

# BIOLOGY

**SUBJECT SPECIFIC GUIDELINES FOR CLASS XII BIOLOGY THEORY PAPER**

1. The theory paper shall be of 70 marks and of 3 hrs duration.
2. The syllabus shall be in accordance with the core syllabus provided by COBSE.
3. The questions shall be from all the units.
4. The question paper shall have four sections A,B, C & D. Section A will have 8 questions of one mark each. Section B will have 10 questions of 2 marks each, Section C will have 9 questions of 3 marks each and Section D will have 3 questions of 5 marks each. Total number of questions will be 30.
5. All questions will be compulsory.
6. There will be no overall choice. However an internal choice will be provided in one question of section B ,one question of section C and all the three questions of section D. A student has to attempt only one of the alternatives in such questions.
7. The student shall draw correct and neat diagram wherever asked.

**BROAD GUIDELINES FOR SUBJECT SPECIFIC PRACTICALS BIOLOGY CLASS XII**

- The practical examination shall be of 30 marks and 3hr. duration
- The following skill shall be evaluated during practical exam
  - Procedural skill
  - Observational skill
  - Drawing skill
  - Reporting and interpretative skill
- Originality of investigatory project shall be given more importance than volume of report.
- Scheme for evaluation during practical exam:

**PART A****(9 marks)**

S.No	Area	Marks	Criteria	Marks Distribution
1	Practical file and viva on practical's	4	Complete and well maintained file	1
			Correct reporting of practical's done	1
			Viva on practical's	2
2	Investigatory Project and viva	5	Reason for selection	1
			Investigatory Project report	2
			Viva Voce on investigatory project	2
Part-B(21Marks)				
3	Physiology experiment (Major experiment)	6	Procedural skill	2 + 1/2
			Observation	1
			Drawing	-
			Interpretation + conclusion	1 + 1/2
			precaution	1
4	Minor experiment Note:- ☆ wherever diagram is considered essential as part of observation allot 1 ½ marks for procedure and 1 ½ for observation and labeled diagram	4	Procedural skill	2☆
			Observation	1☆
			Drawing	-
			Interpretation	1
5	Slide Preparation	4	Procedure skill	1
			Setting and focusing	1
			Drawing + Identification	1
			Reason for identification	1
6	7 spots	7(1 mark each)	Identification	½ X 7=3.5
			Reason for identification / labeled diagram	½ X 7=3.5

### A. List of Experiments

1. Study pollen germination on a slide.
2. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity. Correlate with the kinds of plants found in them.
3. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organism.
4. Study the presence of suspended particulate matter in air at two widely different site.
5. Study the plant population density by quadrature method.
6. Study the plant population frequency by quadrature method.
7. Prepare a temporary amount of onion root tip to study mitosis.
8. Study the effect of different temperatures and three different pH on the activity of salivary amylase on starch.
9. Isolate DNA from available plant material such as spinach, green pea seeds, papaya etc.

NOTE: Major experiments- experiment No-8

Minor experiments-experiment No-1-7 and 9

### B. Study/observation of the following (spotting)

1. Flowers adapted to pollination by different agencies (wind, insects, birds).
2. Pollen germination on stigma through a permanent slide.
3. Identification of stages of gamete development, i.e., T.S. of testis and T.S. of ovary through permanent slides (from grasshopper/mice).
4. Meiosis in onion bud cell or grasshopper testis through permanent slides.
5. T.S. of blastula through permanent slides (Mammalian).
6. Mendelian inheritance using seeds of different colour/sizes of any plant.
7. Prepared pedigree charts of any one of the genetic traits such as rolling of tongue, blood groups, ear lobes, widow's peak and colour blindness.
8. Controlled pollination- emasculation, tagging and bagging.
9. Common disease causing organisms like Ascaris, Entamoeba, Plasmodium, Roundworm through
10. Two plants and two animals (models/virtual images) found in xeric conditions. Comment upon their morphological adaptations.
11. Two plants and two animals (models/virtual images) found in aquatic conditions. Comment upon their morphological adaptations.

