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

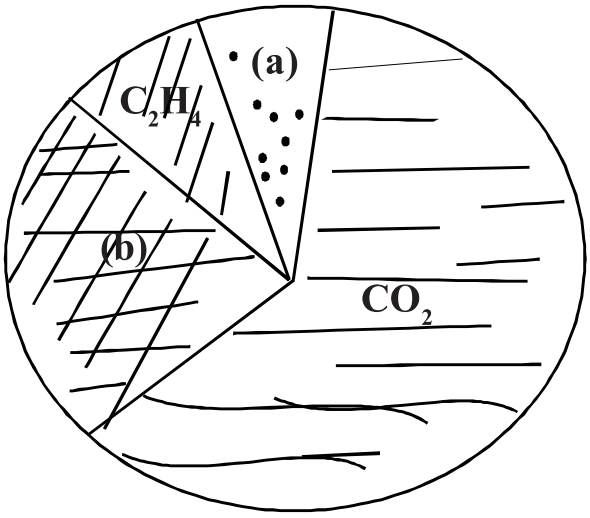
(a) What did the doctor immediately do?
(b) What kind of an immunity was he providing to the patient?
(c) Define this kind of immunity.

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

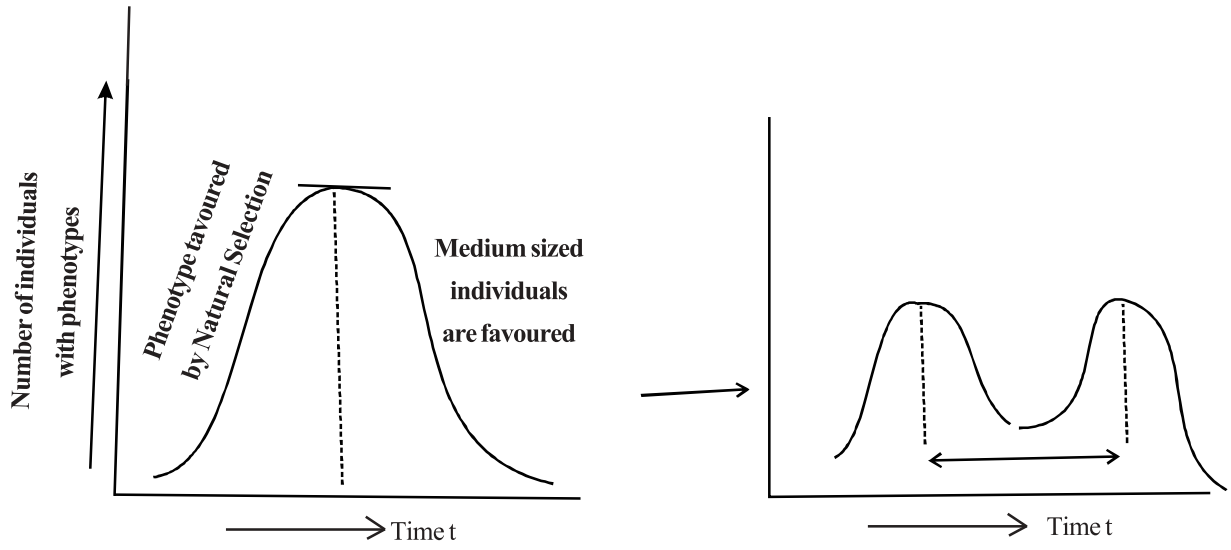
21. A policeman finds a very small piece of body tissue from the site of a crime and takes it to the forensic department.

(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

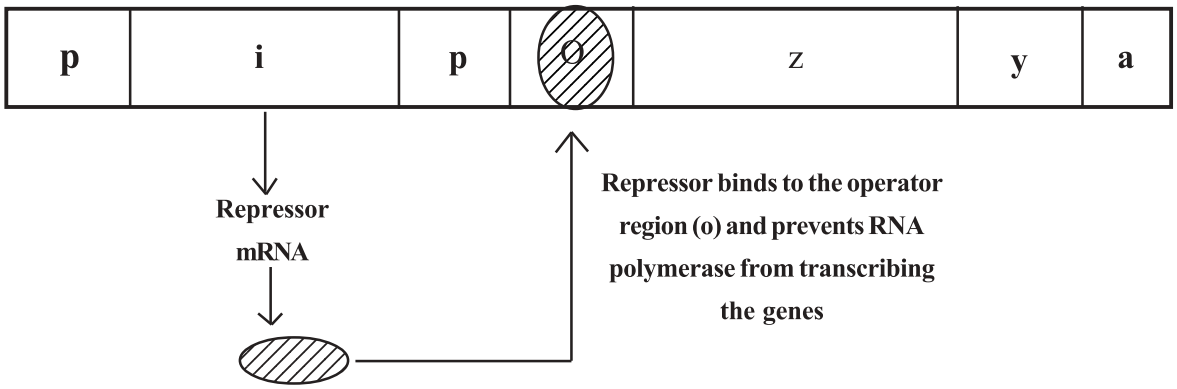
(a) When and where does spermatogenesis in a human male begin to take place? 1

