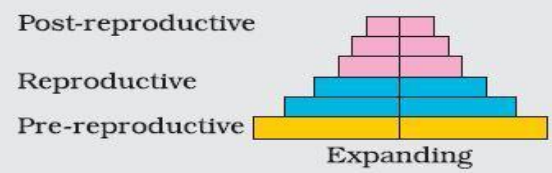
CLASS: XII
BIOLOGY

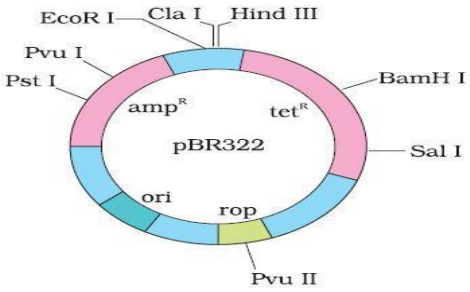
MAXIMUM MARKS: 70 **TIME ALLOWED: 3HRS**

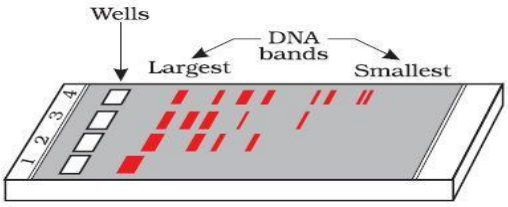
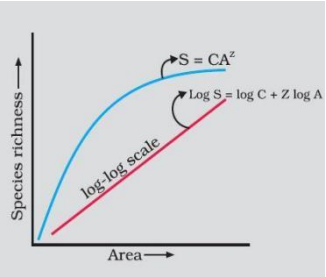
General Instructions:
(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student must attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat, and properly labelled diagrams should be drawn.

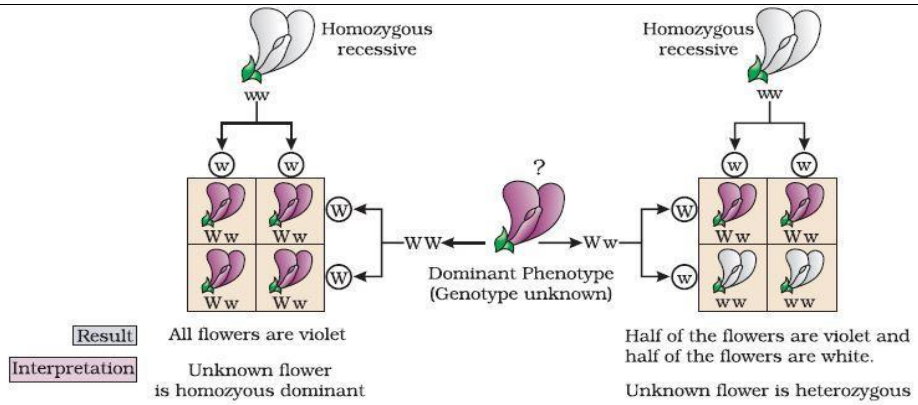
SECTION: A		
Q NO.	**QUESTIONS**	**MARKS**
1	Which among the following came into India as a contaminant with imported wheat, has become ubiquitous in occurrence and causes pollen allergy (a) *Lantana* (b) *Eicchhornia* (c) *Parthenium* (d) *Chenopodium*	**1**
2	Match column I with column II. **Column I** — **Column II** A. Fimbriae — (i) Oviduct B. Fallopian tube — (ii) Capture ova released into coelom C. Infundibulum — (iii) Site of fertilization D. Ampulla — (iv) Part of oviduct closer to ovary (a) A-(iv), B-(i), C-(ii), D-(iii) (b) A-(ii), B-(i), C-(iv), D-(iii) (c) A-(i), B-(ii), C-(iii), D-(iv) (d) A-(i), B-(iii), C-(iv), D-(ii)	**1**
3	If a double stranded DNA has 30% of cytosine, what will be the percentage of adenine in it? (a) 20% (b) 40% (c) 30% (d) 60%	**1**
4	Which of the following statements indicates parallelism in genes and chromosomes?	**1**

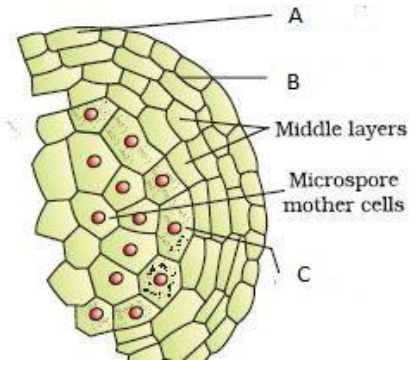
	(i) They occur in pairs (ii) They segregate during gamete formation (iii) They show linkage (iv) Independent pairs segregate independently (a). (i) and (iii)(b) (ii) and (iii)(c) (i), (ii) and (iii)(d). (i), (ii) and (iv)	
5	Microbes are used in I. primary treatment of sewage II. secondary treatment 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	**1**
6	The inoculum is added to the fresh milk in order to convert milk into curd, the term 'inoculum' here refers to (a) a starter rich in vitamin B12 (b) a starter rich in proteins (c) a starter containing millions of LAB (d) an aerobic digester	**1**
7	 Study the diagram showing the entry of HIV into the human body & the process that follows- i) The human cell in which HIV enters first is macrophage. ii)Reverse transcriptase is the enzyme which viral DNA uses to convert to viral RNA. iii) retrovirus has an envelope enclosing the RNA genome iv)infected cell can survive while viruses are being replicated and released Identify the **<u>incorrect</u>** one from the options given below- a) i&ii b) iii & iv c) only ii d) only iv	**1**
8	Which of the following is/are used in recombinant DNA technology? 1. Agarose gel 2. Restriction endonuclease 3. Plasmid vector 4. Ethidium bromide	**1**

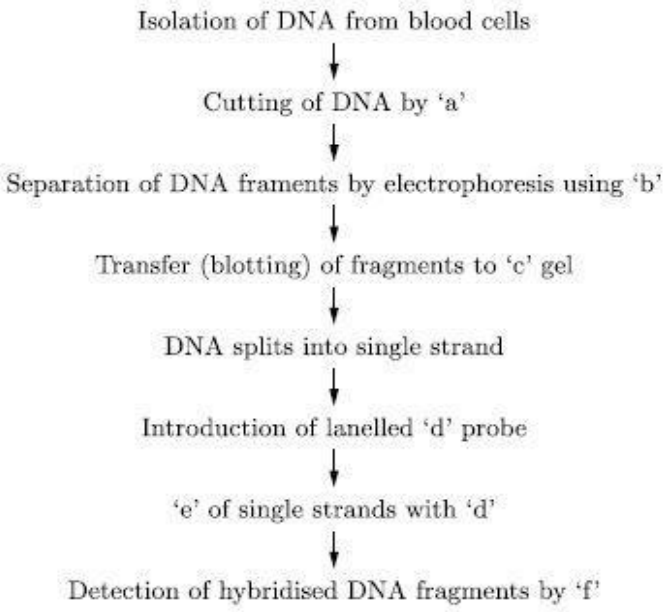
	(a) 1 and 2 (b) 2 and 3 (c) 3 and 4 (d) All of these	
9	For a population that is expanding in size, the following age distribution indicates that**.**  **(**a) The population's birth and death rates are both high. (b) The population's birth and death rates are both low. (c) The population's birth rate is low, but its death rate is high. (d) The population's birth rate is high, but its death rate is low.	**1**
10	For which of the following cases, population density can be easily determined by not utilising biological-entities directly? (a) Fish caught per trap (b) Density of bacteria in bacterial culture (c) population census (d) Tiger census	**1**
11	Plants capture approximately ----------% of the sun's energy while other trophic level capture about ----------% of the energy available to them in their food. (a) 10,1 (b) 1,10 (c) 90,10 (d) 10,90	**1**
12	The active chemical present in *Rauwolfia vomitoria* of Himalayan ranges is- (a) Reserpine (b) Penicillin c) Haemozoin (d) Morphine	**1**
	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:** Agrobacterium tumefaciens is popular in genetic engineering because it spontaneously transfers tumor inducing genes to broad leaf dicot plants. **Reason:** A gene incorporated in the bacterial chromosomal genome gets autonomically transferred to be crop with which the bacterium is associated**.**	**1**
14	**Assertion.** When more than one adaptive radiation appeared to have occurred in an isolated geographical area, one can call this convergent evolution **Reason:** Placental mammals in Australia exhibit adaptive radiation	**1**
15	**Assertion**: Lactational amenorrhea is a natural method of contraception.	**1**