**ASSESSMENT OBJECTIVES & DISTRIBUTION OF FORMS OF QUESTIONS PER UNIT**  
**TASK 4: BLUEPRINT OF CLASS XII BIOLOGY THEORY QUESTION PAPER**

TIME ALLOWED: 03 HOURS

MAXIMUM MARKS:70

UNIT	NAME OF UNIT	KNOWLEDGE				UNDERSTANDING				APPLICATION				SKILLS				TOTAL
		LA	SA	VSA	OBJECTIVE	LA	SA	VSA	OBJECTIVE	LA	SA	VSA	OBJECTIVE	LA	SA	VSA	OBJECTIVE	
1	Reproduction in animals	1 (3) ★2	1 (2) ★1	1 (2)	1(1)				1(1) MCQ			1(2)		1 (2) ★2	(1) ★1			14
2	Genetics and evolution	1 (5)		1 (2)			1 (3)	1(2)	1 (1) MCQ 1(1)		1 (3)						1(1)	18
3	Biology and Human welfare		1 (3) ★1		1(1)		1 (3)	1(2)			1 (3)	1(2)						14
4	Bio technology and its application			1 (2)			1 (3)	1(2)	1 (1) MCQ			1(2)						10
5	Ecology and Environment		1 (3) ★3		1(1) MCQ	1 (2) ★3					1 (3)	1(2)		1 (3) ★3				14
TOTAL					11(25)				11 (21)				7(17)				1+3 starr ed ques- tion( 7)	30(70)

Note:- Questions marked as ★1, ★2 & ★3- test two different objectives in each question and therefore are placed under two different objective columns.

## DESIGN OF CLASS XII BIOLOGY (Theory question paper)

THEORY  
M.M – 70  
Time – 3 hrs.

## 1. Weightage to assessment objectives

Objectives	%Weightage	Marks Out Of 70
Knowledge	35	25
Understanding	30	21
Application	25	17
Skill/Diagrams	10	7

## 2. Weightage to Form/Types of Questions

Type Of Questions	%Weightage	No. Of Questions	Marks out of 70
Objective type(MCQ/VVSA)	11	8 (4MCQ/4VVSA)	8
VSA	29	10	20
SA	39	9	27
LA	21	3	15
Total No. of Questions = 30			
Total marks = 70			

## 3. Weightage to difficulty level of questions

Level	%Weightage	Marks Out Of 70
Difficult	20	14
Average	50	35
Easy	30	21



**SAMPLE QUESTION PAPER**  
**CLASS - XII**  
**SUBJECT BIOLOGY**

Time allowed: 3.00 hrs

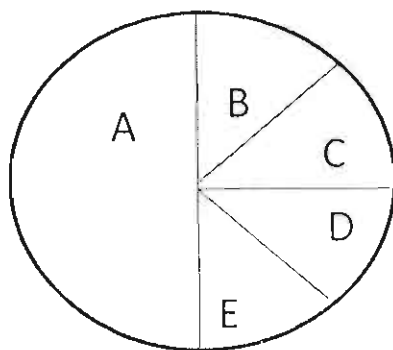
Maximum Marks: 70

**General Instructions:**

- (1) All questions are compulsory.
- (2) This question paper consists of four sections A, B, C and D. Section A contains 8 questions of one mark each. Section B has 10 questions of two marks each, Section C has 9 questions of three marks each and section D has 3 questions of five marks each.
- (3) There is no overall choice. However, an internal choice has been provided in one question of section B, one question of section C and all the three questions of section D. A student has to attempt only one of the alternatives in such questions.

**Section A**

- 1 'Saheli' is a non steroidal preferred female contraceptive because it can be taken:  
(a) Once a month  
(b) once a week  
(c) once in a fortnight  
(d) continuously only for seven days in a month.
2. For the lac- operon to be operational in E.coli, Lactose in its culture medium acts as  
(a) a regulator  
(b) an operator  
(c) an inducer  
(d) repressor
3. Gel electrophoresis is used in DNA profiling. Which of the following is incorrect statement regarding gel electrophoresis?  
(a) An electric current is passed through the gel matrix to separate DNA molecules.  
(b) DNA molecules move towards the -ve electrode.  
(c) Different sized DNA molecules form distinct bands on the gel.  
(d) larger DNA molecules move through the gel more slowly than the smaller DNA molecules.
4. The figure depicts the proportionate number of species of major taxa of vertebrates at the global level.