(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

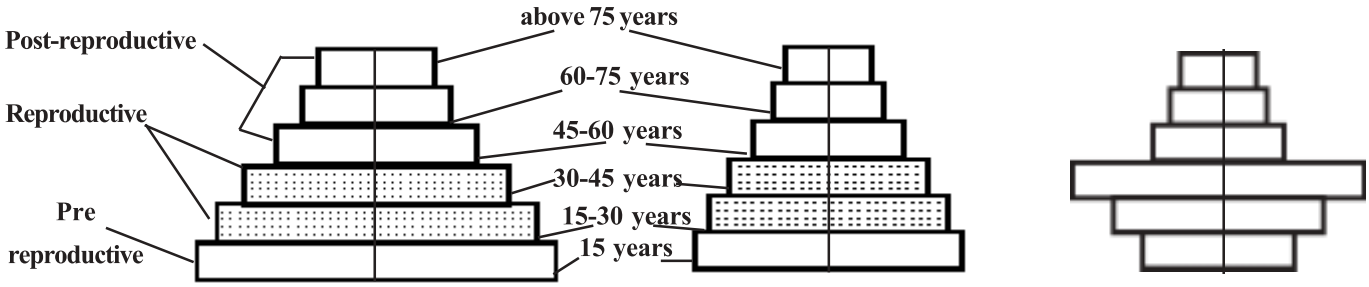
29. (a) Describe the experiment conducted by Alfred Hershey and Martha Chase for identification of genetic material.
(b) Why is it considered pathbreaking in the field of Molecular Biology?

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:



(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.

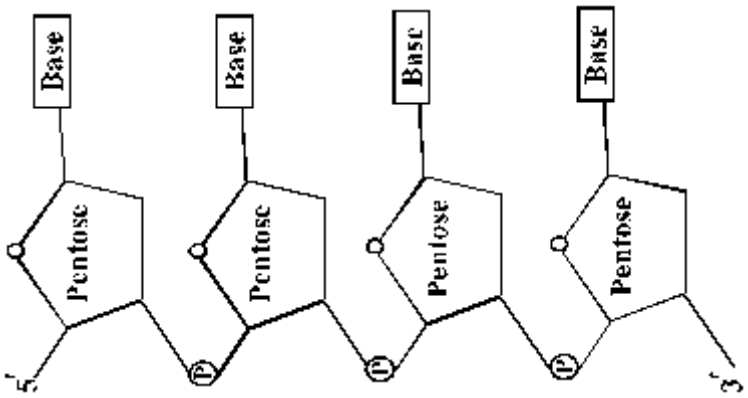
SECTION - A

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

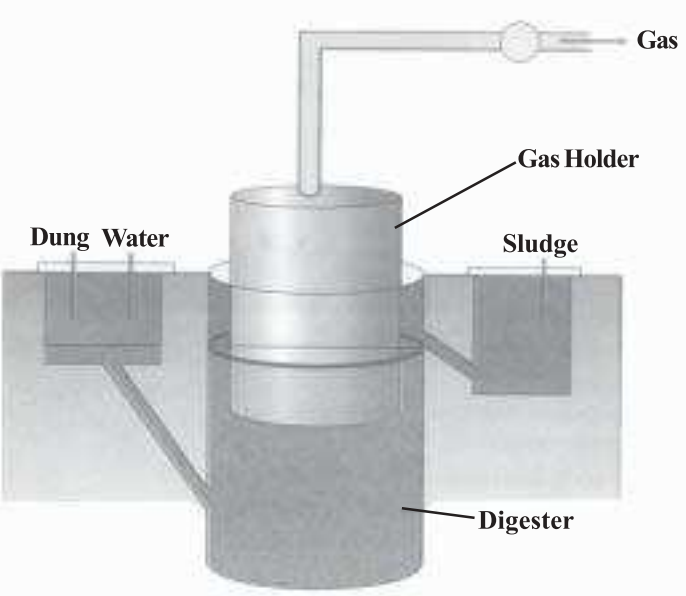
19.	i) Ecological Succession requires soil; ii) Forest destroyed by fire has some soil, so succession progresses faster/secondary seccession iii) Bare rock has no soil/ it takes a lot of time before soil can be formed on bare rock, so succession shall be slow/primary succession (any Two)	(1x2) = 2
	Even 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