	Reason: Ovulation does not take place during the period of intense lactation followingchildbirth**.**	
16	**Assertion**: Sixth extinction presently in progress different from the previous episode. **Reason**: Difference is in the rate; current species extinction rates are estimated to be 100 to 1000 times faster than in the pre-human times.	**1**
	SECTION: B	
17	(i) Where do the signals for parturition originate from in humans? (ii) Why is it important to feed the newborn babies on colostrum?	**2**
18	Name the genus of baculovirus that acts as a biological control agent despite being a pathogen. Justify by giving three reasons that make it an excellent candidate for the job.	**2**
19	A person had a simple cut in his hand that led to nonstop bleeding. Name the disease & explain the cause.	**2**
20	Name the source organism that possesses *Taq* polymerase. What is so special about the function of this enzyme?	**2**
21	Identify the type of interaction seen in each of the following examples: (i) Ascaris worms living in the intestine of humans (ii) Wasp pollinating fig inflorescence (iii) Clown fish living among the tentacles of sea-anemone (iv) Mycorrhizae living on the roots of higher plants	**2**
	SECTION:C	
22	(a) How does Hardy–Weinberg's expression (p^2+ 2pq + q^2= 1) explain that genetic equilibrium is maintained in a population? (b) List any two factors that can disturb the genetic equilibrium.	**3**
23	When a seed of an orange is squeezed, many embryos, instead of one are observed. Explain the biological process involved. (b) Are these embryos genetically similar or different?Comment.	**3**
24	**Observe the diagram of the first artificial plasmid vector pBR322.**  (i) Expand ori and rop.	**3**

	(ii) How is the coding sequence of β-galactosidase considered a better marker than the ones shown in the diagram? Explain. (iii) Why is it essential to have a 'selectable marker' in a cloning vector? **OR** Richa was doing gel electrophoresis to purify DNA fragments. Given below is the sketch of the observations of the experiment performed by her.  (i) At which end he would have loaded the samples and where? (ii) Analyze the reason for different positions taken up by the DNA bands. (iii) Elaborate the step he would have followed to visualize DNA bands.	
25	Expand the following terms and write one significance with respect to ARTs. (a)ZIFT (b) GIFT (c) ICSI	**3**
26	The graph given below showsspecies area relationship.Study the graph & answer the following- (a) Name the scientist who proposed it. (b) what was his observation? (c) What does'Z'represent? Give a case wherethe slope of the line will be much steeper  	**3**
27	(a)Name the plant source of the drug commonly called 'smack'. How does it affect the body of the abuser? (b)Why do sports person often fall a victim to cocaine addiction?	**3**

28	 Observe the above diagram and answer the following questions- (a) What is this cross known as? Write the genotype of the F_1 generation. (b) Based on the above observations Mendel proposed two general rules. what are these rules? **(c)** When does a geneticist need to carry out the above cross?What ratio did you get from the above cross?	**3**
	SECTION:D	
29	**Read the passage given below and answer the following questions** Acquired immunity, on the other hand, is pathogen specific. It is characterized by memory. This means that our body when it encounters a pathogen for the first time produces a response called primary response which is of low intensity. Subsequent encounters with the same pathogen elicit a highly intensified secondary or anamnestic response. This is ascribed to the fact that our body appears to have memory of the first encounter. (a)Write two characteristics of acquired immunity, other than being pathogen specific. (b)When does a human body elicit an anamnestic response? (c) Name the two types of cells that carry out the immune responses? (d) How do both the cells of our immune system differ from each other in their functions?	**4**

30	 (a) (b) Observe the above diagram and answer the following questions- (i)What do the above pictures 'a' and 'b' illustrate with reference to evolution? **(ii)** How does industrial melanism support Darwin's theory of natural selection? (iii) What are used as good pollution indicators?	**4**
	SECTION: E	
31	(a) Explain the proliferative 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? (c) Explain the events that occur in a graafian folicle at the time of ovulation and thereafter. OR (a) Identify the diagram and label A,B & C. (b) Mention the function of C. (C) Explain the following by giving reasons: (i) Pollen grains are well preserved as fossils. (ii) Pollen tablets are in use by people these days.  	**5**
32	Answer the following questions based on Meselson and Stahl's experiment: (a) Why did the scientists use $15NH_4Cl$ and $14NH_4Cl$ as sources of nitrogen in the culture medium for growing E. coli? (b) Name the molecule(s) that 15N got incorporated into. (c) How did they distinguish between 15N labelled molecules from 14N ones?	**5**

	(d) Mention the significance of taking the E. coli samples at definite time intervals for observations. (e) Write the observations made by them from the samples taken at the end of 20 minutes and 40 minutes respectively. OR (a)The given flow chart highlighting the steps in DNA fingerprinting technique. Identify a, b, c, d, e and f  (b)List any two applications of DNA fingerprinting technique	
33	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? OR (a)A method to present infestation of a nematode *Meloidegyne incognitia* on roots of tobacco is silencing the specific mRNA. What is the scientific name of the technique? How is this performed by ds-RNA? (b) A two years old baby is deficient in his immune system since birth. His father was told that this was due to an enzyme deficiency which is crucial for the immune system to function. i- Name the enzyme and the cause of its deficiency ii-Name the process to cure this disease.	**5**

MARKING SCHEME-1

QUESTIONS	MARKS
C	**1**
B	**1**
A	**1**
D	**1**
C	**1**
C	**1**
C	**1**
D	**1**
D	**1**
D	**1**
B	**1**
A	**1**
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.**	
C	**1**
B	**1**
A	**1**
A	**1**
SECTION: B	
(i) Signals for parturition originate from the fully developed foetus the placenta which induce uterine contractions. This is called foetal ejection reflex. (Any one) (ii) Colostrum contains antibodies (IgA), to (passively) immunize the baby.	**1+1**
(i)Nucleo polyhedron virus	**½x4=2**

(ii)They are species-specific & show narrow spectrum insecticidal applications, show no negative impacts on plants, mammals, birds, fish or even on non-target insects	
Haemophilia Cause-In this disease, a single protein that is a part of the cascade of proteins involved in the clotting of blood is affected	**1+1**
Source organism: Thermus aquaticus The enzyme can tolerate high temperatures and is thus thermostable. It does not get denatured during PCR at high temperature.	**1+1**
(i) Parasitism (ii) Mutualism (iii) Commensalism (iv) Mutualism	**2**
SECTION:C	
(a) (i) Sum total of all the allele frequencies is 1: Let there be two alleles A and a in a population. The frequencies of alleles A and a are p and q, respectively. The frequency of AA individual in a population is p2 and it can be explained that the probability that an allele A with a frequency of P appears on both the chromosome of a diploid individual is simply the product of the probabilities, i.e., p2. Similarly, the frequency aa is q2 and that of Aa is 2pq. p2 + 2pq + q2 = 1, where p2 represents the frequency of homozygous dominant genotype, 2pq represents the frequency of the heterozygous genotype and represents the frequency of the homozygous recessive. (ii) Genetic equilibrium states the status of evolution. If there is some fluctuation or disturbance in genetic equilibrium or Hardy–Weinberg equilibrium, i.e., change of frequencies of alleles in a population then it can predict that evolution is in progress. (b) Factors that affect Hardy–Weinberg equilibrium: (i) Gene migration or gene flow (ii) Genetic drift (iii) Mutation (Any two)	**2+1**
(a) polyembryony-Occurrence of morethan one embryo in a seed is referred as polyembryony. Here some of the nucellar cells surrounding the embryo sac start dividing, protrude into the embryo sac and develop into the embryos. (b)if the polyembryony is due to fertilization of more than one egg,then the formed embryo will not be of same genetic material. but if all the embryo develop directly from diploid cells,then they will have same genetic make up.	**1½x2=3**
(i) ori- origin of replication; rop-proteins for replication of plasmid (ii) The insertion of rDNA into the coding sequence of an enzyme β-galactosidase leads to the inactivation of the enzyme. This is called insertional	**1+1+1**

