DESIGN OF THE QUESTION PAPER
BIOLOGY-CLASS XII

Time : 3 Hrs. **Max. Marks : 70**

The weightage of the distribution of marks over different dimensions of the question paper shall be as follows:

A. Weigthtage to content/subject units

Units	Content	Marks
1.	Sexual reproduction	12
2.	Genetics and evolution	20
3.	Biology and human Welfare	12
4.	Biotechnology and its applications	12
5.	Ecology and environment	14
	Total	**70**

B. Weightage to different form of questions

S. No.	Form of Questions Questions	Marks for each	No. of	Total Marks
1.	Very Short Answer (VSA)	1	8	08
2.	Short Answer (SAII)	2	10	20
3.	Short Answer (SAI)	3	09	27
4.	Long Answer (LA)	5	3	15
	TOTAL	**-**	**30**	**70**

C. Scheme of Options

1. There will be no overall option.
2. Internal choices (either/or type) on a very selective basis has been provided. This choice has been given in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage.

D. Weightage to difficulty level of questions.

S.No.	Estimated difficulty level	Percentage
1.	Easy	15
2.	Average	70
3.	difficult	15

About 20% weightage has been assigned to questions testing higher order thinking skills of learners.

Blue Print I
Biology
Class XII

S.No.	Type of Questions ⟶ ↓ Units	VSA (1 mark)	SA II (2 marks)	SA I (3 marks)	LA (5 marks)	Total -
1.	Sexual Reproduction	2 (2)	2 (1)	3 (1)	5 (1)	12 (5)
2.	Genetics and Evolution	2 (2)	4 (2)	9 (3)	5 (1)	20 (8)
3.	Biology and Human Welfare	1 (1)	8 (4)	3 (1)	_	12 (6)
4.	Biotechnology and its applications	1 (1)	2 (1)	9 (3)	_	12 (5)
5.	Ecology and Environment	2 (2)	4 (2)	3 (1)	5 (1)	14 (6)
	Total	8 (8)	20 (10)	27 (9)	15 (3)	**70 (30)**

SAMPLE QUESTION PAPER-I
XII - BIOLOGY

Time : 3 Hours **Max. Marks : 70**

GENERAL INSTRUCTIONS :

(i) *All questions are compulsory.*

(ii) *The question paper consists of four sections A, B, C and D. Section-A contains 8 questions of 1 mark each, Section B is of 10 questions of 2 marks each, Section C has 9 questions of 3 marks each whereas Section D is of 3 questions of 5 marks each.*

(iii) *There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.*

(iv) *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

SECTION - A

1. Why do internodal segments of sugarcane fail to propagate vegetatively even when they are in contact with damp soil? 1

2. Mention any two probable reasons for rapid rise of population in our country from about 350 million at the time of independence to about 1 billion by the year 2000. 1

3. The gene I that controls the ABO blood grouping in human beings has three alleles I^A, I^B and i.
(a) How many different genotypes are likely to be present in the human population?
(b) Also, how many phenotypes are possibly present? 1

4. State any one reason to explain why RNA viruses mutate and evolve faster than other viruses. 1

5. Mention any two measures for prevention and control of alcohol and drug abuse among adolescents. 1

6. What would be the impact on the environment around a thermal power plant if its electrostatic precipitator stops functioning? Give a reason. 1

7. Why is thermoregulation more effectively achieved in larger animals than in smaller ones? 1

8. A plasmid and a DNA sequence in a cell need to be cut for producing recombinant DNA. Name the enzyme which acts as molecular scissors to cut the DNA segments. 1

SECTION B

9. Even though each pollen grain has two male gametes, why are at least 10 pollen grains and not 5 pollen grains required to fertilise 10 ovules present in a particular carpel? 2

10. When a red flowerd *Antirrhinum* plant was crossed with a white flowered *Antirrhinum* plant, the F_1 - offspring had pink flowers. Mention (a) the genotype of F_1 plant and (b) the reason why it did not bear the parental red or white flower colours? 2

11. Draw schematically a single polynucleotide strand (with at least three nucleotides). Provide labels and directions. 2

OR

Choose and rearrange any four of the following groups of plants in an ascending evolutionary scale.

Cycads; Gnetales; Monocotyledons; Rhynia-like plants; Cholorophyta ancestors; Dicotyledons; and Seed ferns. 2

12. Fill in the blanks in the different columns of the table given below: 2

Disease	**Causal organism**	**Medium of Transfer**	**Symptoms**
Filariasis	*Wuchereria*	a	Lymphatic vessels of lower limbs affected
b	*Trichophyton*	Using towels of infected person	Dry, scaly lesions on body
Common cold	c	Droplets from Sneezing of infected persons	Affect nose, and respiratory passage, sore throat
Ascariasis	*Ascaris*	Through contaminted water, vegetables and fruits	d

13. In which parts of the body of the hosts do the following events in the life cycle of *Plasmodium* take place? Name both, the body part and the host. 2

(a) Fertilization
(b) Development of gametocytes
(c) Release of sporozoites
(d) Asexual reproduction

14. A person injured in a road accident and requiring an urgent immune response was brought to a doctor. 2

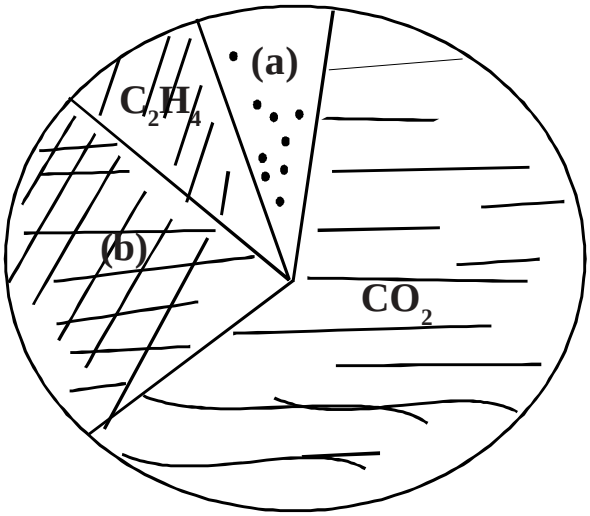
(a) What did the doctor immediately do?
(b) What kind of an immunity was he providing to the patient?
(c) Define this kind of immunity.

15. Why does a beekeeper keep beehives in crop fields during the flowering periods? State any two advantages. 2

16. List any four advantages of genetically modified crop plants over their wild/domesticated relatives. 2

17. Which one out of the eurythermal or stenothermal species is likely ot survive increased global temperatures? Give one reason for your answer. 2

18. The figure given below shows relative contributions of various green-house gases to the total global warming.
(i) Name the gases (a) and (b)



(ii) Explain how increase in green-house gases in earth's atmosphere leads to melting of ice caps. 2

SECTION - C

19. Explain why ecological succession will be faster in a forest devastated by fire than on a bare rock? Also compare succession in case of an abandoned land after floods with that on a bare rock? 3

20. What is the cause of adenosine deaminase deficiency in a person? Why is it that even after infusion of genetically engineered lymphocytes into the patient suffering from deaminase deficiency, the cure is not permanent? 3

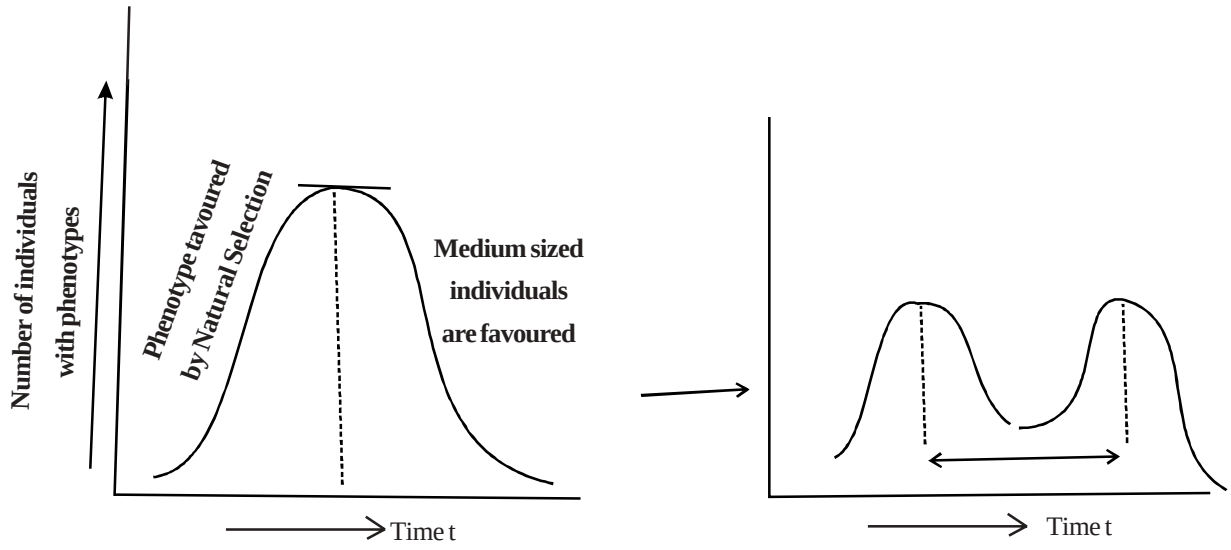
21. A policeman finds a very small piece of body tissue from the site of a crime and takes it to the forensic department.

(A) By which technique will they amplify the DNA collected from the tissue sample?
(B) Mention in a sequence, the 3 steps involved in each cycle of this technique;
(C) What is the role of thermostable DNA polymerare in this technique? 3

22. In case of Bt cotton, how does the toxic insecticide protein produced by the bacterium kill the insect pest but not the cell of *Bacillus thuringiensis* where the toxic protein is generated? 3

23. You have been deputed by your school principal to train local villagers in the use of biogas plant. With the help of a labelled sketch explain the various parts of the biogas plant. 3

24. Study the figures (a) and (b) given below and answer the questions given after the graphs



(i) Under the influence of which type of Natural Selection would graph (a) become like graph (b)?
(ii) What could be the likely reasons of new variations arising in the population?
(iii) Who suggested Natural Selection as a mechanism of evolution?

OR

Illustrate schematically the process of initiation. elongation and termination during transcription of a gene in a bacterium.

25. How did Louis Pasteur successfully demolish the popular theory of spontaneous generation? What were his conclusions? 3

26. If a true breeding homonzygous pea plant with green pod and axial flower as dominant characters is crossed with a recessive homonzygous pea plant with yellow seeds and terminal flowers, then what would be the: 3

(a) genotypes of the two parents;
(b) phenotype and genotype of the F_1 offspring;
(c) phenotypic distribution ratio in F_2 population?

27. With the help of labelled diagrams, depict the stages of a microspore maturing into a pollen grain. 3

SECTION -D

28 (a) Draw a longitudinal sectional view of a typical anatropous ovule to show the site where double-fertilization takes place. Label any four major parts of the ovule. 3
(b) How do the male gametes that are present in the pollen grains reach the site mentioned by you in part (a) to cause double fertilization?