'A' in the given diagram represent (a) mammals (b) Birds (c) fish (d) Amphibians



5. In organism exhibiting internal fertilization the male gametes are motile. How are the non motile male gametes in seed plants reached to the female gametes ?
6. Write two ways in which meiosis contributes to genetic variation during gametogenesis.
7. Draw a labeled diagram of a nucleosome.
8. Name the breeding process that helped in developing resistance in mung beans to yellow mosaic virus and powdery mildew.

#### Section B

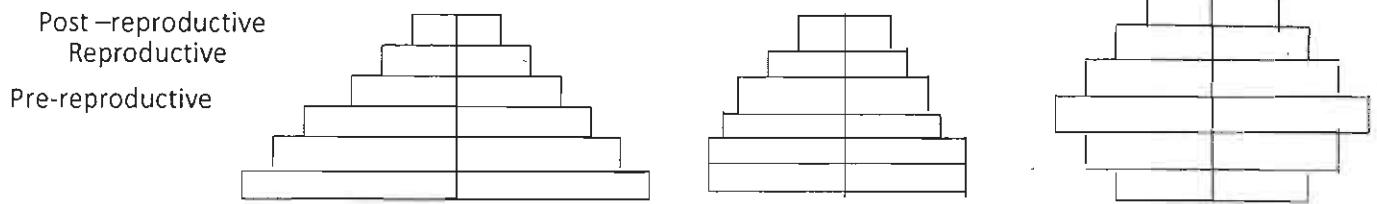
9. Why do majority of flowering plants producing hermaphrodite flowers prefer cross pollination to self pollination? Give a reason. Mention any two devices developed by them to encourage cross pollination.
10. Name and state the functions of the two factors RNA polymerase is associated with, to carry transcription in bacteria.
11. (a) Why do the seeds produced by the hybrid plants, when sown, fail to give the crop the same character which were observed in the previous crop ?  
(b) Can apomictic hybrid seeds be a solution to the above situation? Give reason in support of your answer.
12. Write the differences in the replicating strands in a replicating fork.
13. You are asked to prepare a plan of an artificial cloning vector for a biotechnology experiment. Name the different essential components that you will suggest for the required cloning vector and why?
14. Write the usefulness of molecular scissors and polymerase chain reaction in biotechnology
15. How do cry genes when incorporated in cotton plants make it bollworm resistant? Explain.
16. Genetic variability is the root of any breeding programme. Explain the importance of genetic variability in the breeding programme.

Or

A group of bacteria are referred to as 'methanogens'. why are they so called? Explain.

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17.



- (a) Given above are the representations of age pyramids for human population. Identify and name the one that represents the population of India.
- (b) Which one of these is desirable for our country and why?
18. A boy cut his foot on a rusty metal while playing football and had to go to the doctor to have stitches. The doctor also gave him an injection to prevent him from contracting a certain disease.
- (a) name the disease the doctor feared the boy might contract.
- (b) what did the doctor inject and why was an immediate need for such an injection?
- (c) State the kind of immunity the boy could gain from the injection.

### Section C

19. Draw a labeled diagram of blastocyst. Describe the process of implantation of blastocyst in the human uterus.
20. Explain with the help of an example that homology is based on divergent evolution.
21. A couple with normal vision has two children, one of them is colourblind. Explain with the help of a cross how it is possible. Mention the sex of the affected child.

Or

Mention the genotypes of the following plants giving reasons in support of your answer.

- (a) Snapdragon plant bearing red flowers.
- (b) A pea plant bearing violet flowers in the axial position.
22. How was the American company Eli Lilly successful in producing human insulin by using recombinant DNA technology? Why is this insulin very much preferred to the ones produced by the conventional methods?
23. Explain why is there a time lag of few months to many years between the infection and symptoms of 'AIDS' to appear.
24. The population of the world suffers from "hidden hunger". What does "hidden hunger" refer to? Explain with the help of suitable example any one way that can help in overcoming this problem.