inactivation. The recombinants do not produce blue-colored colonies in the presence of chromogenic substrate while the nonrecombinants produce a blue color. Thus, coding sequence of β-galactosidase is a better marker. (iii) Selectable markers are essential to identify and eliminate non transformants, by selectively permitting the growth of the transformant. OR (i) He would have loaded the samples near end A, in the wells. (ii) The DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel. Hence, the smaller the fragment size, the farther it moves. (iii) After staining the DNA with ethidium bromide followed by exposure to UV radiations the DNA bands appear colored.	
(a) ZIFT–zygote intra fallopian transfer, The zygote or early embryos (with upto 8 blastomeres) could then be transferred into the fallopian tube (b) GIFT – gamete intra fallopian transfer, Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce one, but can provide suitable environment for fertilisation and further development (c) ICSI- Intra cytoplasmic sperm injection - specialised procedure to form an embryo in the laboratory in which a sperm is directly injected into the ovum	**1+1+1**
(a) Alexander von Humboldt (b) He observed that within a region species richness increased with increasing explored area, but only up to a limit (c) Z= Regression co-efficient very large areas like the entire continents / or for frugivorous (fruit-eating) birds and mammals in the tropical forests of different continents.(any one)	**1+1+1**
(i)latex of poppy plant *Papaver somniferum.* It is a very effective sedative and painkiller, and is very useful in patients who have undergone surgery (ii) It has a potent stimulating action on central nervous system, producing a sense of euphoria and increased energy.	**1+1+1**
(a) Test cross.F_1 Genotype-Ww (b) law of dominance,law of segregation	**1+1+1**

(c) to study the unknown genotype of the parent. ratio =1 : 1.	
SECTION:D	
(a) i-It is characterised by memory of the first encounter with a pathogen. ii-it can differentiate the self cells from non-self cells. (b) when our body encounters a pathogen for the second time. (c)B-lymphocytesandT-lymphocytes (d)B-lymphocytes produce an army of protein called antibodies which fight with the antigens. T-lymphocytes stimulate B-lymphocytes to produce antibodies and they are responsible for cell mediated immunity.	**1x4**
(i)white - winged moth and dark - winged moth in (a) unpolluted/before industrialization (b)polluted/after industrialization (ii) Before industrialisation set in, thick growth of almost white-coloured lichen covered the trees - in that background the white winged moth survived but the dark-coloured moth were picked out by predators. During postindustrialisation period, the tree trunks became dark due to industrial smoke and soots. Under this condition the white-winged moth did not survive due to predators, dark-winged or melanised moth survived.so in a mixed population, those that can better-adapt, survive and increase in population size (iii) Lichen	**1+2+1**
SECTION: E	
(a) During Follicular phase, the primary follicles in the ovary grow to become a fully mature Graafian follicle and simultaneously the endometrium of uterus regenerates through proliferation. These changes in the ovary and the uterus are induced by changes in the levels of pituitary and ovarian hormones . The secretion of gonadotropins (LH and FSH) increases gradually during the follicular phase, and stimulates follicular development as well as secretion of estrogens by the growing follicles. (b) the endometrium of uterus regenerates through proliferation.	**2+1+2**

(b) The ovulation (ovulatory phase) is followed by the luteal phase during which the remaining parts of the Graafian follicle transform as the corpus luteum. The corpus luteum secretes large amounts of progesterone which is essential for maintenance of the endometrium. Such an endometrium is necessary for implantation of the fertilized ovum and other events of pregnancy. During pregnanacy all events of the menstrual cycle stop and there is no menstruation. In the absence of fertilisation, the corpus luteum degenerates. This causes disintegration of the endometrium leading to menstruation, marking a new cycle. **OR** (a) A= Epidermis,B= Endothecium,C= Tapetum (b) to provide nutrition for the developing pollengrains (c) i-The hard outer layer called the exine is made up of sporopollenin which is one of the most resistant organic materialknown. It can withstand high temperatures and strong acidsand alkali. No enzyme that degrades sporopollenin is so farknown. ii- Pollen grains are rich in nutrients. Pollen consumption has been claimed to increase the performance of athletes and race horses.	**OR** **1½+1+2½**
(a) ^{15}N is the heavy isotope of nitrogen and it can be separated from 14N based on the difference in their densities. (b) ^{15}N was incorporated into newly synthesized DNA. (c) The two molecules were distinguished by cesium chloride centrifugation in which these two separated into two different bands at different positions based on their densities. (d) E. coli culture is taken at equal intervals to know the progress of the experiment as generation time of E. coli is 20 minutes. (e) After 20 minutes the culture had an intermediate density showing a band in the middle tube and after 40 minutes, the culture had equal amounts of hybrid DNA and the light DNA showing two bands, one in the center and one at the bottom. **OR** (I)a-restriction endonuclease b- agarose gel c- nitrocellulose membrane d-VNTR e- hybridization f- auto radiography	**1x5** **OR**

(II)Application- paternity /maternity dispute,detection of crimes & legal pursuits,identifying racial group,,to identify genes connected to hereditary diseases(any 2)	**3+2**
Since DNA is a hydrophilic molecule, it cannot pass through cell Membranes. Bacterial cell can be made competent by treating them with a specific concentration of a divalent cation, such as calcium, which increases the efficiency with which DNA enters the bacterium through pores in its cell wall. Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 420C (heat shock), and then putting them back on ice. This enables the bacteria to take up the recombinant DNA **OR** (a)RNAi (RNA interference) Through Agrobacterium vectors, nematode specific genes are introduced into the host plant. The DNA produces both sense and anti-sense RNAin host cells. The two RNA's being complementary form double stranded RNA and silence the specific mRNA. (silencing). **(b)** i.Adenosine deaminase • Defective gene/ deletion of gene that synthesize the enzyme which is hereditary ii. Gene therapy	***1+3+1*** ***1+2*** ***1+1***

CLASS XII

BIOLOGY (044)

Time Allowed: 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.

(b) Wherever necessary, neat and properly labelled diagrams should be drawn.

Section A

1. In a Mendelian dihybrid cross, a garden pea plant heterozygous for violet flowers and round seeds was crossed with another pea plant, homozygous for white flowers and wrinkled seeds. The phenotypic ratio of the progeny would be
   (a) 9: 3:3:1

   (b) 1: 2:2:1

   (c) 1:1:1:1

   (d) 3:1

2. A recombinant plasmid/DNA bearing tetR gene is introduced into E.coli cells (host cells). When these host cells are grown on a medium containing tetracycline
   (a) transformants will grow, but non-transformants will die

   (b) recombinants will die and non-recombinants will grow

(c) both recombinants and non-recombinants will grow

(d) both recombinants and non-recombinants will die

3. Which of the following is not a characteristic of humus?
   (a) It is a dark coloured amorphous substance formed from the simplified detritus.

   (b) Being colloidal in nature it serves as a nutrient reservoir.