OR

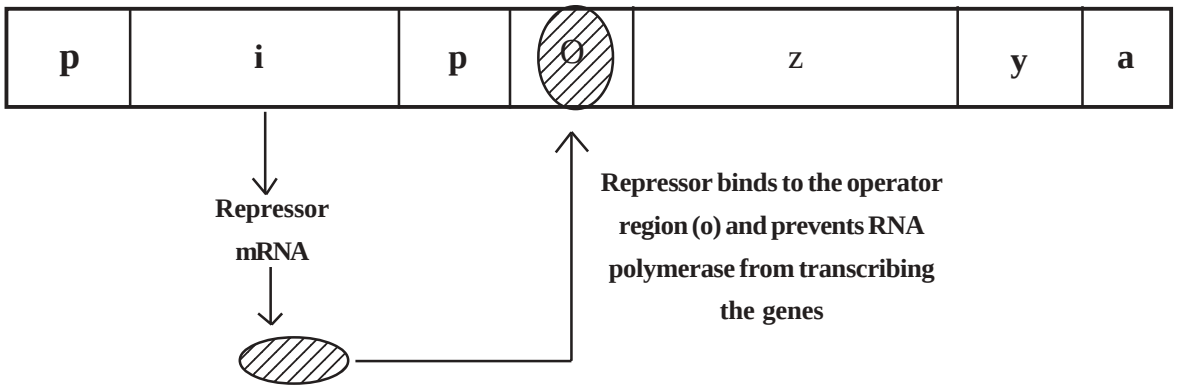
(a) When and where does spermatogenesis in a human male begin to take place? 1

(b) With the help of schematic labelled diagrams trace the development of mature spermatozoa in a human male. 2

(c) Describe the structure of a human sperm. 2

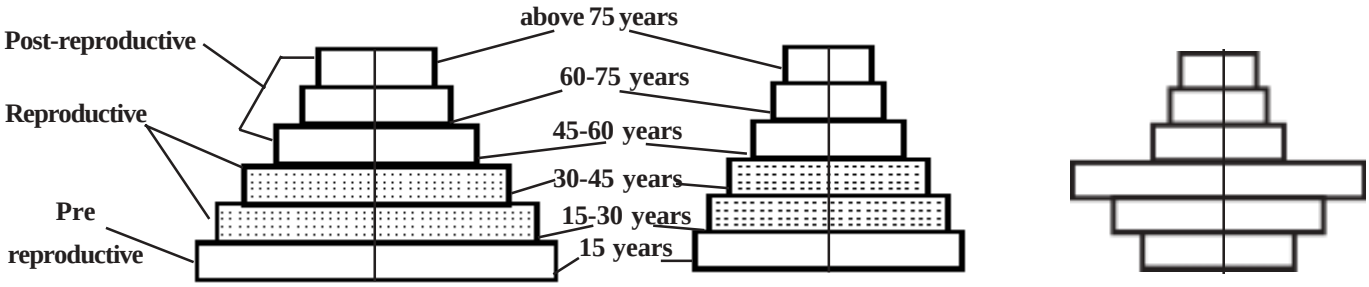
29. (a) Describe the experiment conducted by Alfred Hershey and Martha Chase for identification of genetic material.
(b) Why is it considered pathbreaking in the field of Molecular Biology?

OR



Look at the figure above depicting lac operon of ***E.coli***
(a) What could be the series of events when an inducer is present in the medium in which *E.coli* is growing?
(b) Name the Inducer. 5

30. Study the 3 representative figures of age pyramid relating to human population given below and answer the following question:



(i) (ii) (iii)

(a) Mention the names given to the 3 kinds of age profiles (i), (ii), and (iii).
(b) Which one of them is ideal for a population and why?
(c) How do such age-profile studies help policy makers get concerned about our growing population and prepare for future planning.(say for example : for the year 2022.) 5

(Hint: The age profile you would name as stable was prepared on the data available on January 2007)

OR

30 (a) Write an equation for Verhulst Pearl logistic Growth Where

N	=	Population density at a time t
r	=	Intrinsic rate of natural increase
	and	
K	=	Carrying Capacity

1

(b) Draw a graph for a population whose population density has reached the carrying capacity. 2

(c) Why is this logistic growth model considered a more realistic one for most animal populations? 1

(d) Draw a growth curve where resources are not limiting to growth of a population. 1

MARKING SCHEME
SAMPLE QUESTION PAPER - I
XII - BIOLOGY

Note: The marking scheme given here does not include complete detailed answers for all the questions. At few places the actual answer is too obvious and therefore, only the scheme of distribution of marks has been indicated. Students are advised to write complete answer in the actual examination.

SECTION - A

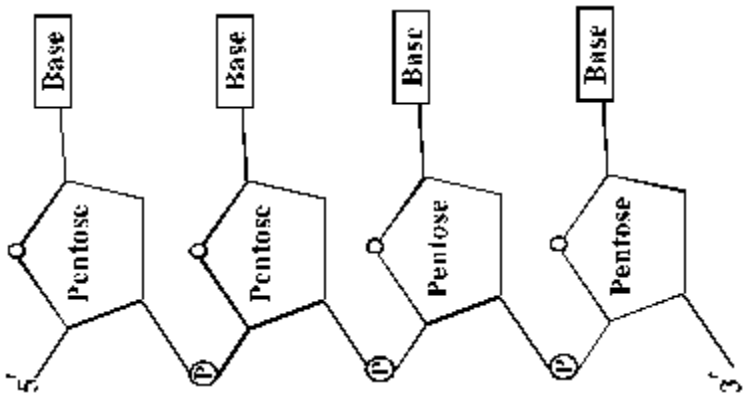
Q. No.	Value Points	Marks
1.	Only nodes can produce/differentiate roots/ establish new plant. (any one)	1
2.	Rapid decline in death rate (due to better medical facilities) Rapid decline in maternal mortality rate (MMR) Rapid decline in Infant Mortality rate (IMR) Increase in number of individuals in reproductive age. (any two)	½+½=1
3.	(a) 6 (b) 4	1
4.	RNA being unstable mutate at faster rarte/ 2'-OH group present at every nucleotide is a reactive group, so easily labile / degradable/RNA more catalytic hence reactive. (any one)	1
5.	Avoid undue peer pressure/Education and counselling/Seeking help from parents and peer/ Looking at danger signs/Seeking professional or medical help. (any two)	1
6.	Pollution (air) shall increase because particulate matter will not be absorbed/removed.	
7.	Smaller animals lose body heat much faster as they have large surface area per unit volume/large animals lose less body heat because they have less surface area per unit volume.	1
8.	Restriction enzyme/ restriction endonuclease	

SECTION - B

9.	(i) Only one pollen tube enters an ovule/10 pollen tubes would be required for 10 ovules; (ii) Even if a pollen grain produces more than one pollen tube, only one of them carries male gametes/ of the two male gametes per pollen tube, one is used in syngamy and other in triple fusion.	2
10.	(a) Rr {presuming parents had genotypes(RR) and (rr)} (b) None of the parental alleles for colour is dominant or recessive/shows Incomplete Dominance	2

Q. No.	Value Points	Marks

11.



2

(The diagram should have the following attributes:)

(i) 5' ----3' direction

(ii) Phosphate attached to sugar molecule

(iii) sugar molecule attached to a purine or pyrimidine base

(iv) 3' end of sugar attached to 5' phosphate 2

OR

↑
Monocotyledons
↑
Dicotyledons
↑
Gnetales
↑
Cycads
↑
Seed ferns
↑
Rhynia-like plants

Cholorophyta ancestors
(any four in correct sequence) 2

12. (a) Bite by female mosquito;
(b) Ringworm;
(c) Rhino Virus;
(d) Internal bleeding/muscular pain/fever/anemia/blockage of intestinal passage. (any one symptom) 2

Q. No.	Value Points	Marks
13.	(a) Intestine of mosquito/vector; (b) RBC of human beings; (c) Salivary glands of mosquito/vector; (d) Liver cells/RBC of host human being	(½ x 4) = 2
14.	(a) Inject antitoxin/preformed antibodies/tetanus toxoid (b) Passive immunity (c) When preformed antibodies or antitoxin are injected into patient/person, the resultant immunity acquired is termed passive immunity.	(½ x 4) = 2
15.	(a) Bees are pollinators of many of our crop plants (b) It increases the efficiency of pollination resulting in improved yield of crop plants (c) Provide better nourishment to bees resulting in better/higher yield of honey (any two)	(1 x 2) = 2
16.	(a) More tolerant to abiotic stresses; (b) Reduced reliance on chemical pesticides; (c) Redued post-harvest losses; (d) Increased efficiency with which they use minerals. (e) Enhanced nutritional value of food eg. Vit-'A'-rich rice. (any four)	(½ x 4) = 2
17.	Eurythermal; because they can thrive in a wide range of temparature variations	2
18.	(i) (a) N_2O, (b) CFC's	(½ x2) =1
	(ii) Green-house gases cause global warming which in turn causes melting of ice-caps.	1

SECTION - C

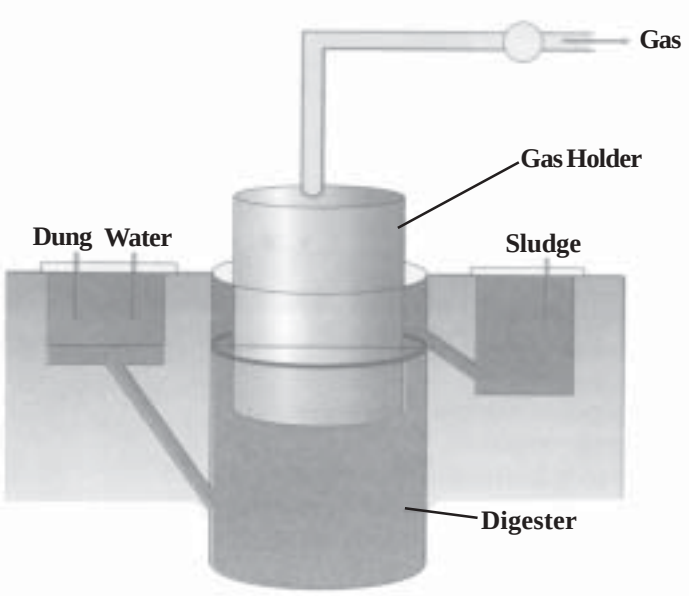
19.	i) Ecological Succession requires soil; ii) Forest destroyed by fire has some soil, so succession progresses faster/secondary seccession iii) Bare rock has no soil/ it takes a lot of time before soil can be formed on bare rock, so succession shall be slow/primary succession (any Two)	(1x2) = 2
	Even after floods the land mass has plenty of soil and thus ecological succession will be faster;/it shall have secondary succession.	1
20.	A disorder caused due to the deletion of the gene for the enzyme adenosine deaminase (it is called adenosine deaminase (ADA) deficiency.	1
	Since the life-span of such genetically engineered lymphocytes is very short/the patient needs repeated introduction of such lymphocytes into the body of the patient.	2
21.	(a) PCR/Polymerase chain reaction	1
	(b) Denaturation; Annealing; and Extension	(½ x 3) = 1½
	(c) This enzyme remains active even during high temperature-induced denaturation of double stranded DNA	½

Q. No.	Value Points	Marks

22. Toxin binds to the surface of epithelial cells of the midgut; creates pores in these cells; cause swelling of cells leading to; lysis of cell ½ x 4 =2

Toxin is present in inactive state in *Bacillus thuringiensis*, but once it enters the gut of insect, it becomes active. 1

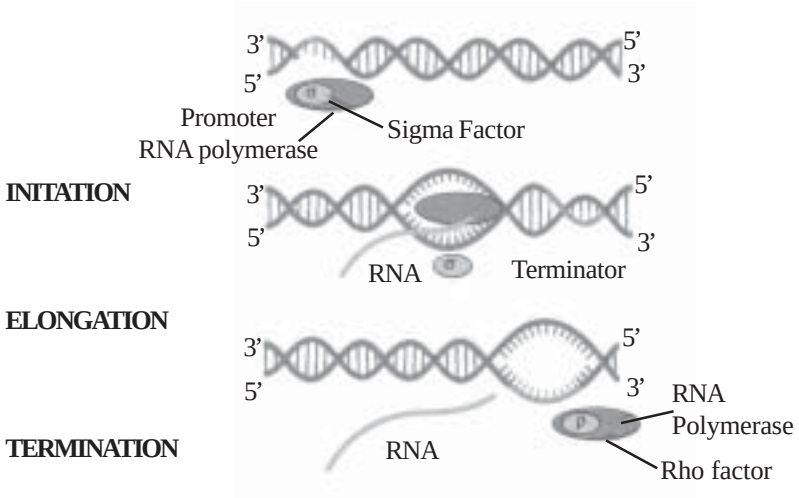
23. Six labels (dung, Water, Gas-holders; Gas; Sludge and Digester) along with diagram. 3



A typical biogas plant

24. (i) When Natural Selection is disruptional ½
(ii) Recombination (during gametogenesis); gene flow; genetic drift; mutation 2
(iii) Charles Darwin ½

OR



(1 x 3)=3

Process of Transcription in Bacteria

Q. No.	Value Points	Marks

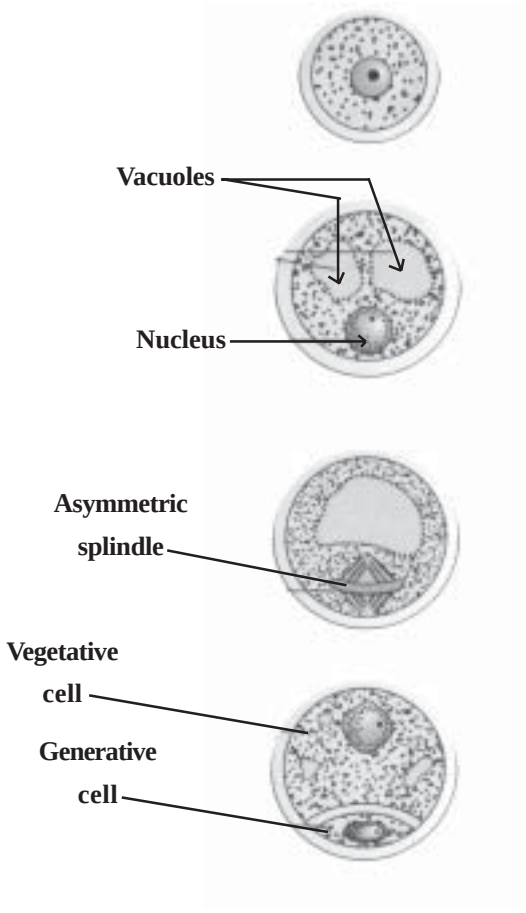
25. Louis Pasteur's 2 flask experiment;
-2-Flasks used both pre-sterilized;
- Pre-killed yeast placed in both them;
-one flask was open to air the, other was not;
-flask open to air has new life but not the one with closed mouth (½ x 2) = 2

Life comes from pre-existing life/life begets life 1 x 1 = 1

26. (a) GGAA and ggaa ½ x 2 = 1
(b) plant with green pod and axial flower; GgAa ½ x 2 = 1
(c)

Green Seed : Axial flower	Green Seed : Terminal Flower	Yellow Seed : Axial Flower	Yellow Seed : Terminal Flower
9 :	3 :	3 :	1

27.