25. Your mother is unknowingly using microbes in her kitchen inspite of her never being a biology student. Explain with the help of three examples how she is making use of beneficial microbes.
26. In your class the teacher has assigned the topic for discussion on impact of human activities on:-  
 (a) Carbon cycle and  
 (b) Biodiversity  
 How convincingly will you present the impact of the mentioned topics? Explain giving reason.
27. Where would you find xerarchsuccession in progress? Explain the xerarch succession from a pioneer species to the climax community.

#### Section D

28. (a) Why is a t - RNA molecule referred to as an adaptor molecule ?  
 (b) State what is aminoacylation and write its importance in translation.  
 (c) What is an m- RNA translational unit ?  
 (d) Write the events that take place in ribosome during translation in bacteria.

Or

- (a) Darwin observed a variety of finches with different types of beaks on his visit to Galapagos islands. Write the explanation he gave and the conclusion he arrived at.  
 (b) Write the difference in the mechanism of evolution as explained by Darwin and de-Vries.
29. (a) Where is a microsporangium located in an angiosperm? Mention the ploidy and the function of tapetum.  
 (b) Name the tissue that undergoes microsporogenesis. Draw the diagram of its bicelled end product and label its different parts.  
 (c) Write any two specific characteristics of the two cells labeled in the above diagram.

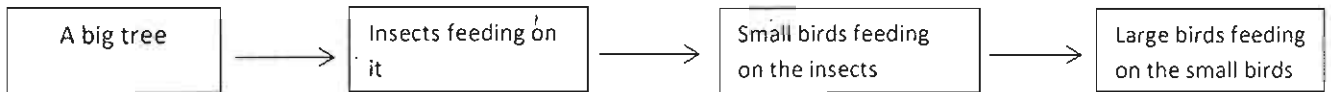
Or

- (a) Differentiate between the process of spermatogenesis and oogenesis on the basis of the following:  
 (i) time of its initiation  
 (ii) site of its completion  
 (iii) Nature of meiotic division undergone by the gamete mother cells.
- (b) Draw the sectional view of human ovary and label the following.  
 (i) Follicle containing primary oocyte  
 (ii) Follicle containing secondary oocyte  
 (iii) Follicle that undergoes ovulation  
 (iv) Structure that release large amounts of progesteron.

30. (a) Construct a food chain representing the correct order of biomagnifications in an aquatic eco system.
- (b) State the cause of biomagnification.
- (c) Mention the effect of biomagnification on the organism occupying the highest trophic level.

Or

- (a) Construct pyramid of biomass and pyramid of number for the following food chain.



- (b) Explain giving reasons the difference observed between the two pyramids drawn by you.
- (c) Name the type of pyramid that is always upright and why.



## Marking Scheme

### Class XII, Biology

- |   |                             |
|---|-----------------------------|
| 1. B  | 1                           |
| 2. c  | 1                           |
| 3. b  | 1                           |
| 4. c  | 1                           |
| 5. Pollen tube carries the male gametes                       | 1                           |
| 6. Random assortment, crossing over/recombination             | $\frac{1}{2} + \frac{1}{2}$ |
| 7. Diagram showing Histone proteins and DNA strand around it. | 1                           |
| 8. Mutation Breeding  | 1                           |