   (c) It is highly resistant to microbial action and undergoes a very slow decomposition.

   (d) It undergoes degradation in a process, called humification.

4. Cleistogamous flowers are invariably autogamous because
   (a) they are bisexual flowers, which do not open at all.

   (b)they are bisexual and open flowers.

   (c)they are unisexual.

   (d)their stigma matures before anthers dehisce.

5. In the diagrammatic sectional view of a human ovary given above, identify the following with their corresponding labels.
   (i) Corpus luteum

   (i) Antrum

   (iii) Graafian follicle

   Select the correct option

   (a) (i) - (D), (ii) - (B), (iii) - (A)

   (b) (i) - (D), (ii) - (B), (iii) - (B)

   (c) (i) - (A), (ii) - (B), (iii) - (C)

   (d) (i) - (D), (ii) - (A), (iii) - (E)

6. The mediterranean orchid, Ophrys employs (1)____ and it is a case of (2)

   (a) 1. sexual deceit, 2. commensalism

   (b) 1. sexual deceit, 2. amensalism

   (c) 1. wasps, 2. commensalism

(d) 1. sexual deceit, 2. mutualIdentify the correct statements about eukaryotic transcription and select the correct option.

- RNA polymerase I transcribes rRNAs
- RNA polymerase II transcribes hnRNA
- Transcription can be coupled to translation.
- RNA polymerase III transcribes mRNA
- hRNA has to undergo splicing, capping and tailing to become the functional mRNA.
- The primary transcripts of RNAs have both exons and introns.

(a) A, B and D

(b) A, B, C and F

(c) A, B and E

(d) A, B, E and F

8. In humans, the opioid receptors are present in the
   (a) central nervous system

   (b) gastrointestinal tract

   (c) urinogenital tract

   (d) both (a) and (b)

9. Select the incorrect statement(s) from among the following.
   (a) Flocs are the mesh-like structures formed by masses of bacteria associated with fungal hyphae.

   (b) Secondary treatment of sewage is a physico-chemical process.

   (c) Free-living cyanobacteria like Azospirillum enrich the nitrogen content of the soil.

   (d) both (b) and (c).

10. Meloidegyne incognitia is a A that infects B
    (a) A. bacterium, B. leaves of tobacco

    (b) A. nematode, B. roots of tobacco

    (c) A. bacterium, B. cotton balls

    (d) A. nematode, B. leaves of tobacco

11. Caterpillars on brassicas can be controlled by
    (a) Trichoderma sp.

(c) Bacillus thuringienesis

(b) Nucleopolyhedrovirus

(d) Agrobacterium tumefacierns

12. Analogous structures are the result of
(a) stabilising selection

(b) divergent evolution

(c) convergent evolution

(d) disruptive selection

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

- Both A and R are true and R is the correct explanation of A.
- Both A and R are true and R is not the correct explanation of A.
- A is true but R is false.
- A is False but R is true.

13. Assertion (A): During gel electrophoresis, DNA moves towards the anode.
Reason (R): DNA is positively charged.

14. Assertion (A): In vasectomy, the sterilisation method for males, a small part of the vas deference is removed or tied up.
Reason (R): This technique is highly effective, but its reversibility is very poor.

15. Assertion (A): All animals are consumers and are heterotrophs.
Reason (R): Animals depend on plants either directly or indirectly for their food needs.

16. Assertion (A): Thalassemia is an autosomal recessive disorder.
Reason (R): Thalassemia is caused by deletion, mutation of one or more alleles of two closely-linked genes on chromosome 16.

Section B

17. Write the effect of high concentration of LH on a mature Graafian follicle.

18. Explain pleiotropy with an example.

19. Name the following:
- The vector of dengue fever.

- A vaccine produced by recombinant DNA technology.
- The type of immunity that is present at the time of birth.
- A fish that helps in eradication of mosquito larvae.

20. Explain the defense mechanisms evolved in preys to avoid overpopulation of their predators.

Or

- What is the mission of Ramsar Convention?
- Name the invasive fish introduced into Lake Victoria that caused extinction of a unique assemblage of another fish species. Name the fish species that became extinct.

21. Explain the role of selectable markers in pBR 322.

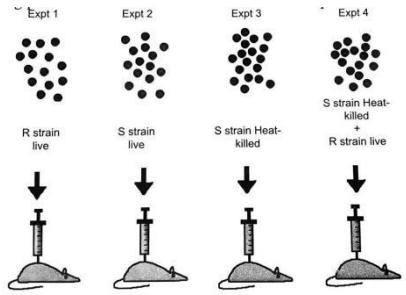
Section C

22. (a) Draw a neat diagram of L.S. of an embryo of grass and label any four parts.
(b) Why do hybrid seeds have to be produced year after year by artificial hybridization?

23. Oogenesis is the process of formation of a mature female gamete. Answer the following questions with respect to oogenesis.
    - At what stage of cell division, cells remain arrested in the ovary of a female till puberty? Name these cells.
    - What happens to this cell in the tertiary follicle? Name the cells formed as a result in the tertiary follicle from this cell.

24. In 1928, Frederick Griffith conducted a series of experiments on bacterial transformation using the bacterium causing pneumonia as illustrated below. Answer the questions that follow:
- Write the scientific name of the bacterium that causes pneumonia.
- In which of the four experiments did the mouse die?
- Differentiate between R strain and S strain of the bacterium.

25. (a) Name the source organism of crylAb gene and its target pest.
(b) List any four ways by which GMO's have been useful for enhanced crop output.



26. (a)Draw a neat labelled diagram of *lac* operon in its 'switched on' position of the lac operon.

(b) What does i refer to in 'i gene? When does it express? Explain how it regulates this operon.

Or

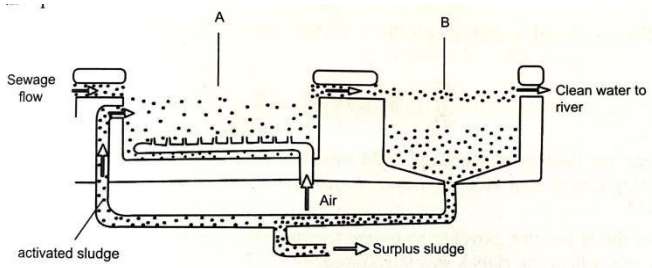
(a) Who proposed an adapter molecule for the flow of genetic information? Name the molecule.

(b) (i) Why is it called an adapter molecule?

(ii) Why is it necessary?

(c)What is ribozyme? Mention its function.

27. Carefully observe the image given below that illustrates secondary treatment of sewage water and answer the questions.



(a) Name the labels A and B in the diagram shown.

(b) Why is air pumped through A? When is the effluent passed from A to B?

(c) What is activated sludge and how is the surplus sludge further treated?

28. (a) Give two examples of defence mechanisms that prey species of animals have evolved against predators.

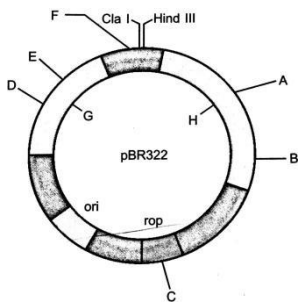
(b) Name the type of interaction seen in each of the following.

(i) Ascaris worms living in the intestine of human.

(ii) Insects feeding on plant sap.

(iii) Glomus living on the roots of higher plants.

(iv) Clown fish living among the tentacles of sea anemone.



Section D

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

29. We know that plasmids and bacteriophages are the most commonly used vectors in biotechnology experiments. If we can link an alien piece of DNA to the plasmid DNA, the alien DNA can be multiplied equal to the copy number of the plasmid. Engineered vectors are used these days. Study the diagram of the E.coli cloning vector pBR322 and answer the questions that follow

    (a) Why are plasmids and bacteriophages used as cloning vectors?