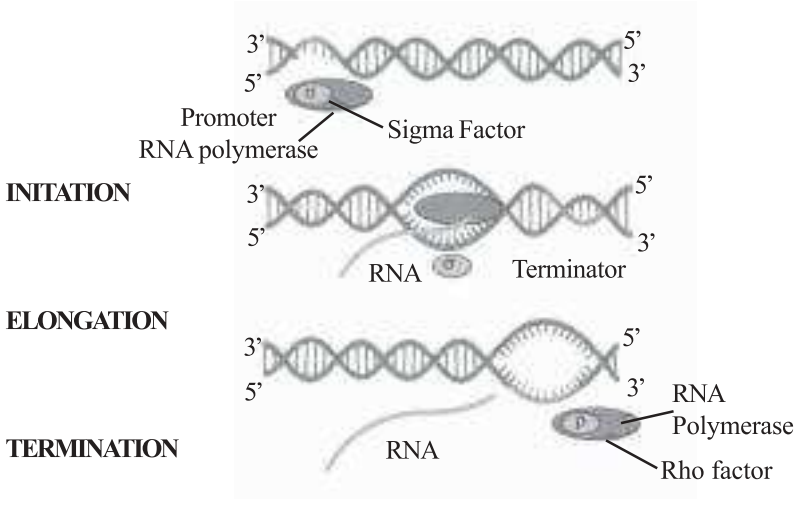
23. Six labels (dung, Water, Gas-holders; Gas; Sludge and Digester) along with diagram. 3



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

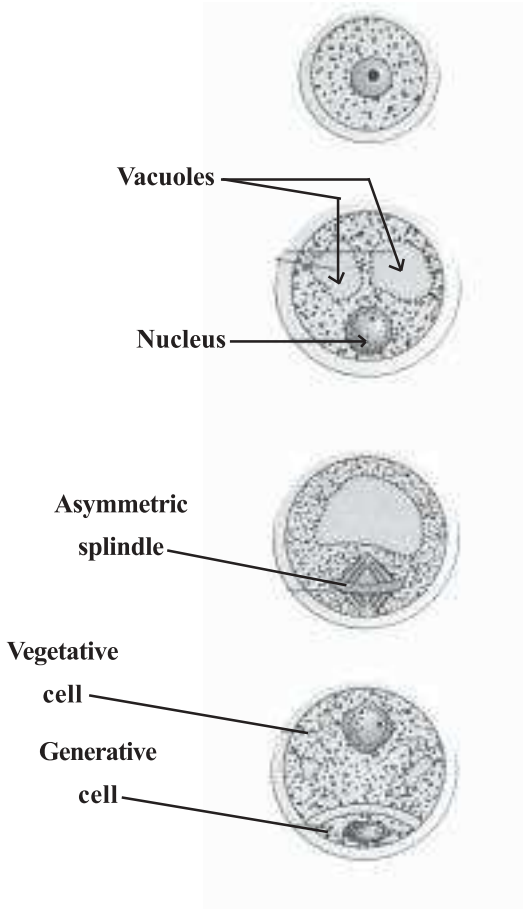
25. Louis Pasteur's 2 flask experiment;
-2-Flasks used both pre-sterilized;
- Pre-killed yeast placed in both them;
-one flask was open to air the, other was not;
-flask open to air has new life but not the one with closed mouth (½ x 2) = 2

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

27.



(½ x 4) = 2 + 1

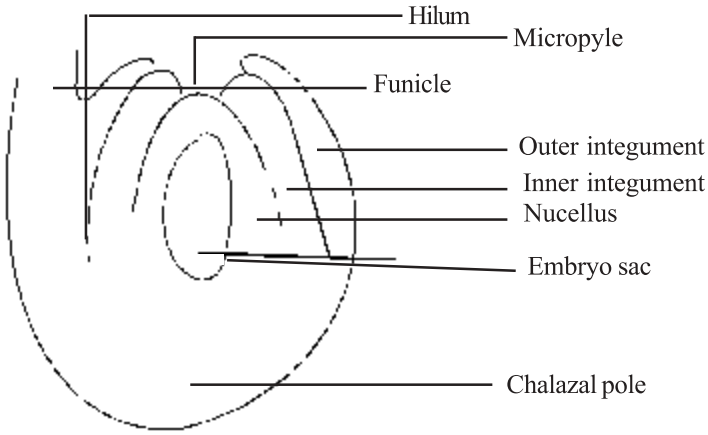
stages of a microspore maturing into a pollen grain

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

SECTION - D

28.