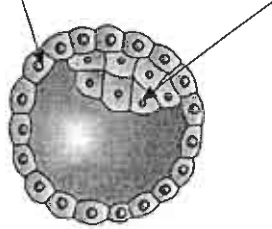
#### Section B

- |   |                                      |
|---|--------------------------------------|
| 9. To avoid Inbreeding depression / to bring variation - ;<br>Stigma receptivity and pollen maturity in some species are not synchronized; anther and stigma are placed at different positions; self-incompatibility. (Any two) | 1<br>$\frac{1}{2} + \frac{1}{2}$     |
| 10. Name                      . Function<br>Sigma factor    →        to initiate transcription<br>Rho factor      →        to terminate transcription   |                                      |
| Note: Do not proceed with marking if the names of the factors not written   | $\frac{1}{2} \times 4 = 2$           |
| 11. (a) Seeds sown from hybrid plants show segregation of characters in the progeny<br>(b) Yes, apomixis is a form of asexual reproduction  | 1<br>$\frac{1}{2} + \frac{1}{2} = 1$ |
| 12. (i) Replication is continuous in one strand, ligase not used<br>(ii) Where as it is discontinuous in the other, ligase used.  | $\frac{1}{2} \times 4 = 2$           |
| 13. Ori, - Replication begins at this DNA sequence ,selectable marker – their function,<br>Cloning Site/ recognition Site – to link the alien/desired DNA. (Any two)  | $\frac{1}{2} \times 4 = 2$           |
| 14. Molecular scissors identifies and cuts the DNA at specific site ,<br>forms multiple copies of desired DNA for various biotech experiments   | 1<br>1                               |
| 15. Cry genes produce an inactive toxin,<br>When bollworm ingests it, the toxin gets activated by alkaline pH of its gut, toxin binds to the gut epithelium, damages it and kills the boll worm.                                | $\frac{1}{2} \times 4 = 2$           |
| 16. Wild relatives of crop plant are a source of pre-existing genetic variability,<br>Can thus be used for developing desired crop varieties  | 1 + 1 = 2                            |
| or  |                                      |
| Anaerobic bacteria acting upon cellulosic material, producing large amount of methane<br>( along with $\text{CO}_2 + \text{H}_2$ )  | 1 + 1 = 2                            |

17. (a) A, expanding  $\frac{1}{2} + \frac{1}{2} = 1$   
 (b) B, to check population growth rate to minimize exploitation of natural resources /to make basic amenities available to all  $\frac{1}{2} + \frac{1}{2} = 1$
18. (a) Tetanus  $\frac{1}{2}$   
 (b) Antibodies of tetanus/ tetanus toxoid, fatal disease.  $\frac{1}{2} + \frac{1}{2} = 1$   
 (c) Artificial/ passive  $\frac{1}{2}$

### Section C

19. Diagram of blastocyst labeled parts (i) trophoectoderm (ii) inner cell mass.  $\frac{1}{2} \times 2 = 1$



### (Blastocyst)

Trophoblast/outer layer of blastocyst gets attached to the endometrium, uterine cells divide, cover blastocyst, blastocyst gets embedded in the endometrium.  $\frac{1}{2} \times 4 = 2$

20. Same origin /basic structural plan similar, performing different function to adapt to different need.  $1 + 1 = 2$   
 Fore limbs of whale, bat, Cheetah and human perform different function but have same structural plan. 1

21. Parents –  $X^c X^C$ ,  $X^C Y$   $\frac{1}{2}$

Gametes –  $X^C$ ,  $X^c$ ,  $Y$   $\frac{1}{2}$

Offspring/F1 –  $X^C$   $X^c$

$x^c$	$X^C X^C$	$X^c X^C$	1
	$X^C Y$	$X^c Y$	

$Y \leftarrow$  affected child (son)

Reason – Mother is carrier  $\frac{1}{2}$

The affected child is son  $\frac{1}{2}$

Or

- (a) RR, as the red colour is expressed only in homozygous condition  
 (b) Homozygous for both traits as both the traits are dominant, Heterozygous for both the traits. 3

22. Prepared DNA stand A and B corresponding to human insulin chain, introduce them into the plasmid of E. coli, separate chains A and B produced, extracted and combined by creating disulphide bands.  $\frac{1}{2} \times 4 = 2$   
Ready to use, no side effects. 1
23. HIV enters the macrophage of human and replicates using reverse transcriptase, virus enters helper T lymphocytes, replicate and produce large number of progeny, affecting more T lymphocyte, number of T lymphocytes progressively decreased, leading to loss of immunity which may take years depending on the immunity of the infected person and gradually suffers from full blown AIDS.  $\frac{1}{2} \times 6 = 3$
24. Deficiencies in micronutrients, proteins and vitamins. 1  
Bio fortification explained with example /  
Single cell proteins explained with example 1+1
25. Starter of curd contains LAB, helps in setting of curd,  $\frac{1}{2} + \frac{1}{2}$   
idli fermentation, bacteria,  $\frac{1}{2} + \frac{1}{2}$   
Baking bread using *Saccharomyces cerevisiae* /  $\frac{1}{2} + \frac{1}{2}$   
Or any other correct example
26. Carbon cycle - deforestation leading to loss of carbon sink;  $\frac{1}{2} + \frac{1}{2}$   
Use of fossil fuels leading to increase in greenhouse gases/global warming.  $\frac{1}{2} + \frac{1}{2}$   
Bio diversity- habitat loss, fragmentation of habitat threatens the survival of biodiversity (explained)  $\frac{1}{2} + \frac{1}{2}$
27. Takes place in dry areas,  $\frac{1}{2}$   
Pioneer species are lichens, invade bare rocks secrete acids help in soil formation,  
Pave way for small plants/bryophytes, with time succeeded by bigger plant, and ultimately to stable climax community/mesophyte community  $\frac{1}{2} \times 5 = 2 \frac{1}{2}$