    (b) Identify:

        (i) the gene in the cloning vector that controls the copy number of the vector and

        (ii) the restriction site C in the 'rop' gene.

    (c) Identify and name two selectable markers shown in the diagram. Why are they used as selectable markers in the E.coli cloning vector

    OR

    (c) Name two restriction sites each in the two genes you have identified as selectable markers.

30. Refer to the figures given below and answer the question that follow:

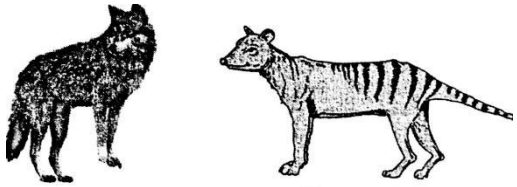
    (a) Name the specific geographical region, where these animals share the same habitat.

    (b) Compare and contrast the two animals shown

(c) Explain how these two different groups of mammals have come to live in the habitat.

Or

(c) Name four animals that have evolved along with Tasmanian wolf from the same ancestor.

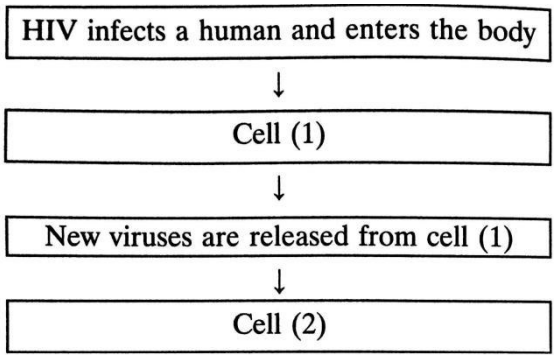


Wolf Tasmanian wolf

Section E

31. (a) Draw a labelled sketch of a typical biogas plant.
(b) Name a free-living and a symbiotic bacterium that serve as biofertilisers. Why are they so called?

OR

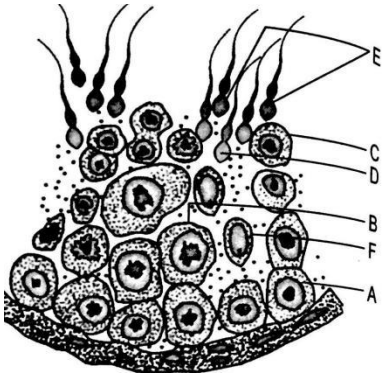


(a) Write the full form of the disease caused by HIV infection in humans.

(b) Name the cell (1) where HIV enters after entering the human body. Mention the events that occur in it in the form of a flow chart. Does this cell (1) survive after the release of the viruses?

(c) Name the cell (2) the new viruses enter. Does this cell survive after the viral attack?

32. What is the inheritance pattern observed in the size of starch grains and seed shape of Pisum sativum? Work out the monohybrid cross showing the above traits. How does this pattern of inheritance deviate from that of Mendelian law of dominance?



OR

Enlist the salient features of the double-helix structure of DNA.

33. Each testicular lobule in a human testis contains one to three highly coiled seminiferous tubules, where sperms are produced. Each seminiferous tubule is lined on its inner side by two types of cells-the spermatogonia and Sertoli cells. The diagram given below shows an enlarged view of a section of a human seminiferous tubule, showing the various stages of spermatogenesis.

(a) Identify and name the cells) which undergo(es) spermatogenesis.

(b) Name the cell F and mention its function.

(c) Identify and name the cells which have 92 chromatids in them

(d) Identify and name the cell(s) which undergo(es)

(i) meiosis I (ii) meiosis II

(e) Name and define the process, which the cell D undergoes.

OR

(a) How is artificial hybridisation considered a crop improvement programme?

(b) Explain the process of artificial hybridisation, if

(i) female parent bears bisexual flowers.

(ii) female parent bears unisexual flowers.

CLASS XII-CBSE RATIONALISED SAMPLE QP (2023-24) ANALYSIS

S.No.	UNIT/CHAPTER NAME	Sec-A OBJECTIVE/ARQ (1 Mark) 16 x 1 = 16	Sec-B SA-I 2 Marks 5x 2 = 10	Sec-C SA-II 3 Marks 7x 3 = 21	Sec-C CBQs 4 Marks 2x4 = 8	LA 5 Marks 3 x 5 = 15	Total
VI	**REPRODUCTION- 16 MARKS**						
1	Sexual Reproduction in flowering plants	3 (Q.NO.1,2,13)					16
2	Human Reproduction		2 (Q.NO.17)	6 (Q.NO.22,23)			
3	Reproductive health					5 (Q.NO.31)/ SAME CHAPTER	
VII	**GENETICS AND EVOLUTION-20 MARKS**						
4	Principles of Inheritance	3(Q.NO.4,7,8)	2 (Q.NO.18)	3 (Q.NO.24)		5 (Q.NO.32)	20
5	Molecule basis of Inheritance	2 (Q.NO.3,14)				Q.NO.32 EITHR OTHER QUESTION	
6	Evolution	2 (Q.NO.5,6)		3 (Q.NO.25)			
VIII	**BIOLOGY IN HUMAN WELFARE-12 MARKS**						
7	Human health and disease	1 (Q.NO.15)	2 (Q.NO.19)			5 (Q.NO.33)/ SAME CHAPTER	12
8	Microbes in Human welfare	1 (Q.NO.9)		3 (Q.NO.26)			
IX	**BIOTECHNOLOGY-12 MARKS**						
9	Biotechnology principles and processes	2 (Q.NO.10, 16)	2 (Q.NO.20)		4 (Q.NO.29-a), b) & c)		12
10	Biotechnology & its application	1 (Q.NO.11)		3 (Q.NO.27)) / SAME CHAPTER			
X	**ECOLOGY-10 MARKS**						
11	Organism and populations				4 (Q.NO.30-a),b) & c)		10
12	Eco system	1 (Q.NO.12)	2 (Q.NO.17)/ SAME CHAPTER				
13	Biodiversity & Conservation			3 (Q.NO.28)			
	TOTAL	**16 (12+4)**	**10**	**21**	**8**	**15**	**70**

NOTE

1. **/-Either or question**
2. **Outside the brackets indicates total marks and inside the brackets indicates no. of question(s)**
3. **Overall no deviation found between unit-wise mark weightage and SQP.**

COMPILED BY

Dr. SRIDHAR R *M.Sc., M.Sc., CLTC, CRTI, M.Ed., M.Phil., Ph.D.*

PGT IN BIOLOGY

SAMPLE QUESTION PAPER
Class –XII
BIOLOGY(044)

M.M. 70 **Duration: 3 Hrs**

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 labelled diagrams should be drawn.

SECTION-A

1.How many male gametes are present in 3 celled stage pollen grain –
a) one b) two c)three d) infinite

2. The role of polar bodies is-
a) maintain the no. of chromosomes in the ootid
b)prevent polyspermy
c)release progesterone
d) all the above

3. Identify the figure i,ii,iii,iv in the given pedigree chart-

a) affected individual, mating between male and female, monozygotic identical female, monozygotic non identical male and female
b) mating between male and female, affected individual, monozygotic identical female, monozygotic identical male and female
c) affected individual, monozygotic identical female, monozygotic identical male and female, mating between male and female,
d) mating between male and female, monozygotic identical female, monozygotic identical male and female, affected individual

4. For MN blood group system, the frequencies of M and N alleles are 0.7 and 0.3 respectively. The expected frequency of MN blood group bearing organisms is likely to be-
a) 42% b)49% c)9% d) 58%

5. Ig E is released during-
a) allergy
b) colostrum secretion
c)tear formation

d) none

6. By which method detection of hybridized DNA fragments is possible-

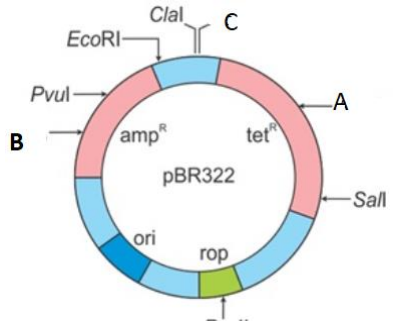
a) electrophoresis

b) southern blotting

c)Northern blotting

d) auto radiography

7. Name the regions A,B,C in the given pBR 322-



a) Pst ,ampicillin^r ,BamHI

b) BamHI,Pst I,Hind III

c) ampicillin^r ,BamHI,ori

d) Pst I,Hind III,BamHI

8. For what purpose human protein α-1anti trypsin is used in medical field-

a) to treat diabetic

b) to remove clot

c) immunosuppressive agent

d) to treat emphysema

9. If a population of 50 paramecium present in a pond increases to 150 after an hour,what would be the growth of population ?