A. (i)



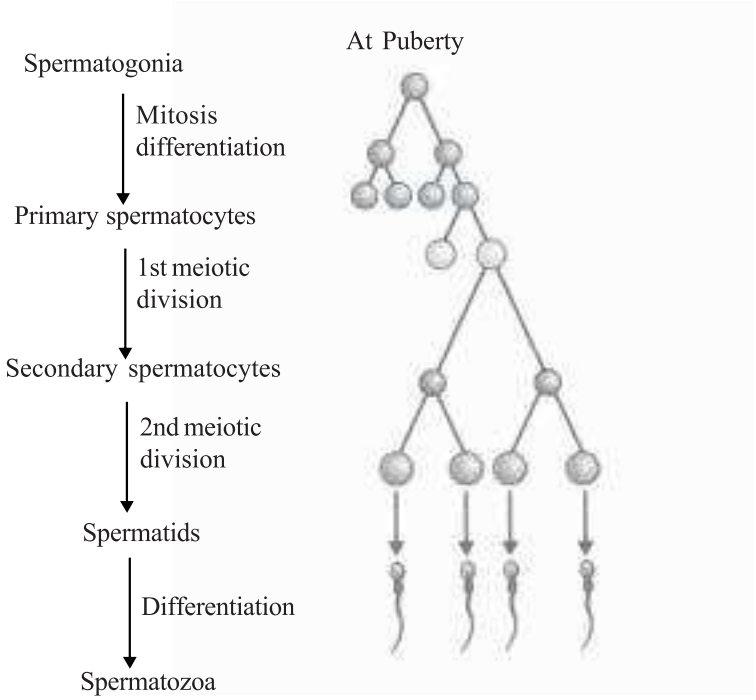
(ii) Any four labels

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

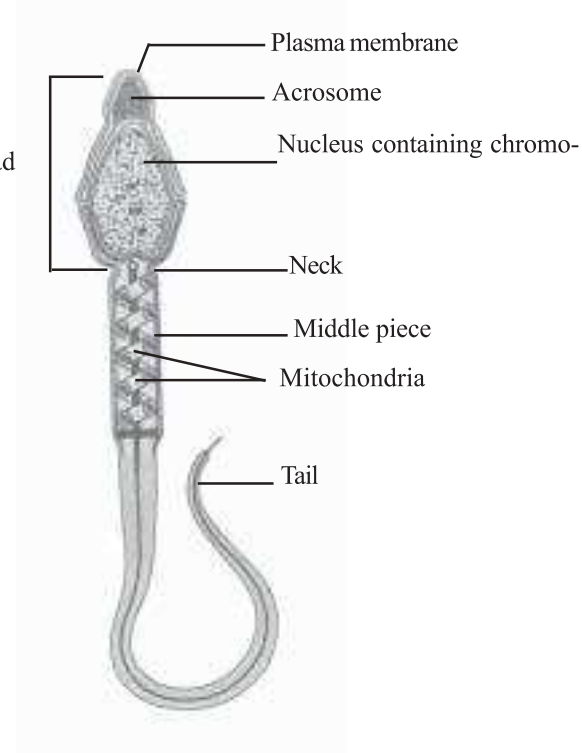
28. (a) Puberty; in seminiferous tubules in testes ½ x 2 = 1