(½ x 4) = 2 + 1

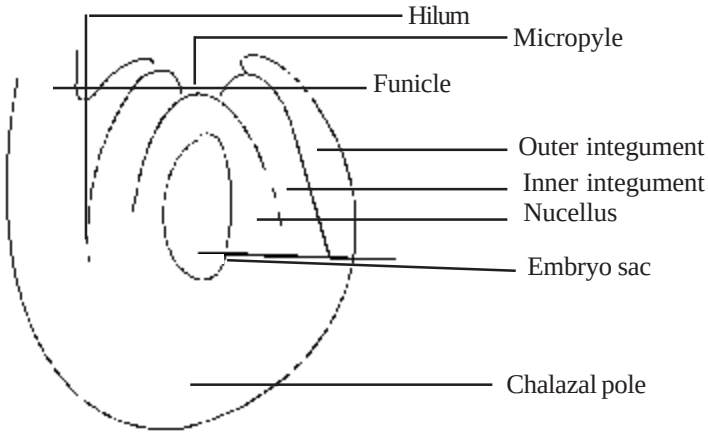
stages of a microspore maturing into a pollen grain

Q. No. **Value Points** **Marks**

SECTION - D

28.

A. (i)



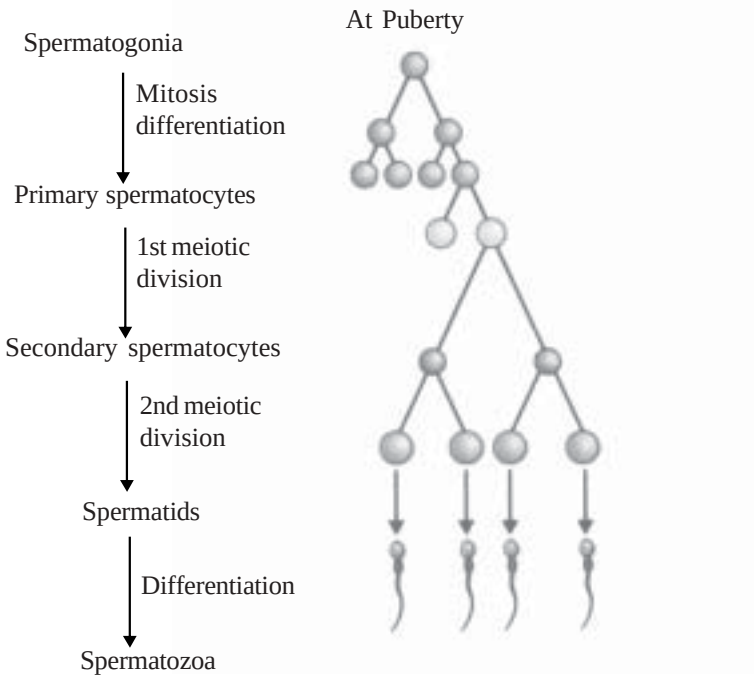
(ii) Any four labels

Micropyle; Integument outer; Inner integument; chalazal pole; Nucellus; Hilum; Funicle; Micropyle (½x4) = 2

(b) Pollen grain land on the stigma; emergence of pollen tube; growth of pollen tube in style; movement/ transfer of 2 male gametes into the pollen tube; entry of pollen tube in ovule through micropyle; pollen tube enters embryo sac/female gametophyte through synergids; pollen tube release 2 male gametes in the embryo sac; one gamete fuses with egg cell resulting in syngamy; the other male gamete fuses with 2 polar nuclei to form primary endosperm nucleus; results in double fertilization. (Open ended) 2

OR

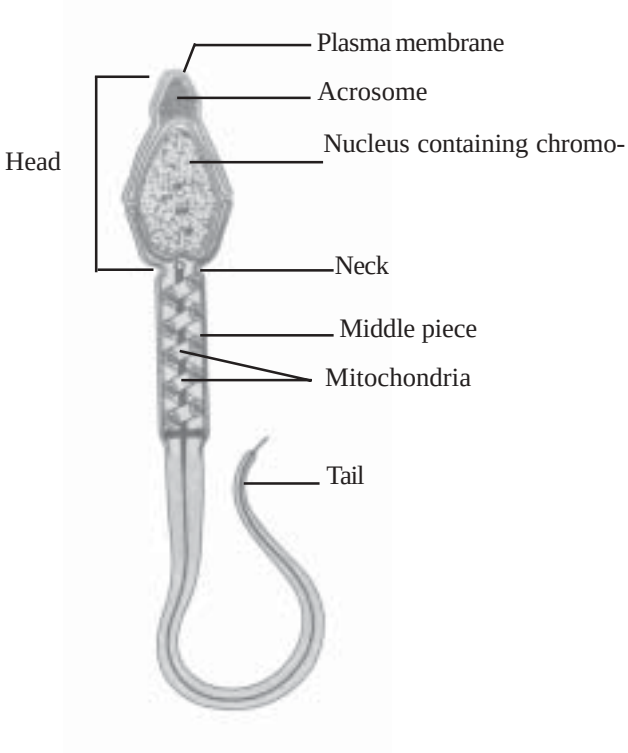
28. (a) Puberty; in seminiferous tubules in testes ½ x 2 = 1



Schematic representation of Spermatogenesis ½ x 4 = 2

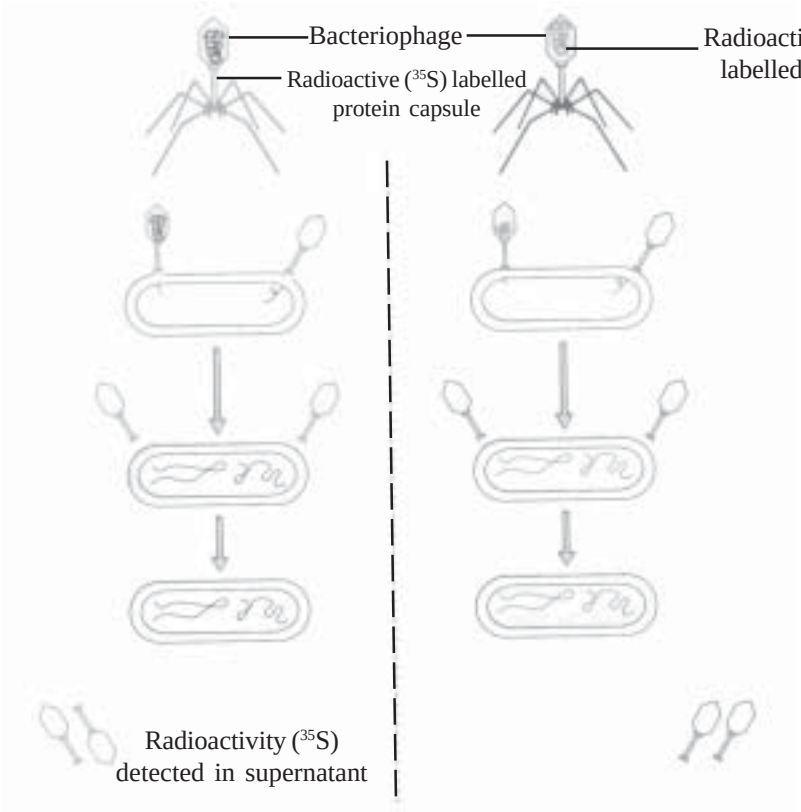
Q. No.	Value Points	Marks

(b)



Structure of a sperm/description (1 + 1) = 2

29.



THE HERSHEY - CHASE EXPERIMENT

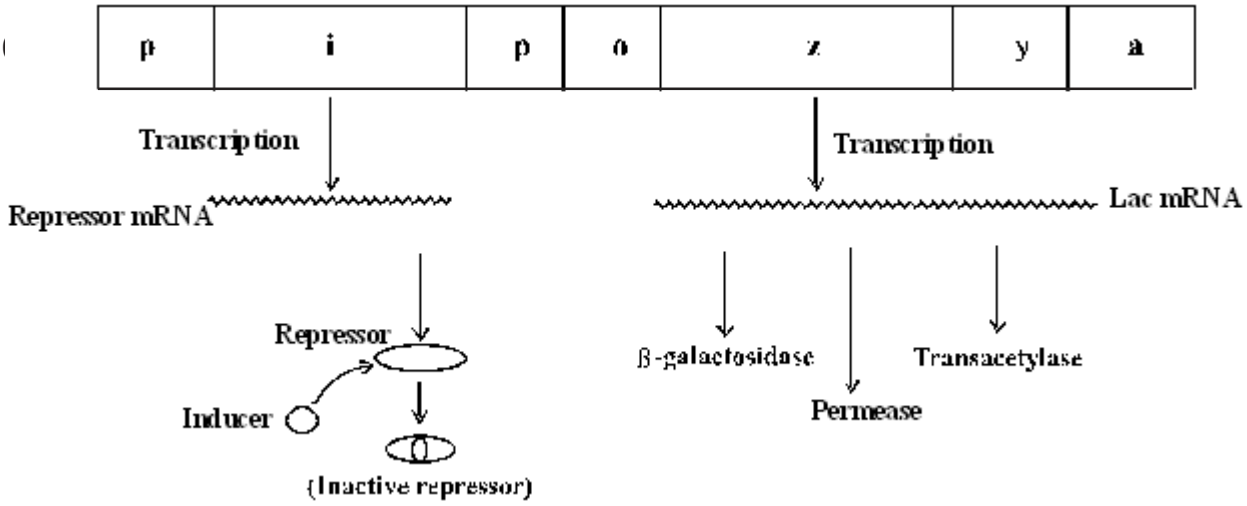
Q. No. **Value Points** **Marks**

(a) - Bacteriophage is a virus that infects bacteria.
- It has protein coat and DNA inside
- Bacteriophage raised in environment rich in radioactive sulphur (S^{35})
- Sulphur is present in protein but is absent in DNA
- Some bacteriophages raised in the medium rich in radioactive phosphorous (P^{35})
- Phosphorous present in DNA but absent in protein.
- Now, in one set of experiments radioactive sulphur rich phages allowed to infect bacterium; in other set the phages were with radioactive phosphorus.
- Through stages of Infection blending and centrifagation, protein and DNA segments were separated.
- Those bacteria which were infected with viruses that had radioactive protein were not radioactive, indicating that protein component of phage did not enter host.
- Reverse true of P^{35} phages. (Open Ended) 4

(b) It conclusively proved that the genetic material was nucleic acid; in this case DNA 1

OR

29.