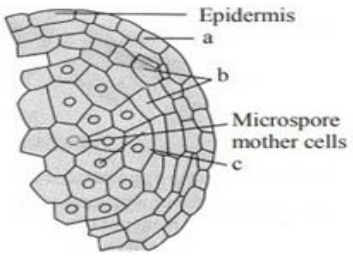
a) 50 per hour

b) 200 per hour

c) 5 per hour

d) 100 per hour

10. The given diagram shows microsporangium of a mature anther. Identify A,B and C –



a) epidermis ,endothecium, middle layer

b) endothecium,middle layer, microspore mother cell

c) middle layer, microspore mother cells, tapetum

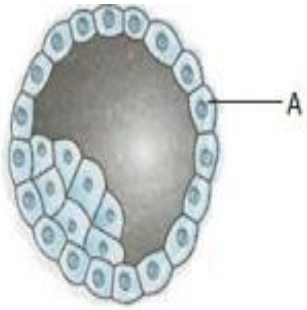
d) epidermis ,endothecium,tapetum

11. which of the following represent XOtype of sex determination-

(a)lizard

(b) human
(c) grass hopper
(d)earth worm

12. Identify the part of Blastocyst labelled as “A”



(a)inner cell mass
(b) Morula
(c)Epidermis
(d)Trophoblast

Assertion based question

13. assertion: cross pollination results in healthy and stronger off spring.
Reason: Due to phenomenon of hybrid vigour.
14. Assertion:The endosperm of angiosperm is generally triploid (3n).
Reason: it develops from primary endosperm nucleus formed by the fusion of haploid male gamete and diploid secondary nucleus.
15. Assertion : sickle cell hemoglobin has a valine in place of glutamic acid at position six in the beta polypeptide chain.
Reason: sickle cell anemia is expressed only in homozygous recessive state .
16. Assertion: interferons help to eliminate viral infection.
Reason: It is released by infected cells, reach the nearby uninfected cells and make them resistant to viral infection.

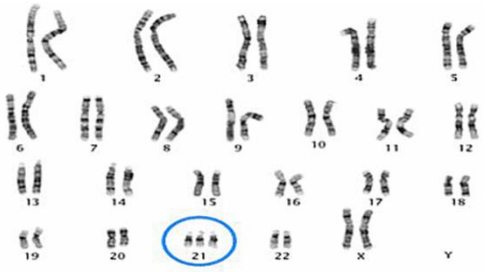
SECTION B

17. (a) List the two methodologies which were involved in human genome project.
(b) Expand 'YAC' and mention what was it used for.
18.During a field trip, one of your friends in the group suddenly became unwell, she started sneezing and had trouble in breathing. Name and explain the term associated with such sudden responses. What would the doctor recommend for relief?

OR

Explain the primary and secondary immune responses produced by our body. Name the type of antibody: (i) Present in the colostrum of mother, and (ii) That is produced in response to an allergy.

20. During a study an infant's karyotype was found to possess an extra chromosome (autosome). Name the disorder which an infant is suffering from? Describe the symptoms the child is likely to develop later in the life.



21. Not all hydrophytes are pollinated by water. Justify by giving two examples.

22. Write any four ways used to introduce a desired DNA segment into a cell in recombinant DNA technology experiments.

SECTION –C

23. The bacterium *Bacillus thuringiensis* produces a toxic protein called "cry protein". That protein is lethal to certain insects, but not to bacteria.

a) Why does not this toxin kill bacteria?

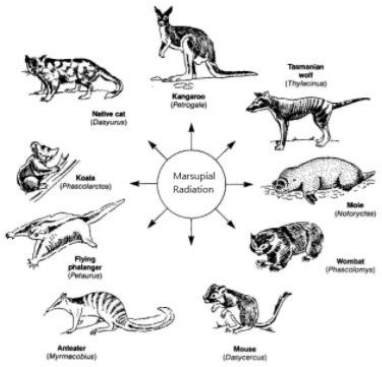
b) After consuming this protein, what type of changes occur in the gut of insects?

c) How did humans use this protein for their benefit?

24. a) Mention the specific geographical region where these organisms are found.

b) Name and explain the phenomenon that has resulted in the evolution of such diverse species in the region.

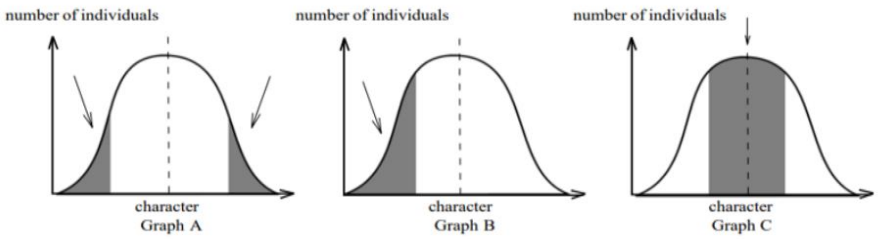
c) Explain giving reasons the existence of placental wolf and Tasmanian wolf sharing the same habitat.



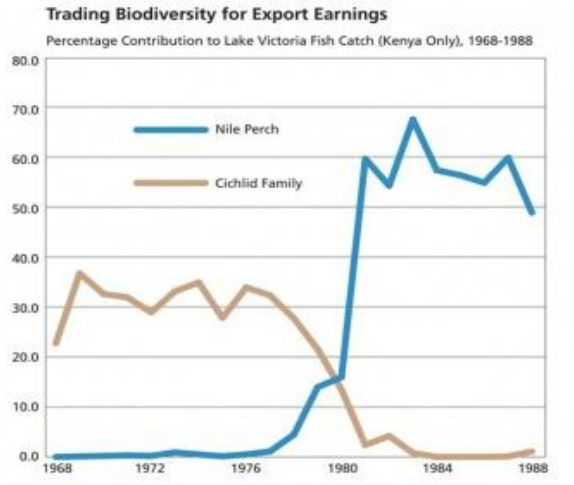
25. The graphs below show three types of natural selection. The shaded areas marked with arrows show the individuals in the population which are not selected. The dotted vertical lines show the statistical means.

a) What names are given to the types of selection shown in graphs A, B and C.

b) After the selection has operated for several generations in the above populations indicated as Graph A, B and C, graphically illustrate the probable results.



26.a. What kind of biodiversity loss is exhibited by the given graph?
b. Give another example of this kind of biodiversity loss seen in plants.
c. What can be done to prevent it?

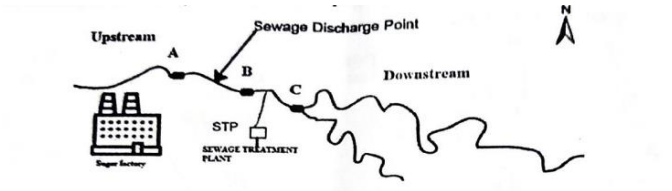


27. Darwin found the varieties of finches that in Galapagos Islands and observed variations in them.

i) What is adaptive radiation?

ii) How do Darwin's finches illustrate adaptive radiation?