Schematic representation of Spermatogenesis ½ x 4 = 2

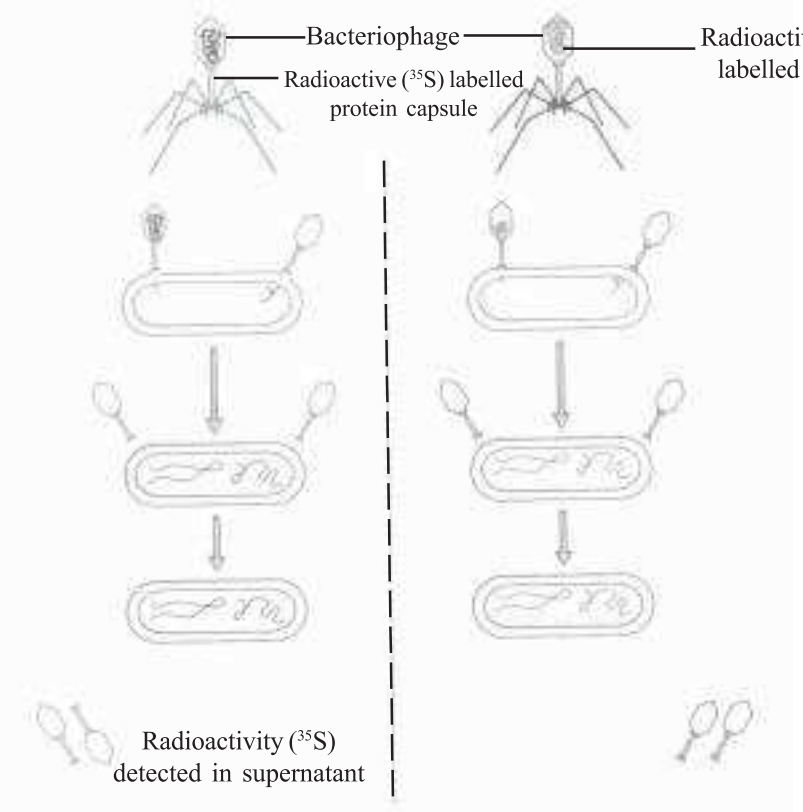
Q. No.	Value Points	Marks

(b)



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

29.



THE HERSHEY - CHASE EXPERIMENT

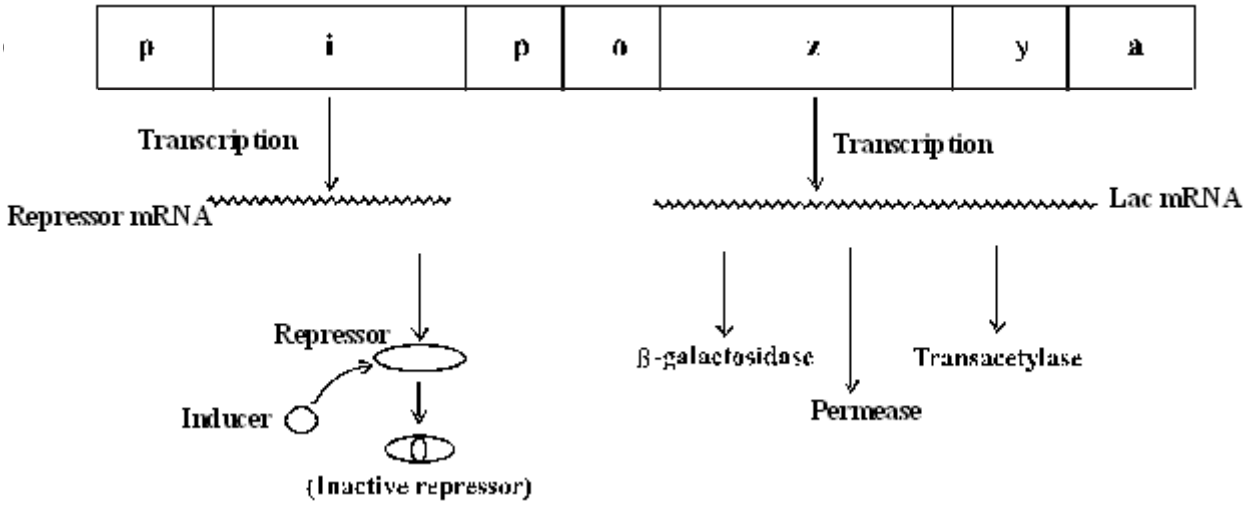
Q. No.	Value Points	Marks

(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

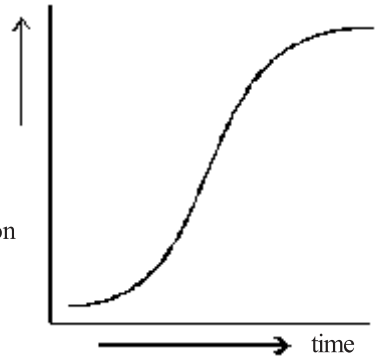
(b) Stable is ideal ½
Because, here the pre-reproductive and Reproductive population are almost similar; so balanced continuity is maintained 1

(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

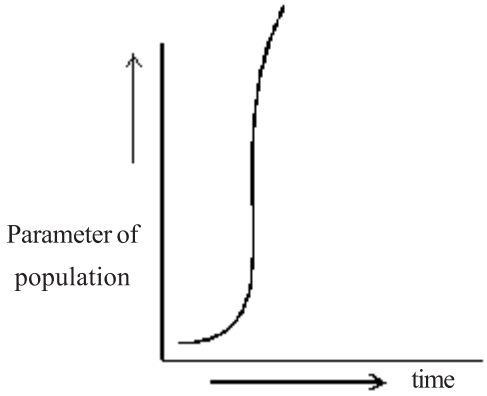
(b) Sigmoid Curve



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