THE LAC OPERON

With diagram
(Open-ended); series of events to described
- Repressor m RNA produces repressor;
- Inducer binds with this repressor;
- Makes this repressor inactive;
- Operator gene become active;
- Structural gene z, y, a transcribe mRNA
- lac -mRNA translate z, y, and a genes to give the enzymes ß-galactosidase, permease and transacetylase enzymes respectively
- These 3 enzymes are required for the metatolism of lactose. ½ x 8 = 4
- This model was proposed by F. Jacob and J. Monod

(b) Lactose acts as inducer

Q. No.	Value Points	Marks

30. (a) (i) Expanding
(ii) Stable
(iii) Declining (½x3) = 1, ½

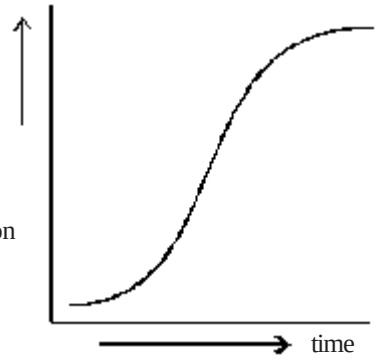
(b) Stable is ideal ½
Because, here the pre-reproductive and Reproductive population are almost similar; so balanced continuity is maintained 1

(c) It tells us by 2022 how many of the individuals in different age-groups shall constitute the total population. That tells policy makers in year 2001 itself that by 2022, the needs for say -Primary schools; secondary schools., institutes of higher learning in, dwelling units, roads and infra structure, hospitals, old-age homes, recreation facilities, employment workforce etc,. 2

OR

(a) $\frac{dn}{dt} = rN\left(\frac{K-N}{K}\right)$ 1

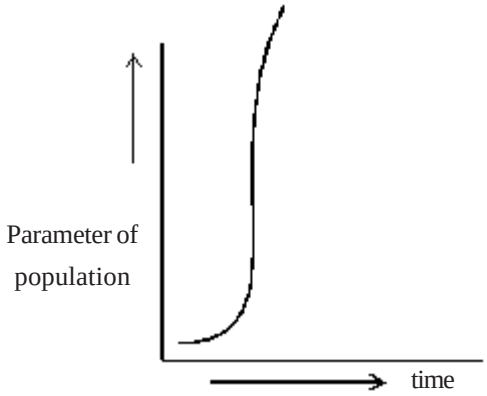
(b) Sigmoid Curve



1 + 1 = 2

(c) Because , resources are perishable, So carrying capacity controls the populations causing the growth curve to be flatter at end. 1

(d) Exponential



1

Blue Print II
Biology
Class XII

Types of Questions → **Units** **↓**	**VSA** **(1 mark)**	**SA II** **(2 marks)**	**SA I** **(3 marks)**	**LA** **(5 marks)**	**Total** **-**
Sexual Reproduction	2 (2)	4 (2)	6 (2)	_	12 (6)
Genetics and Evolution	2 (2)	4 (2)	9 (3)	5 (1)	20 (8)
Biology and Human Welfare	1 (1)	2 (1)	9 (3)	_	12 (5)
Biotechnology and its applications	2 (2)	2 (1)	3 (1)	5 (1)	12 (5)
Ecology and Environment	1 (1)	8 (4)	_	5 (1)	14 (6)
Total	8 (8)	20 (10)	27 (9)	15 (3)	**70 (30)**

Sample Question Paper II
XII- Biology

Time : 3 Hours **Max. Marks : 70**

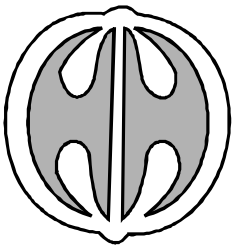
GENERAL INSTRUCTIONS :

1. *All questions are compulsory.*
2. *The question paper consists of four sections A, B, C and D. Section-A contains 8 questions of 1 mark each, Section B is of 10 questions of 2 marks each, Section C has 9 questions of 3 marks each whereas Section D is of 3 questions of 5 marks each.*
3. *There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.*
4. *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

SECTION - A

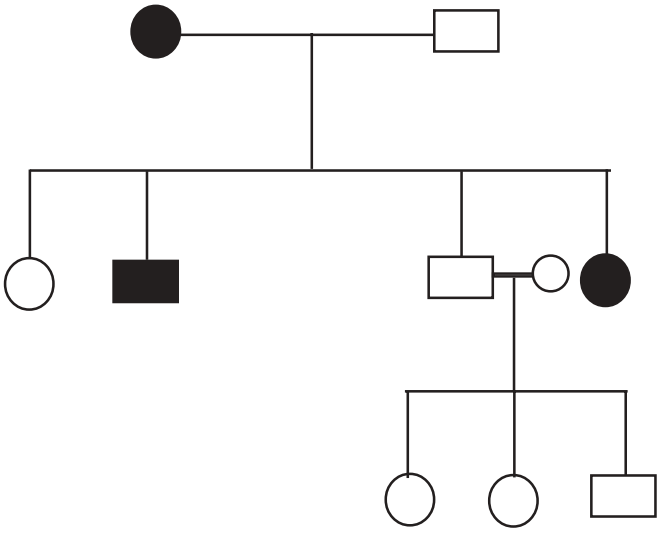
(1) In the whiptail lizards only females are born generation after generation. There are no males How is this possible? 1

(2) In the following figure of a fruit, label the part which is protective in function and that which is responsible for producing new plants. 1



(3) Which Mendel's law of inheritance is universally acceptable and without any exception? State the law. 1

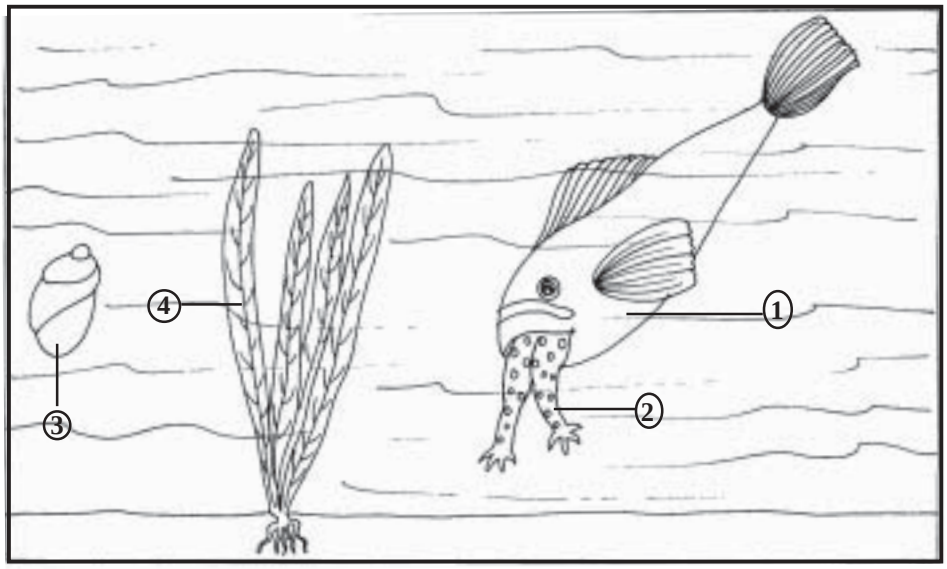
(4) In the following pedigree chart, state if the trait is autosomal dominant, autosomal recessive or sex linked. Give a reason for your answer. 1



(5) Given below are pairs of disease and causative organism. Which out of these is not a matching pair and why? 2

Filariasis	:	*Wuchereria*
Ringworm	:	*Ascaris*
AIDS	:	Human immuno virus
Malaria	:	*Plasmodium*

(6) In the picture provided, what is the relationship between (1) and (2) with respect to population interaction and between (3) and (4) with respect to trophic levels.

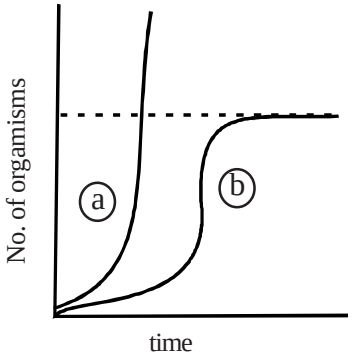


(7) Provide one word or one sentence information about 'plasmid' with respect to its (i) chemical nature and (ii) its duplication.

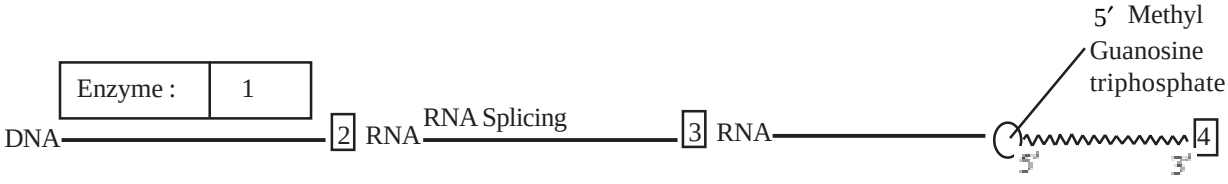
(8) Expand the following
(i) PCR
(ii) Bt

SECTION -B

(9) In the adjacent population growth curve,
(i) What is the status of food and space in the curves (a) and (b)?
(ii) In the absence of the predators, which curve (a) or (b) would appropriately depict the prey population?



(10) Given below is a sequence of steps of transcription in a eukaryotic cell.
Fill up the blanks (1, 2, 3, 4) left in the sequence.



OR

(10) Name the type of inheritance in which the genotypic ratio is the same as the phenotypic ratio. Also give the ratio. 2

(11) In the following table the ecological units are mentioned in the first column vertically and their attributes are mentioned horizontally. Match the ecological units and its attribute and put a tick in the blanks within the table: 2

Attribute → Ecological Unit ↓	Age	Flow of Energy	Natality	Predator-prey relationship
Individual organism				
Population				
Community				
Ecosystem				

(12) Certain molecular processes are given in column (A). Provide the terms given to these processes in column (B), after selecting them from the terms: Recombination, gene regulation, prokaryotic, transcription, eukaryotic transcription, translation, replication, gene transfer, DNA fingerprinting

Column A	**Column B**
(i) DNA ⟶ DNA	
(ii) DNA ⟶ hnRNA	
(iii) mRNA ⟶ Protein	
(iv) Repressor Protein + Operator ⟶ No transcription	

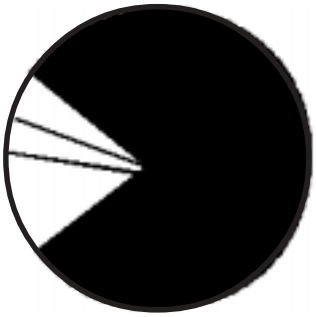
½x4 = 2

(13) In the table given below, select and enter one correct device out of the following :
Oral pill, condom, Copper T, Saheli, Vasectomy, Diaphragm, Tubectomy, Cervical cap

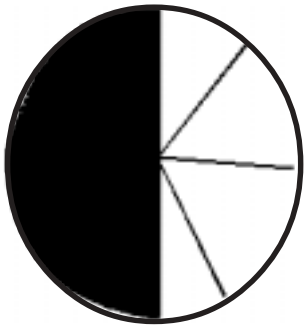
Method of birth control	Device
Barrier	
IUD	
Surgical Technique	
Administering Hormones	

(14) If the chromosome number of a plant species is 16, what would be the chromosome number and the ploidy level of the (i) microspore mother cell and (ii) the endosperm cells? 2

(15) In the pie charts (A) and (B) drawn below to show the global animal diversity, which groups of animals would you name and write on the areas shaded black in (A) and (B). In which kind of habitat would you find these groups of animals? 2



(A) INVERTERBRATES



(B) VERTEBRATES

(16) In the pyramid of biomass drawn below, name the two crops : (i) one which is supported and (ii) the one which supports. In which ecosystem is such a pyramid found? (½ + ½ + 1) =2

(17) The steps in a programme are: 2

- Collection of germplasm
- Crossbreeding the selected parents
- Selecting superior recombinant progeny
- Testing, releasing and marketing new cultivars.

(I) What is this programmme related to?

(ii) Name two special qualities as basis of selection of the progeny.

(iii) What was the outcome of the programme?

(iv) What is the popular term given to this outcome? Also name the Indian scientist who is credited with chalking out of this programme.

(18) A multinational company (XYZ) marked a medicine extracted from medicinal herbs grown in the sprawling fields in a foreign country. This herb is found only in our country and no compensation was paid or permission taken from relevant authority. 2

(i) What is the term used to refer to such an act committed by the multinational company?