28. Water samples were collected at points A,B and C in a segment of a river near a leather 3 factory and tested for BOD level. The BOD levels of samples A,B and C were 500 mg/l, 540 mg/1 and 25 mg/l respectively. What is the indicative of? Explain why the BOD level gets reduced considerably at the collection point C?



29. i) What is Biopiracy?
ii)What is GEAC and what are its objectives?

OR

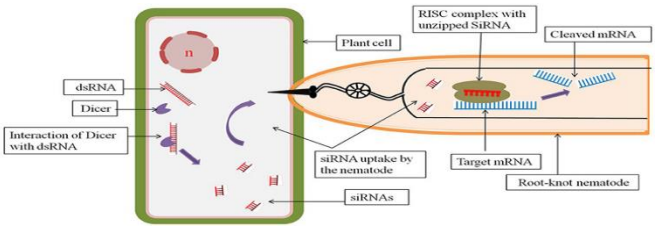
Biotechnology has emerged as an offshoot of modern Biology, It is the science that deals with the techniques of using living organisms or enzymes from organisms to produce products and processes useful to humans.

i) Name the group of enzymes used as key tool in Biotechnology?

ii) Describe the process by which a bacterial cell can be made competent to take up foreign DNA from its surroundings.

SECTION –D

30.

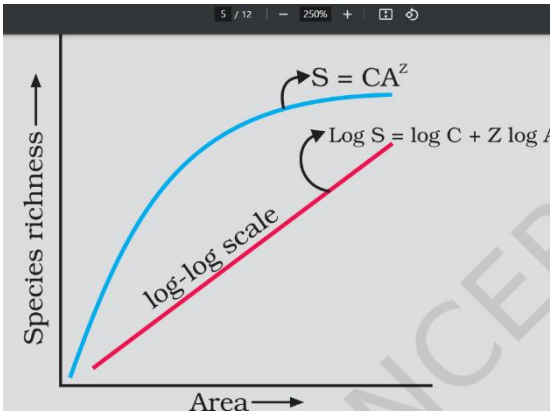


1. What phenomenon is expressed by the above diagram. (1)
2. What organism is targeted and what does the rectangular box signify? (1)
3. How is this method used to protect the crop yield? (2)

Or

Write the role of Dicer in this phenomenon.

31. The following graph shows the species-area relationship. Answer the following questions as directed.:



(i) Who studied the kind of relationship shown in the graph? (1)

(ii) In the species-area relationship, 'Z' represents. (1)

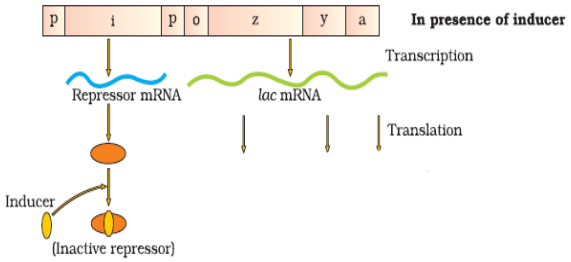
(iii) What is value of 'Z' regardless of the taxonomic group or the region and give one example? (2)

Or

(iv) What is the value of Z in species-area relationships among very large areas and give one example?

SECTION –E

32. **Study the figure given below and answer the questions.**



(a) What does the figure express?

(b) When does the transcription of lac mRNA stop?

(c) Name the enzymes transcribed by the genes 'z' and 'a'.

OR

Given below is a DNA sequence and the genetic code. Answer the questions based on these, assuming no post-transcriptional or post-translational modifications will take place. - TACATGCCGTACTGTACC -

First position	Second position U	Second position C	Second position A	Second position G	Third position
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gin	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gin	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

(a) Write the nucleotide sequence that will be obtained on transcription of this DNA sequence.

(b) Will translation of this sequence take place? Give a reason to support your answer.

(c) What is the amino acid sequence that will be formed? Identify the sequence of the first tRNA.

(d) If the first guanine base in the DNA sequence gets replaced by thymine, how will the amino acid sequence change?

(e) Name and describe the mutation that occurred in (d).

33.(a) Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify.

(b) Give an example of a bacterium, a fungus and an insect that are used as biocontrol agents.

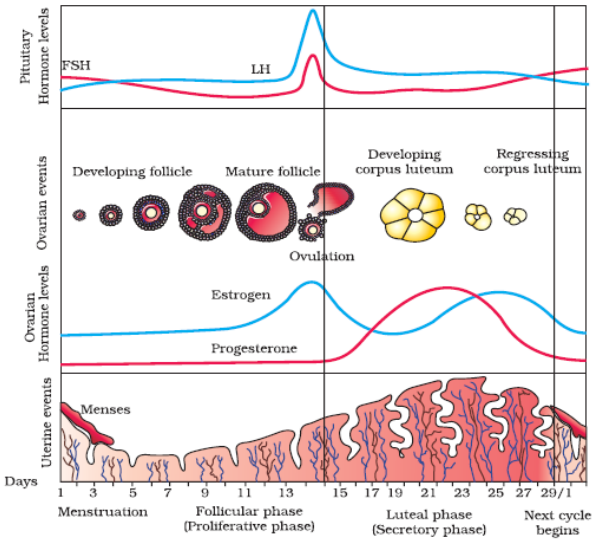
Or

(i)What is activated sludge in a sewage treatment tank? How is this activated sludge used?

(ii)Expand the term BOD and give the meaning of it.

(iii) How does *Anabaena* and mycorrhiza act as biofertilisers?

34. Study the image given showing the menstrual cycle in female and answer the following questions:



a) What is the period of menstruation?

b) On which day does ovulation occur during menstrual cycle?

c) During which period is corpus luteum active during menstrual cycle? Which hormones are secreted by corpus luteum ?

d) In menstrual cycle which reproductive organs undergo changes?

e) Which period is said to be period of regeneration of endometrium?

f) Which period is said to be period of secretions of glands in the endometrium?

OR

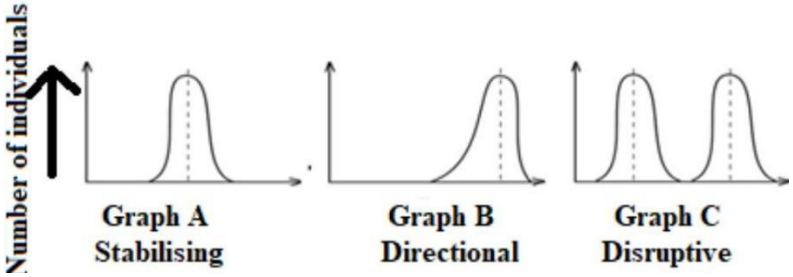
a) Draw diagrammatic sectional view of seminiferous tubule.

b) Explain how male germ cells lead to formation of four spermatids? Mention the role of Sertoli cells.