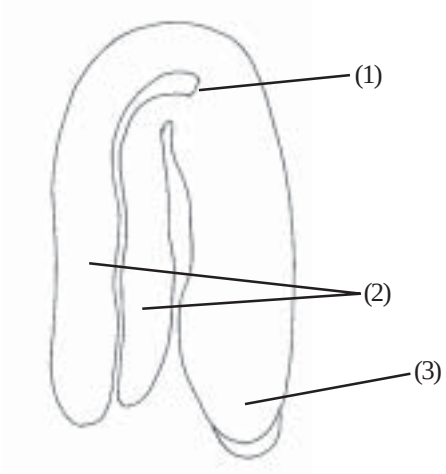
(ii) Justify the meanig of the term.

(iii) What has our government done to prevent such deeds?

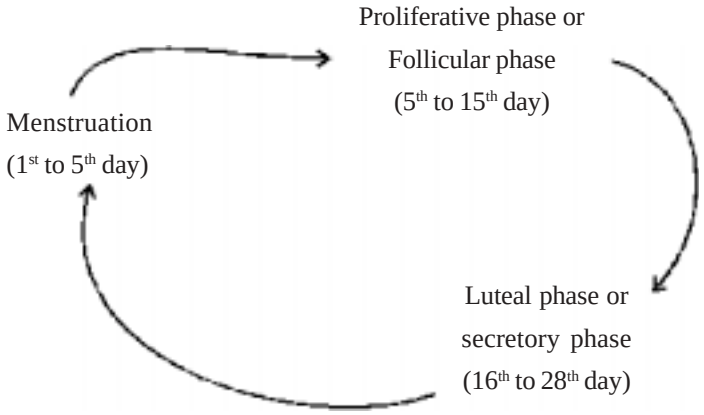
SECTION - C

(19) How are biofertilisers different from fertilisers such as NPK that we buy in the market? Justify the role of *Rhizobium* as a biofertiliser. 3

(20) In the adjacent figure of a typical dicot embryo, label the parts (1), (2) and (3). State the function of each of the labelled part. 3



(21) The events of the menstrual eycle are represented below. Answer the questions following the diagram.



(i) State the levels of FSH, LH and Progesterone simply by mentioning high or low, around 13th and 14th day and 21st to 23 rd day

(ii) In which of the above mentioned phases does the egg travel to the fallopian tube?

(iii) Why is there no menstruation upon fertilisation? 3

(22) Few gaps have been left in the following table showing certain terms and their meanings. Fill up the gaps. 3

	Terms	**Meanings**
(i)	-	Non coding sequence in eukaryotic DNA
(ii)	-	Technique used in solving paternity disputes
(iii)	Restriction endonuclease	_____
(iv)	Plasmid	_____
(v)	Transgenics	_____
(vi)	-	Nucleotide sequences with single base differences

(23) A $_{3'}$ _____ $_{5'}$ B 3

C $_{5'}$ _____ $_{3'}$ D

AB and CD represent two strands of a DNA molecule.

When this molecule undergoes replication, forming a replication fork between A and C in the above.

(i) name the template stands for replication.

(ii) using which strand as the template, will there be continuous synthesis of a complementary DNA strand?

(iii) complementary to which strand will okazaki segments get synthesised discontinuous synthesis will occur.

(iv) What are template strands and Okazaki pieces?

(v) In which direction is a new strand synthesised?

(24) "A population has been exhibithing genetic equilibrium". 3

Answer the following with regard to the above statement.

(i) Explain the above statement.

(ii) Name the underlying principle.

(iii) List any two factors which would upset the genetic equilibruim of the populationn.

(iv) Take up any one such factor and explain how the gene pool will change due to that factor

OR

In the 1950s, there were hardly any mosquitoes in Delhi. The use of the pesticide DDT on standing water killed their larve. It is believed that now there are mosquitoes because they evolved DDT resistance through the interaction of mutation and Natural Selection. Pointwise, state in a sequence how that could have happened. 3

(25) A thallasemic child needed repeated blood transfusions got infected by HIV. 3

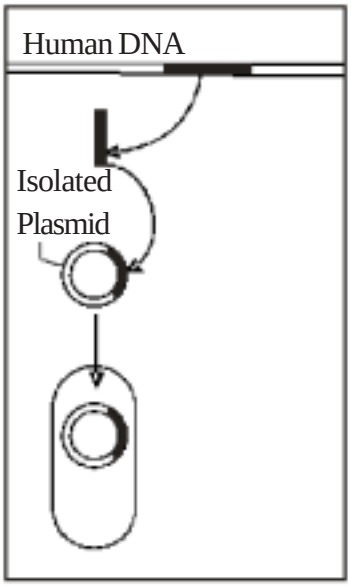
(i) Use a rough diagrammatic sketch and arrows to show how the virus increased in number.

(ii) Why did the increased number of the HIV virus deteriorate the child's immunity?

(iii) Which diagnostic test showed that the infective virus was HIV?

(26) Microbes play a dual role when used for sewage treatment as they not only help to retrieve usable water but also generate fuel. Write in points how this happens? 3

(27) Name the particular technique in Biotechnology whose steps are shown in the figure, Use the figure to summmarise the technique in three steps. 3



SECTION - D

(28) With an example, explain how biotechnology has been applied in each of the following:

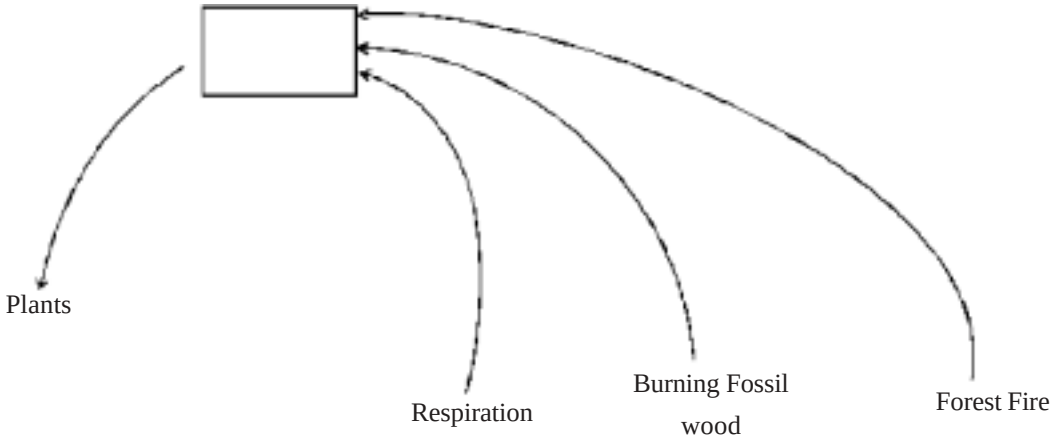
(i) In curing Diabetes mellitus
(ii) In raising pest resistant plants
(iii) In producing more nutritionally balanced milk.

Do you think it is ethical to manipulate organisms for human benefits? Justify your answer. 5

OR

Name any two cloning vectors. Describe the features required to facilitate cloning into a vector.

(29)



The above diagram shows a simplified biogeochemical cycle
(i) Name the compound whose cycle is depicted.
(ii) In what way do vehicles add this compound to the atmosphere?
(iii) What adverse effect does its excess have on the environment?
(iv) Cite an event which depicts this effect in the modern times.
(v) Suggest two ways of reducing this effect. 5

OR

Create an aquatic food chain in a water body into which effluents flow from a pesticide factory. Diagrammatically represent biomagnification in this food chain.

Explain why a decline in the predator-bird population is expected, when it feeds on the tertiary consumers of this food chain. 5

(30) Study the following carefully and explain why mutation (A) did not cause any sickle cell anemia inspite of change in the molecular structure of the gene which codes for Haemoglobin, when as a similar mutation (B) did.5
(The question is based on properties of the genetic code. c = codon, a = amino acid, Hb = Hoemoglobin)

Codons for Hb : C_1-C_2-C_3-C_4-C_5-GAA-GAA-C_8 .....
Amino acids in Hb : a_1-a_2-a_3-a_4-a_5-Glutamic acid -Glutamicacid-a_8 .....
(Normal Haemoglobin)

Mutation (A) : C_1-C_2-C_3-C_4-C_5-GAA-GAA-C_8 .....
a_1-a_2-a_3-a_4-a_5-Glutamic acid-Glutamic acid-a_8 .....
(Normal Haemoglobin)

Mutation (B) : C_1-C_2-C_3-C_4-C_5-GUG-GAA-C_8 .....
a_1-a_2-a_3-a_4-a_5-Valine-Glutamic acid -a_8 .....
(Sickle cell Haemoglobin)

OR

One chromosome contains one molecule of DNA. In eukaryotes the length of the DNA molecule is enormously large. Explain how such a long molecule fits into the tiny chromosomes seen at Metaphase. 5

Marking Scheme
Sample Paper II
XII - Biology

Q. No.	Value Points	Marks
1.	Through asexual reproduction/ parthenogenesis	1
2.	Correctly labelled pericarp and seed.	(½ x 2) = 1
3.	The law of segregation; The factors or alleles present in pairs segregate during gamete formation/ or similary worded.	1
4.	Autosomal dominant; defective trait in both male and female progeny/unaffected child did not pass down trait.	1
5.	Ringworm: *Ascaris* ; Because ringworm is a disease caused by a fungus (or named fungus) Ascaris causes Ascariasis.	1
6.	Predator-prey/Predation between level (1) and (2); Producer-consumer between levels (3) and (4)	(½ x 2) = 1
7.	Plasmid made of DNA/Deoxy ribonucleic acid; Replicates/duplicates along with host bacterial DNA	(½ x 2) = 1
8.	Polymerase chain reaction; *Bacillus thuringiensis* (no mark if specific name written with capital T)	(½ x 2) = 1
9.	(i) a = Unlimited food and space, B = limited food and space (ii) curve a, K/carrying capacity	½ x 4 = 2
10.	(1) RNA polymerase; (2) hn; (3) m; (4) poly A tail	½ x 4 = 2
10.	(b) Incomplete dominance; 1 : 2 : 1	(1 x 2) = 2
11.	Individual = age; population = Natality; community= predator-prey relation; ecosystem = energy flow	(½ x 4) = 2
12.	Replication; Eukaryotic transcription; translation; gene regulation	(½ x 4) = 2
13.	Barrier = Diaphragm/ condom/cervical cap 1UD = Copper T Surgical technique = Vasectomy/Tubectomy Hormonal administrations = Oral pill/saheli	(½ x 4) = 2
14.	(i) Microspore mother cell = 16; diploid/ 2n (ii) Endosperm cell = Triplod/3n	(½ x 4) = 2
15.	(A) Insects/arthropods; aerial/air/ground/ soil/ water etc. (B) = fishes/pisces; aquatic/ water/ sea/river etc.	(½ x 4) = 2

Q. No.	Value Points	Marks

16. Phytoplankton; zooplankton; aquatic/water ecosystem showing pyramid of biomass (½ + ½ + 1) =2

17. Plant breeding; high yield and pest resistant/drought resistant etc (any two) for increase in food production; green revolution; M.S. Swaminathan (½ x 4) = 2

18. Biopiracy; Biopiracy tantamounts to stealing of bioresources of another country (like pirates take away other peoples' valuables); government is developing laws (such as Indian patents Bill) to prevent biopiracy (½ x 4) = 2

19. Biofertilisers = organisims enriching nutrient quality of soil; fertilisers = chemical syathesised in factory; Rhizobium has symbiotic association with leguminous roots and fixes nitrogen 1 x3 =3

20. Label 1 : Origin of plumule; plumule grows into shoot
Label 2 : Cotyledons; food storage
Label 3 : Origin of radicle ; radicle grows into root (½ x 6) = 3

21. (i) FSH and LH : high and progesterone low;
FSH and LH : Low and Progesterone high;

(ii) Luteal phase (iii) uterine wall and blood vessels help maintain implanted imbryo; ½ + ½ +1+1 = 3

22. Intron; DNA finger printing; cuts specific nucleotide sequence; extrachromosomal DNA in bacteria/ vector; modified organisms/ organisms with foreign gene; SNP (½ x 6) = 3

23. (i) AB, CD (ii) AB (iii) CD;
Template strands : parental DNA strands complementary to which new strands of DNA are synthesised;
5′ – 3′ ; small pieces of DNA complementany to template. (½ x 6) = 3

24. (i) Allelic frequencies in the gene pool of a population remains unchanged for generations;
(ii) Hardy-Weinberg equilibrium
(iii) Any two factors - mutation/**Natural selection :** gene flow/genetic drift/ migration
(iv) Mutation : changes alleles/ **Natural selection :** brings about grater reproduction of certain/alleles **gene flow**. migration genetic drift : alleles move out of gene pool ½x 6 = 3

OR

Certain larvae born with mutation; which conferred resistance to DDT; DDT sensitive larvae died; DDT resistant larvae completed life history and became adult mosquitoes; natural selection caused greater reproduction of DDT resistant mosquitioes; which soon replaced DDT sensitive mosquitoes. (½ x 6) = 3

25. (i) simplified (virus replicated in host cell, many viruses , infect new cell)
(ii) Viral DNA enters helper T-lymphocyles, which are responsible for immunity; virus replicates and attacks other T- lymphocytes whose - number decreases.
(iii) ELISA test /Enzyme linked immunosorbent assay. (1 + 1 + 1) =3

Q. No.	Value Points	Marks

26. Heterotrophhic microbes naturally present in sewage are used; vigorous growth of aerobic microbes as flocs use up organic matter in effluent and reduce BOD of waste water; other kinds of bacteria grow in it anaerobically; and digest the bacteria and fungi called flocs (masses of bacteria associated with fungal filaments); As they digest flocs a mixture of CH_4, H_2S, and CO_2 or biogas are evoloved; which can be used as fuel. (½ x 6) = 3

27. Genetic engineering/Recombinant DNA technology; segment of DNA removed from human cell and DNA segmant incorporated into bacterial plasmid ; Plasmid taken up into bacterial cell which makes protein directed by human DNA. (1 + 1 + 1) = 3

28. (i) Page 211 production of insulin to cure Diabetes mellitus or gene therapy for cure of ADA
(ii) Page 209 - using *Agrobacterium* vectors to introduce nematode specific genes or RNAi
(iii) Page 213- generating transgenic cow such as Rosie. (1 x 5) = 5

Ethical standards required as genetically manipulated organisms may harm other organisms/results unpredicatable.

OR

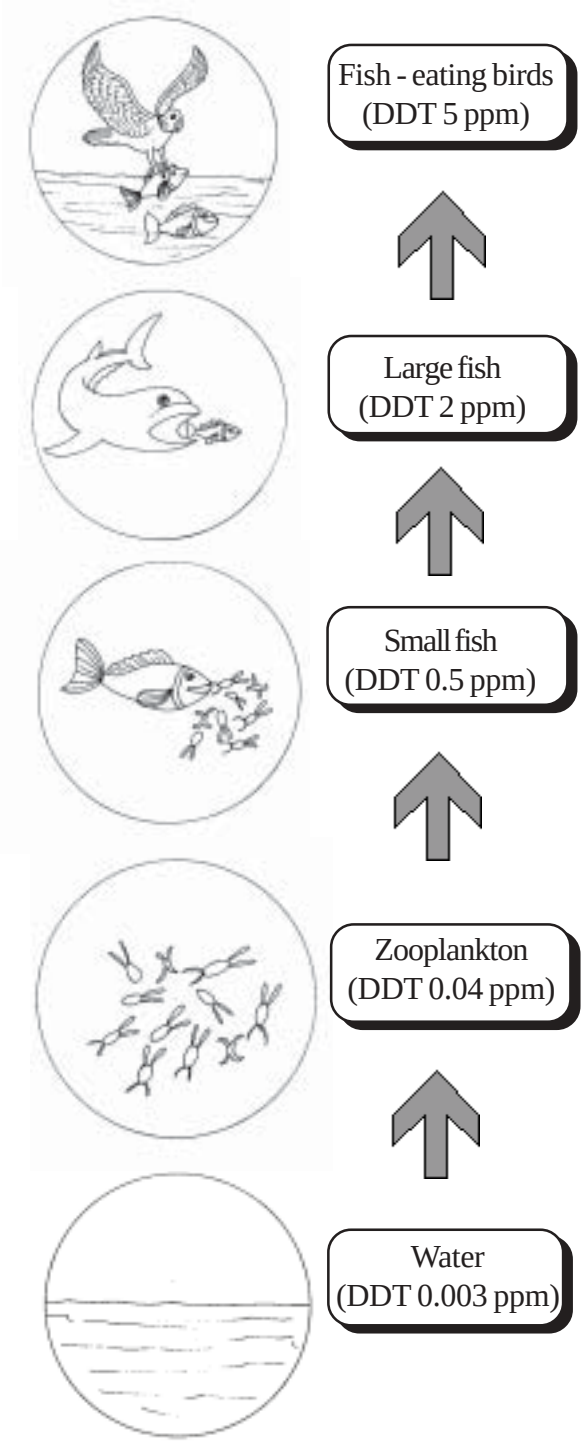
Cloning vectors - (i) plasmids, (ii) bacteriophages (iii) YACS, (iv) BACS (any two) 1

Features required to facilitate cloning into a vector are (1 x 4) = 4

(a) Origin of replication (ori) - Sequence where replication starts and any piece of DNA when linked to this sequence can be made to replicate within host cells.
(b) Selectable marker - Helps in identifying and eliminating non transformants and selectively permitting the growth of the transformants.
(c) Cloning sites : Few or single recognition sites are preferable
(d) Vectors for cloning genes in plants and animals. eg genetically modified *Agrobacterium tumifaciens* and retroviruses.

29. (i) CO_2
(ii) Fuels burnt in vehicles emit CO_2 which goes into atmosphere
(iii) Causes global warming
(iv) Long summer/ Himalayan caps melting/floods etc.
(v) Plant more trees/Afforestation/ car pool/ any other (any two) 1 x 4 + ½ x 2 = 5

Q. No.	Value Points	Marks



Correct food chain - 1

correct doses of DDT - 1

High conc. of DDT disturbs
Ca (Calcium) metabolism in birds - 1

Thinning of egg shell - 1

Premature breaking of egg shell eventnaly leads
to decline in bird population - 1

(***Note :*** Food chain may be depicted in writing or through pictures)

30. - Genetic code degenerate i.e more than one code for one amino acid.
- Both GAG, GAA code for glutamic acid.
- Mutation of third base/ nucleotide- no change in phenotype in mutation A/Wobble hypothesis
- In case of change on 2nd codon of triplet code as in Mutation B, codon stands for a different amino acid valine.
-Hb becomes different/normal Hb becomes Hbs/Structure of protien changed. (1 x 5) = 5

OR

Q. No.	Value Points	Marks

DNA is packaged in the cell in the following manner:

(a) As Nucleosomes consists of Histone octamer around which the positively charged DNA is wrapped around to form a nucleosome. A typical nucleosome contains 200bp of DNA helix.

(b) Repeated units of nucleosomes then form chromatin (in a nucleus). The nuceleosomes represent the "Beads on String" structure" as seen in electron microscopic picture.

(c) These are then further coiled and condensed at metaphase stage to form chromosomes.

(d) For packaging of chromatin at higher level, non histone proteins are required. 5

Blue Print III
Biology
Class XII

Types of Questions → Units ↓	VSA (1 mark)	SA II (2 marks)	SA I (3 marks)	LA (5 marks)	Total -
Sexual Reproduction	2 (2)	4 (2)	6 (2)	_	12 (6)
Genetics and Evolution	2 (2)	4 (2)	9 (3)	5 (1)	20 (8)
Biology and Human Welfare	1 (1)	2 (1)	9 (3)	_	12 (5)
Biotechnology and its applications	2 (2)	2 (1)	3 (1)	5 (1)	12 (5)
Ecology and Environment	1 (1)	8 (4)	_	5 (1)	14 (6)
Total	8 (8)	20 (10)	27 (9)	15 (3)	**70 (30)**

SAMPLE PAPER III
XII - BIOLOGY

Time : 3 Hours **Max. Marks : 70**

GENERAL INSTRUCTIONS :

1. *All questions are compulsory.*
2. *The question paper consists of four sections A, B, C and D. Section-A contains 8 questions of 1 mark each, Section B is of 10 questions of 2 marks each, Section C has 9 questions of 3 marks each whereas Section D is of 3 questions of 5 marks each.*
3. *There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.*
4. *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

SECTION - A

1. Cite an example of an inverted ecological pyramid. What kind of pyramid of energy would it have? 1

2. When is the structure and composition of a community expected to remain unchanged? 1

3. At what stage of life is oogenesis initiated in a human female? When does the oocyte complete oogenesis? 1

4. After a successful in-vitro fertilisation, the fertilised egg begins to divide. Where is this egg transferred before it reaches the 8-cell stage and what is this technique named? 1

5. AaBb was crossed with aabb. What would be the phenotypic ratio of the progeny? Mention the term to denote this kind of cross. 1

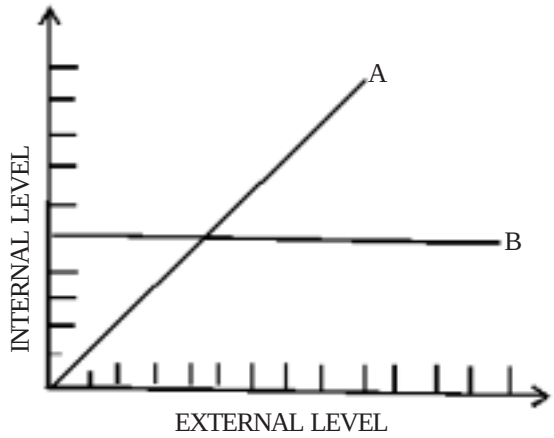
6. In F.Griffith's experiment, how did the nonvirulent strain of *Streptococcus Pneumoniae* become virulent?

7. State the use of :
   (i) *Trichoderma* with respect to organ transplant, and
   (ii) Nucleopolyhedrovirus with respect to pest management 1

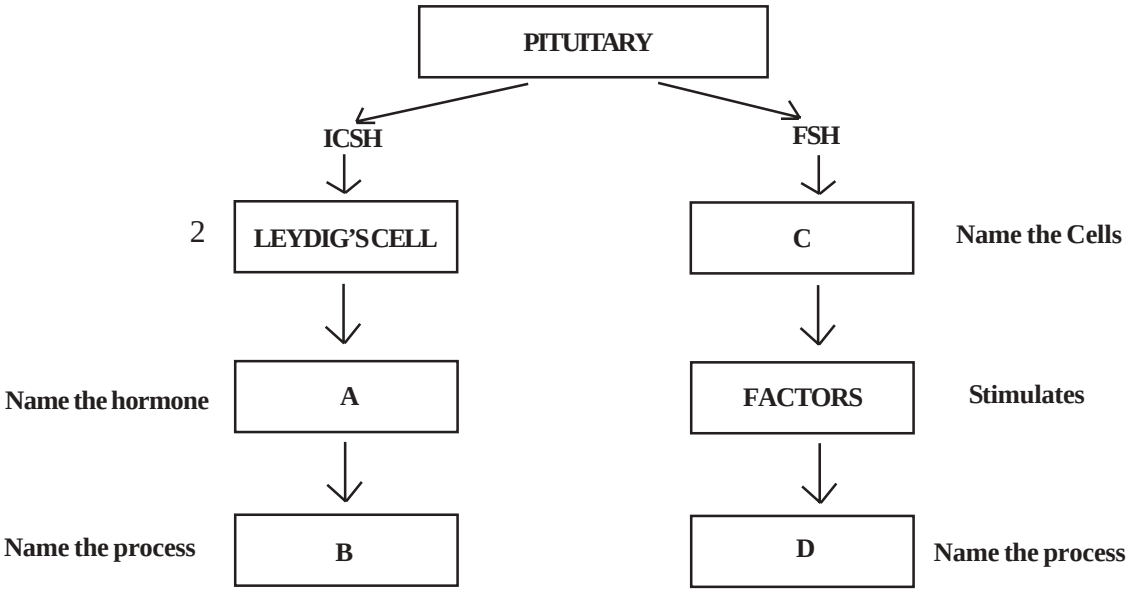
8. Bacteria that convert milk into curd play two other beneficial roles. What are they?