KENDRIYA VIDYALAYA SANGTHAN,

SECTION -A		
S. NO.	**EXPECTED ANSWER**	**VALUE POINTS**
1	b	1
2	a	1
3	a	1
4	a	1
5	a	1
6	d	1
7	B	1
8	D	1
9	D	1
10	D	1
11	C	1
12	D	1
13	A	1
14	A	1
15	b	1
16	a	1
	SECTION B	
17	(a) i) Expressed Sequence Tags ii) Sequence Annotation (b) Yeast Artificial Chromosome, used as cloning vectors (cloning / amplification)	½+½+½ + ½
18	Ans. (a) Allergy, the exaggerated response of the immune response to certain antigens present in the environment is called allergy. (b) Doctors would administer drugs like antihistamines, adrenaline and steroids (any one) to reduce the symptoms. OR. Primary response is a low intensity response shown by the body when it encounters the pathogen for the first time. Secondary response is a high intensity response withrepeated (subsequent) exposure to the same pathogen. (i) Ig A (ii) Ig E	1+1 1+½+½
19	Infant is suffering from Down's syndrome. He will show the following symptoms: i) The affected individual is short statured with a small round head, ii) Furrowed tongue and partially open mouth. iii) Palm is broad with characteristic palm crease. iv) Physical, psychomotor and mental development is retarded. (Any Three)	½+½+½ + ½
20	All hydrophytes are not pollinated by water. Those hydrophytes whose flowers emerge above the surface of water are pollinated by insects or wind, e.g., water hyacinth and water lily are pollinated by insects	1+½+½

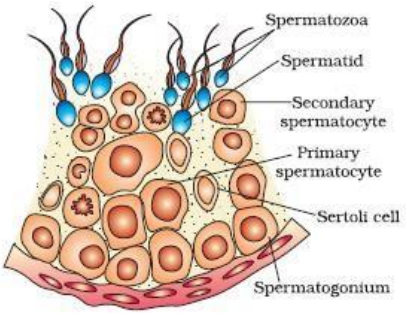
21	The four ways used to introduce a desired DNA segment into a cell in recombinant DNA technology experiments: i) micíoinjection ii) disaímed pathogen vectoís iii) tíeatment of host cell by bivalent cation such as calcium iv) biolistic oí gene gun	½*4
	SECTION C	
22	a) Protoxin is produced in an inactive form. b) This protoxin, in the presence of alkaline pH in the intestine of insects. The toxin	½+1½+1

	binds to the surface of the midgut of the insect that induces pore formation, swelling, and cytolysis, eventually leading to death. c) Isolation of specific Bt toxin genes from *Bacillus thuringiensis* and its integration into several crops such as cotton and corn that are pest-resistant to specific insects.	
23	a) Australia b) Adaptive Radiation: The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitat) is called adaptive radiation c) (Convergent evolution / Adaptive Convergence) Organisms coming from different stock, evolved similar features and adapted to same habitat	½+1½+1
24	a) A -stabilizing; B - directional; C - disruptive; b) Graph A – Stabilizing Graph B – Directional Graph C – Disruptive  	1½+1½
25	1. Alien species invasion 2. Carrot grass (*Parthenium*), *Lantana* and water hyacinth (*Eicchornia*). 3. Any logical reason	1+1+1
26	1) The process of evolution of different species in a given geographical urea starting from a point and literally radiating to other area of geography(habitats) ii) Many varieties of finches in the same island, all varieties had evolved from original seed eating finches, with alteration in beaks enabling them to become insectivorous and vegetarian finches.	1+2
27	At collection points A and B, the BOD level is high due to high organic pollution 3 caused by leather factory and sewage discharge At the collection point C, the water was released after secondary treatment. Vigorous growth of flocs consume the major part of the organic matter present in the river water due to leather factory and sewage discharge.	**3**
28	1) Biopiracy is the use of bioresources by organisations without proper authorisation from the countries and people concerned without compensatory payment. ii) GEAC- Genetic Engineering Approval Committee, Examine the validity of GM research and inspect the safety of introducing GM for public services. i) Restriction enzymes OR	**3**

	ii) Treated with specific concentration of a divalent cation such as calcium to increase the pore size in the cell wall, rDNA can then forced in to such cells by incubating the cells with rDNA on ice, followed by placing thern at 42°C(heat shock) and then placing them back on ice	

29	1. RNA Interference 2. Nematode, tobacco plant cell 3. The function of RNA interference is to silence or deactivate specific RNA. The process is initiated by the presence of short segments of double-stranded RNA (dsRNA). This dsRNA is further processed by the DICER enzyme into short interfering RNA (siRNA). Or Dicer is produced when dsRNA is produced inside the cell. It interacts with the dsRNA and cut the dsRNA into small fragments which leads to silencing of pest mRNA.	1 1 2
30	(i) Alexander von Humboldt studied the relationship shown in the graph. (ii) In the species-area relationship, Z represents regression coefficient. (iii)Ecologists have discovered that the value of Z lies in the range of 0.1 to 0.2, regardless of the taxonomic group or the region whether it is the plants in Britain, birds in California or molluscs in New York state, the slopes of the regression line are amazingly similar. Or The species-area relationships among very large areas (continents), will give a much steeper slope and Z values in the range of 0.6 to 1.2. For example, for frugivorous (fruit-eating) birds and mammals in the tropical forests of different continents, theslope is found to be 1.15.	1+1+2
	SECTION E	
31	a) Lac Operon (Inducible Operon). b) In presence of an inducer (such as lactose or allolactose), the repressor is inactivated by interaction with the inducer. Transcription of lac mRNA stops when the repressor of the operon is synthesized from the i gene. The repressor protein binds to the operator region of the operon and stops transcription. (c) The gene 'z' codes for beta-galactosidase and the gene 'a' code for transacetylase. OR (a) - AUG UAC GGC AUG ACA UGG - (b) Yes - since the mRNA begins with a start codon. (c) MET-TYR-GLY-MET-THR-TRP. First tRNA sequence is UAC. (d) Only methionine will remain in the amino acid sequence as the second codon will get converted to a stop codon. [No marks to be awarded if stop codon is not mentioned]. (e) **Point mutation** - guanine is getting converted to another base, thymine, resultingin the loss of the gene.	1+3+1 1+1+1+1+1

	a) Holistic approach that seeks to develop an understanding of the webs of interaction between the myriad of organisms that constitute the field fauna and flora. The organic farmer holds the view that the eradication of the creatures that are often described as pests is not only possible, but also undesirable, for without them the beneficial predatory and parasitic insects which depend upon them as foodor hosts would not be able to survive.	

32	Thus, the use of biocontrol measures will greatly reduce our dependence on toxic chemicals and pesticides. An important part of the biological farming approach is to become familiar with the various life forms that inhabit the field, predators as well as pests, and also their life cycles, patterns of feeding and the habitats that they prefer. This will help develop appropriate means of biocontrol. *b)* Bacteria – *Bacillus thuringiensis* Fungus – *Trichoderma* Insect – Ladybird / Dragonfly / Moth or any other correct example OR i) Once that BOD of sewage water is reduced significantly, the effluent is passed into a settling tank where aerobic bacterial flocs undergo sedimentation and is called activated sludge. A small part of the activated sludge is pumped into an aeration tank as inoculum for the treatment of sewage water ii) Biochemical Oxygen Demand: - The amount of oxygen required for microorganisms to break organic content present in one litre of water. iii) *Anabaena* fixes atmospheric nitrogen and Mycorrhiza absorbs phosphorus from soil and passes it to the plant.	3½+1½ 2+1+2
33	a) 1 to 5 days b) 14th day c) The Corpus luteum is active till the 28th day of the menstrual cycle. During this time if there is no union of sperm and ovum, the corpus luteum degenerates. Corpus luteum secretes estrogen and progesterone. d) The ovary and uterus changes during menstrual cycle. e) In the menstrual cycle, days 5 to 14 are the period of regeneration of the endometrium. f) The period of secretions of glands in the endometrium is 15 to 28 days. **OR** a)  b) i) In testis, the immature male germ cells (spermatogonia) produce sperms by spermatogenesis that begins at puberty. ii) The **spermatogonia** (sing. spermatogonium) present on the inside wall of seminiferous tubules multiply by mitotic division and increase in numbers. Each spermatogonium is diploid and contains 46 chromosomes. iii)Some of the spermatogonia called **primary spermatocytes** periodically undergo meiosis. A primary spermatocyte completes the first meiotic division (reduction division) leading to formation of two equal, haploid cells called **secondary**	½+½+1 +1 +1+1 3+2

	spermatocytes, which have only 23 chromosomes each. b) The secondary spermatocytes undergo the second meiotic division to produce four equal, haploid **spermatids**. The spermatids are transformed into spermatozoa (sperms) by the process called **spermiogenesis**.	