SECTION B

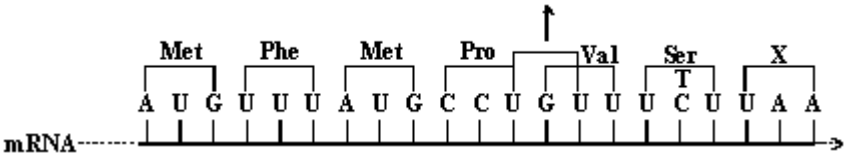
9. Given below is a graph depicting organismic response to changing external conditions. According to their response the organisms are grouped into two types. Name the type which will show (i) pattern A and (ii) pattern B. 2



10. Given below is an incomplete flow chart showing influence of hormones on gametogenesis in males. Observe the flow chart carefully and fill in the blanks A, B, C, and D, 2



11. Read the sequence of the nucleotides in the given segment of mRNA and the respective amino acid sequence in the polypeptide chain.



Polypeptide : met-phe-met-proline-valine-serine

(i) Provide the triplet of bases (codon) for (a) valine (b) proline

(ii) Write the nucleotide sequence of the DNA strand from which this mRNA was transcribed 2

(iii) What does the last codon of this RNA stand for?

OR

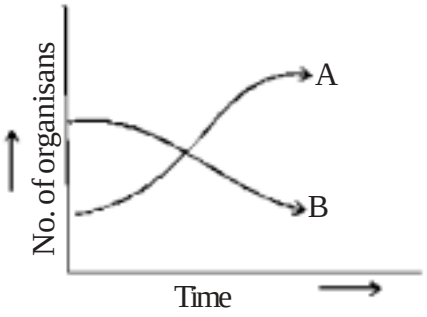
11. The following table shows the genotypes for ABO blood grouping and their phenotypes. Fill in the gaps left in the table :

S.No.	Genotype	Blood Group
1	$I^A I^A$	A
2		A
3	$I^B I^B$	B
4		B
5	$I^A I^B$	
6		O

2

12. (a) The graph below represents the growth patterns of two types of aquatic organisms over a brief period of time in a water body surrounded by an agricultural land extensively supplied with fertilisers. Identify the organisms that would represent (i) A and (ii) B.

(b) State the reason for such a change in the water body and also write the term given to it.



13. Sex determination is based on particular chromosomes in both birds and humans. State two points of difference between their mechanisms of sex determination. 2

14. Following are the steps in MOET programmme for herd improvement in which a cow has been administered hormones with FSH like activity. Arrange steps A to D in their correct sequence.
A - Transferred to a surrogate mother.
B - It is either mated with an elite bull or artificially inseminated.
C - Fertilised eggs at 32 cell stage are recovered non surgically.
D - It produces 6-8 eggs instead of one egg which they normally yield per cycle. 2

15. (i) In which disease is there an uncontrolled division of cells resulting in formation of tumours? How is this disease detected?

(ii) How do interferons help in controlling the disease?

16. State the principle underlying 'gel electrophoresis' and menttion two applications of this technique in biotechnology. 2

17. You have developed a GM organism. Which government organisation will you approach to obtain clearance for its mass production? Why is such a body necessary? Give two reasons. 2

18. How has *Agrobacterium tumifaciens* been suitably modified to act as a cloning vector? 2

SECTION C

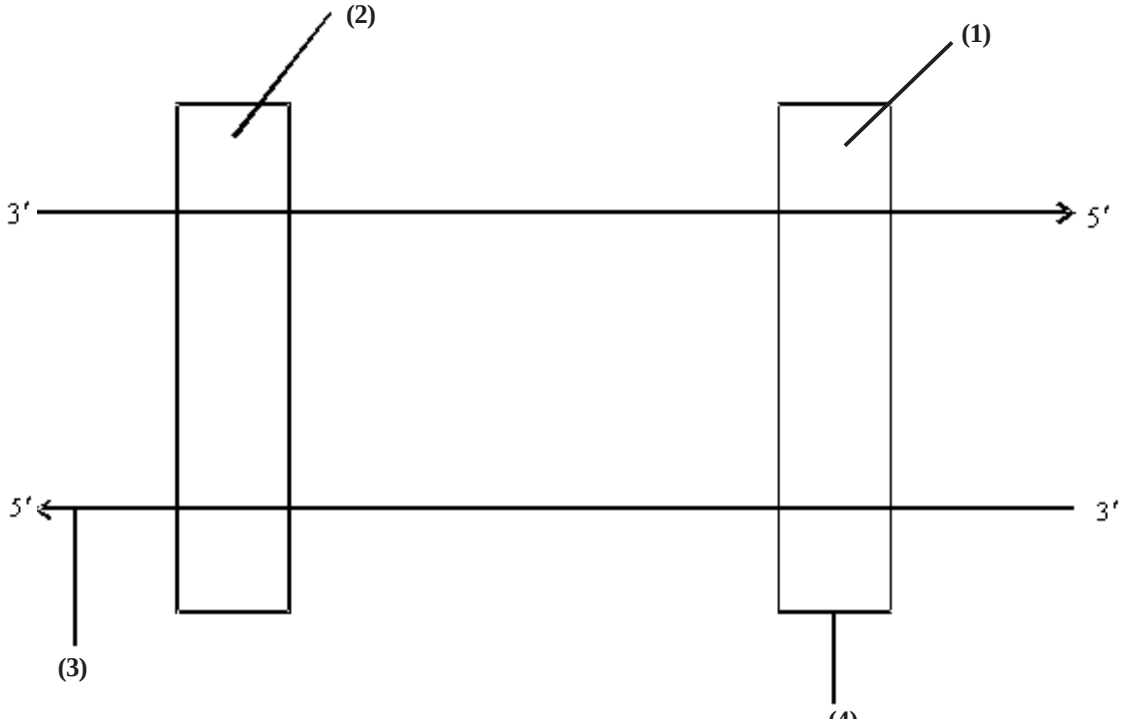
19. Amazonian rain forest has the greatest biodiversity on earth. List any two hypotheses that are proposed by the biologists to account for the greater biological diversity. 3

20. (a) In which part of the human female reproductive system do the following events take place?
I - Release of 1st polar body.
II - Release of 2nd polar body.
III - Fertilisation
IV - Implantation

(b) From where do signals for parturition originate and what does maternal pituitary release for stimulating uterine contractions for child birth? 3

21. A true breeding tall plant is crossed with a true breeding dwarf plant. F_1 progeny is 100% tall and F_2 has tall : dwarf in the ratio 3:1 (i) Explain why F_1 shows only one tpye of parental phenotype; (ii) Name the patterns of inheritance in which the ratio deviates from above. Also mention the deviated phenotypic ratio. 3

22. In the following diagram the two DNA strands represented are ready for transcription



3

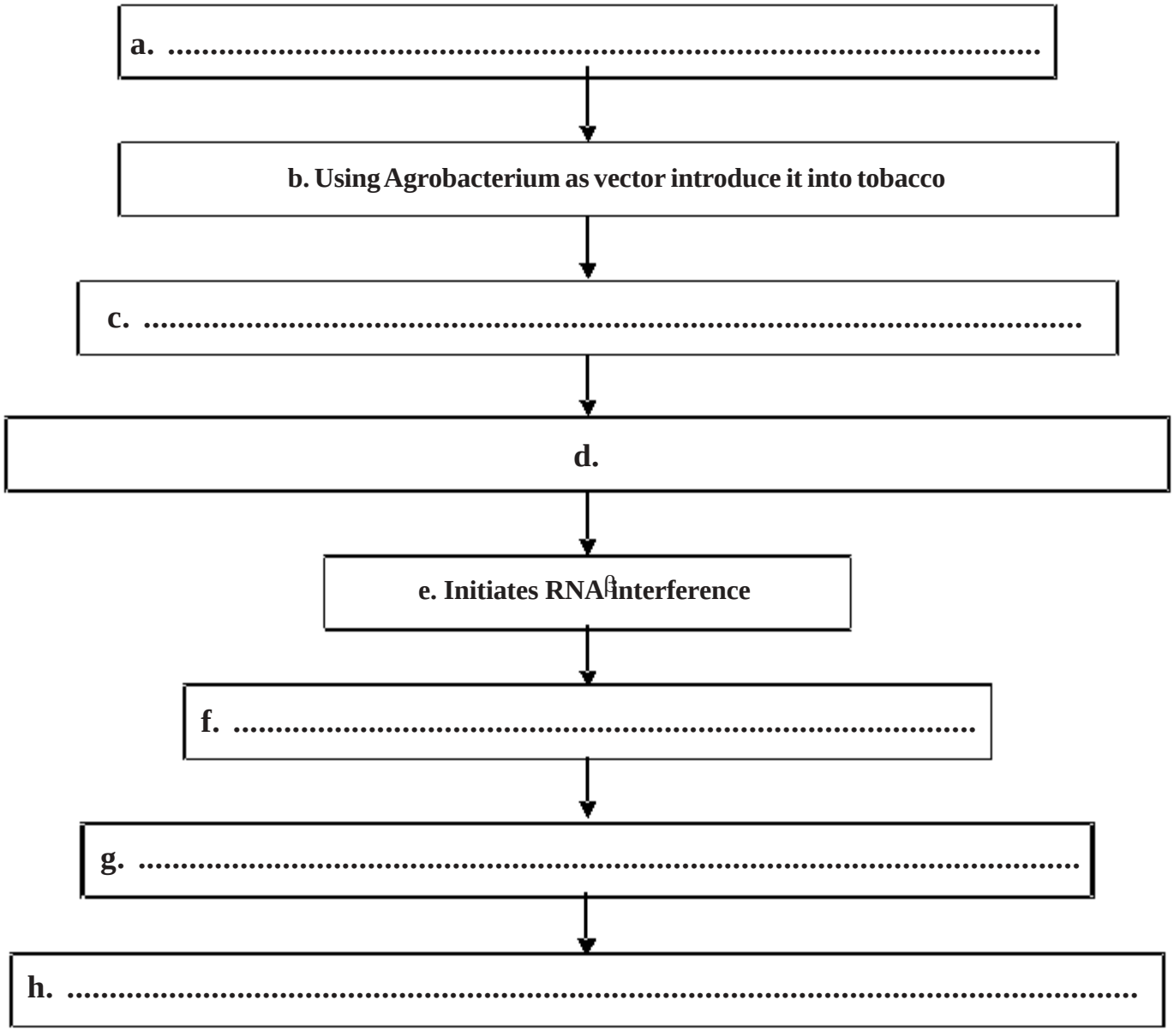
(i) Label the parts marked 1 to 4 and state their functions in transcription.
(ii) Which one of the two strands of DNA has nucleotide sequence similar to the mRNA that will be transcribed and why?

23. State in what ways Stanley Miller simulated the conditions of :
(i) Primitive atmosphere on earth.
(ii) Energy source at the time of origin of life, and
(iii) Formation of organic molecules of life to prove the theory of chemical evolution. 3

24. Draw a flow chart to depict the multiplication of an HIV virus in a host cell. 3

25. What are "flocs"? State their role in effluent treatment and their ultimate fate in sewage treatment tank. 3

26. Two of the steps involved in producing nematode resistant tobacco plants based on the process of RNAi are mentioned below. Write the missing steps in its proper sequence. 3



3

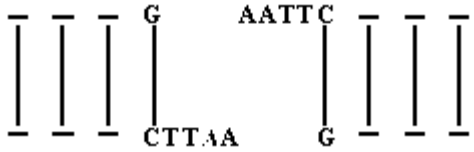
OR

In a bacterial culture some of the colonies produced blue colour in the presence of a chromogenic substrate and some did not due to the presence or absence of an insert (rDNA) in the coding sequence of -galactosidase.

(a) Mention the mechanism and the steps involved in the above experiment.
(b) How is it advantageous over simultaneous plating on two plates having different antibiotics? 3

27. An interesting property of restriction enzymes is molecular cutting and pasting. Restriction enzymes typically recognize a symmetrical sequence of DNA.

Notice that the top strand is the same as the bottom strand, but reads backward. When the enzyme cuts the strand between G and A, it leaves overhanging chains:



A. What is this symmetrical sequence of DNA known as?
B. What is the significance of thsese overhanging chains?
C. Name the restriction enzyme that cuts the strand between G and A. 3

SECTION D

28. (i) A decade back, the enormous vehicular traffic in Delhi had made Delhi rank 4th among polluted cities of the world. Two measures taken by the Delhi Government brought marked improvement in air quality by 2005. What were these two measures and how did they reduce air pollution? 3

(ii) What is the norm set by Euro II for petrol and diesel vehicles?

OR

How is the "sixth episode of extinction" of species on earth, now currently in progress, different from the five earlier episodes? What is it due to? Explain the various causes that have brought about this difference.

29. (a) Draw the embroyo sac of a flowering plant and label (i) central cell (ii) Chalazal end of the embryo sac (iii) synergids.

(b) Name the cell that develops into the embryo sac and explain how this cell leads to the formation of Embryo sac . Also mention the role played by the various cells of the embryo sac. 5

OR

Show diagrammatically the stages of embryonic development from zygote upto implantation in humans. 5

30. Name the genes that constitute an operon. How does lac operon get switched on in the presence of lactose? 5

OR

With the advent of rDNA technology a powerful tool is available to identify a criminal or to the real parents. Name this technique. Write the missing steps in the procedure given below. There of three steps are mentioned in the flow chart: Extraction of DNA from the cells - (ii) .....→(iii) DNA is cut into fragments by restriction enzymes → (iv) .....→ (v).....→ (vi).....→ (vii) Autoradiography. →(viii) 5

Marking Scheme
Sample Paper-III
XII - Biology

Question No.	Value points	Marks
1.	Sea/Forest/Large tree Upright	½ + ½ = 1
2.	When the environment remains unchanged	1
3.	Embryonic life When the sperm enters the egg/at the time of fertilization	½ + ½ = 1
4.	Fallopian tube/oviduct; ZIFT/zygote intra fallopian transfer	½ + ½ = 1
5.	1 : 1 : 1 : 1 : ; Test cross	½ + ½ = 1
6.	Bacterial transformation/transfer of genetic material/by acquiring genes for smooth coat	1
7.	a : Trichoderma - Biocontrol agent of several plant pathogens/ produces Cyclosporin A which is used as an immunosuppressive agent in organ transplant patients b. Nucleopolyhedrovirus - Narrow spectrum insecticide	½ + ½ = 1
8.	Increase in nutritional quality/Vitamain B_{12} check disease causing microbes in the stomach	½ + ½ = 1
9.	A. Conformers B. Regulators	1+1 = 2
10.	A. Androgen/Testosterone/male hormone B. Spermatogenesis C. Sertoli Cells D. Spermiogenesis Stop marking at incorrect entry	½ x 4 = 2
11.	(a) (i) GUU (b) (i) CCU (ii) TACAAATACGGACAAAGAATT (iii) UAA stands as stop signal.	½ x 4 = 2

I^Ai A Blood group $1^A 1^B$ - AB blood group

I^Bi - B blood group ii ɪ¹ [′ - O Blood group

Q.No.	Value points	Marks

12. (A) i. Water Hyacinth / Algal growth
ii. Fish / Aquatic animals
(B) i. Excessive growth of algae triggered by nitrates and phosphates from agricultural land run off water.
ii. Algal bloom / Eutrophication ½ x 4 = 2

13.

Birds		**Human beings**	
(i) Female	: Autosomes + ZW	(i) Autosomes + XX	½ x 4 = 2
Male	: Autosomes + ZZ	Autosomes + XY	
(ii) Male homogametic, Female heterogametic		(ii) Female homogametic, male heterogametic	

14. It produces 6-8 eggs instead of one egg which they normally yield per cycle
It is either mated with an elite bull or artificially inseminated ½ x 4
Fertilised eggs at 32 cell stage are recovered non - surgically
Transferred to surrogate mothers

15. (a) Cancer ; Radiography / Computerised Tomography / Magnetic Resonace Imaging/ any other correct ones ½ x 4
(b) Activate the immune system and help in destroying the cancer cells

16. (a) Technique where charged molecules are separated on their molecular weight, Gel acts as a sieve. ½ x 4
(b) DNA figerprinting / Cloning of rDNA / any other correct two points

17. i. GEAC - Genetic Engineeering Approval Committee
ii. Makes decisions regarding validity of GM research; checks safety of introducing GM- organisms for public services. may harm living organisms. GMO has unpredictable results ½ x 4

18. Genetically engineered to form non-pathogenic,
by modifying Tumor inducing Ti-plasmid 1+1

19. It is a tropical rain forest
A. Speciation is a fuction of time, unlike temporate regions, tropics have remained relatively undisturbed for millions of years and thus had long evolutionary time for species diversification.

B. Tropical environments are more constant, predictable and less seasonal. Variations Such constant environments promote niche specialisation and lead to a greater diversity 1½x2

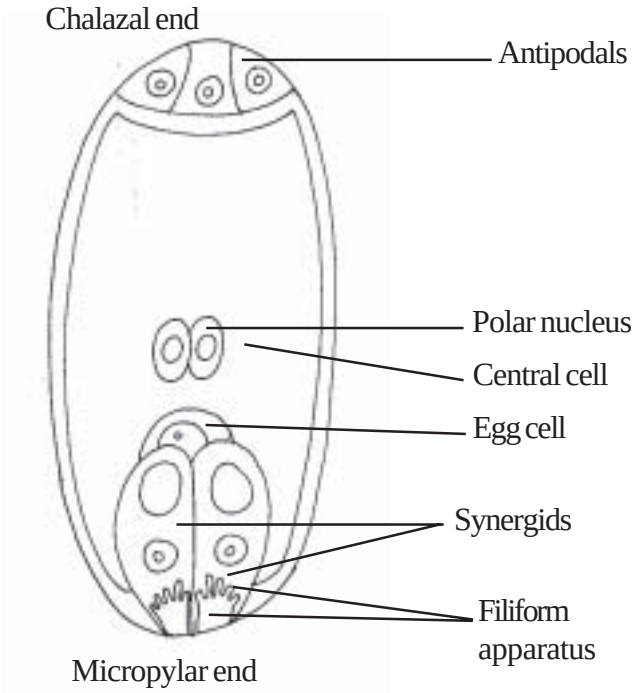
C. More solar energy available - higher productivity - greater diversity (Any two hypotheses)

20. (a) i. In the ovary
ii. In the isthmus - ampullary junction of Fallopian tube
iii. Same as (ii) ½ x 4
iv. In the uterus

(b) fully developed foetus and placenta; Oxytocin/Pitocin 1

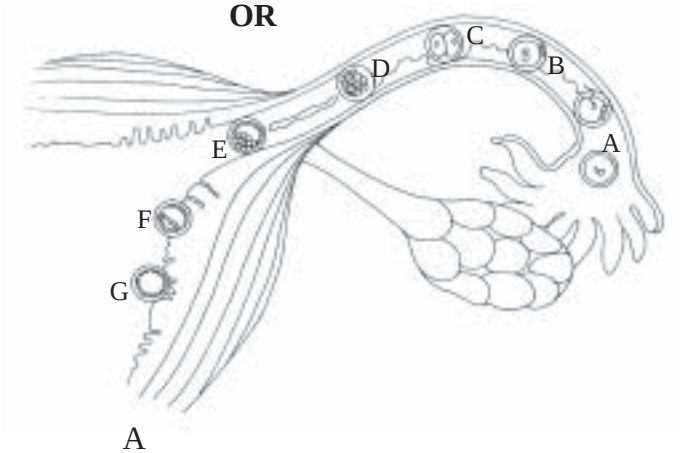
Q.No.	Value points	Marks
21.	(a) Case of dominance where allele T is dominant over allele t that is both heterozygous and homozygous dominant express the dominant trait. (b) Case of incomplete dominance 1 : 2 : 1/ Co-dominance 1 : 2 : 1	1½ + ½
22.	(i) 1. Template strand 2. Promoter 3. Coding strand 4. Terminator (ii) Coding strand because both mRNA and the coding strand are complementary to template strand.	½ x 4 = 2 1
23.	(i) In a closed flask containing NH_3, CH_4, H_2 and Water Vapour to simulate primitive atmosphere (ii) Electric discharge to simulate on primitive earth (iii) Formation of compounds like amino acids from simple molecules like NH_3, CH_4, H_2	1x 3
24.	a. HIV enters the macrophage (human cell) b. Viral RNA genome replicates into DNA with the help of reverse transscription c. Viral DNA is incorporated into host DNA d. Viral DNA directs infected cell to produce viral particles e. Virus comes out while infected cell continues producing HIV particles f. New HIV particles infect Helper T cells which lead to decrease in Helper T cells.	½ x 6
25.	(a) Masses of aerobic bacteria associated with fungal filaments (b) While growing they consume large amount of organic matter of the effluents reducing BOD (c) When effluent goes to settling tank and flocs are allowed to sediment for activated sludge, they get digested by anaerobic bacteria	1 + 1 + 1
26.	(a) Isolate Nematode specific genes (b) Produces sense and antisense RNA in the host cells (c) Being complementary sense and antisense RNA form double stranded RNA (ds RNA) (d) Silence the specific mRNA of the Nematode (e) Parasite cannot survive in the transgenic tobacco host expressing RNAi (f) Thus the transgenic plant tobacco is protected from nematode	
26.	A. (i) Insertional activation : A recombinant DNA is inserted within the coding sequence of an enzyme -galactosidase, results in inactivation of the enzyme (ii) The bacterial colonies whose plasmids donot have the insert produce blue colour but those with an insert do not produce colour B. Simple and easier method of selecting recombinants from non-recombinants.	1x 3
27.	(a) Palindromic nucleotide sequence / Recognition sequence. (b) DNA fragments from two different molecules which have the same kind of sticky ends overhanging chains can be joined together (end to end) by DNA ligases. (c) EcoRI	1 x 3

Q.No.	Value points	Marks
28.	1. Changing of all buses to run on CNG a. CNG burns most efficiently b. Cheaper than petrol or diesel c. Cannot be siphoned off by thieves / adulterated like petrol or diesel 2. a. Phasing out of old vehicles b. use of unleaded petrol / use of low sulphur petrol / diesel c. Use of catalytic converters in vehicles or any other correct two points each	½ x 8 ½ + ½
	Euro II norms : a. stipulates that sulphur to be controlled at 350 ppm in diesel and 150 ppm in petrol. b. Aromatic hydrocarbons are to be contained at 42% of the concerned fuel.	
28.	1. The difference is that 6th episode of extinction is taking place at a 100 to 1000 times faster than the earlier ones. 2. It is largley due to human activities The various causes are: a. Habitat loss and fragmentation b. Over exploitation c. Introduction / Invasion of alien species d. Co-extinctions	½ x 2 + 1 x 4 = 5
29.	(a) Three correct labels	



Q.No.	Value points	Marks
	(b) i. The functional megaspore developes into embryo sac	
	ii. Nucleus undergoes mitotic division and the two cells move to the opposite poles	
	iii. Two successive mitotic division - an eight nucleate embryo sac	½ X 3
	iv. Cell wall formation takes place after nuclear divisins	½ X 7
	v. Three cells group together at the micropylar end - egg apparatus with an egg cell and two synergids	= 5
	vi. Three cells group together at the chalazal end - antipodal cells	
	vii. The remaining two nuclei move to the centre - fuse to form secondary nucleus.	

OR



Zygote------	A	½
Cleavage ----	B 2 celled stage	½
	C 4 celled stage	½
	D Morula with vitelline membrane	1
	E Blastocyst with trophoblast and inner cell mass	1
	F Implantation f blastocyst	½
	G In the endometrium within wall	½

30. i. Regulator gene, Promoter gene. Operator gene and structural gene

1. An inducible operon where Lactose is the inducer and it is the substrate for the enzyme B-galactosidase
2. Three structural genes (z, y, a) which transcribe the polycistronic mRNA
3. z codes for - galactosidase, y for permease and a for transacetylase
4. Near the structural genes is the promoter gene where RNA polymerase binds for transcription
5. An operator gene as a switch near the promoter where a repressor always binds.
6. Repressor protein coded by the i gene prevents the RNA polymerase from transcribing by binding to the operator — ½ X 10 = 5
7. Lactose, an inducer inactivates the repressor and prevents it from binding to the operator.
8. Allows an access for the RNA polymerase to the promoter
9. Transcription takes place
10. The substrate lactose regulates the lac-operon.

OR

DNA finger printing ; (ii) Amplification by polymerase chain reaction

(iv) - Separation of DNA fragments by gel electrophoresis

(v) - Southern blotting — 1 X 5 = 5

(vi) - Hybridization using probe tragment

(viii) Matching of DNA fragment photographs and interpretation.