#### Section D

28. (a) Reads the codons, links the specific amino acids.  $\frac{1}{2} + \frac{1}{2}$   
(b) Activation of amino acid with ATP, this energy used for polypeptide bond formation.  $\frac{1}{2} + \frac{1}{2}$   
(c) Sequence of RNA flanked by AUG/Start codon and stop codon/UAA/UAG/UGA, codes for a poly peptide  $\frac{1}{2} + \frac{1}{2}$   
(d) Ribosome binds to mRNA at AUG, Subsequent amino acids come to two sites (in the bigger sub unit of ribosome), Ribozyme forms the polypeptide bond, ribosome moves from codon to codon till reaches stop codon.  $4 \times \frac{1}{2} = 2$

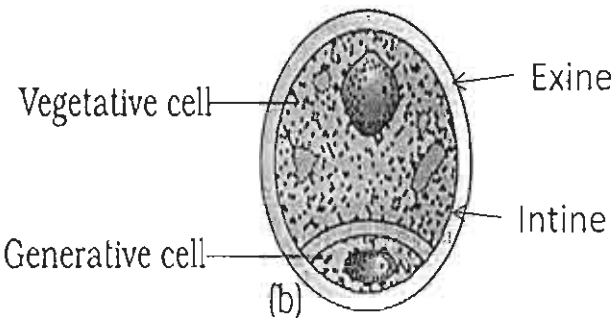
Or

- (a) According to Darwin, all the different finches evolved on the same island, from seed eating original bird, evolved many others with altered beaks, enabling them to become insectivorous and vegetarian, the process of evolution of different species in a given geographical area from a point and radiating in other areas is adaptive radiation.  $6 \times \frac{1}{2} = 3$



(b)	<u>Darwin</u>	<u>deVries</u>	
	<ul style="list-style-type: none"><li>• Heritable variations lead to evolution</li><li>• Small and directional</li><li>• Gradual</li></ul>	<ul style="list-style-type: none"><li>Mutation is cause of evolution</li><li>Random and directionless</li><li>abrupt</li></ul>	2x 1=2

29. (a) Anther lobes, polyploidal/binucleated, nourishes the developing pollen grains. 1 + ½ = 1 ½  
(b) Sporogenous tissue (in the Centre of each sporangium). ½

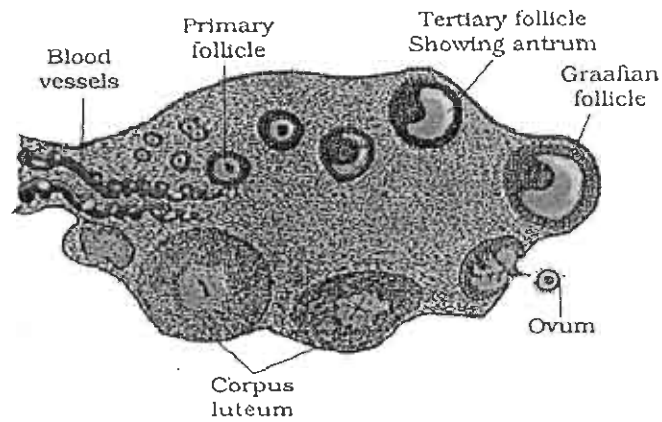


Correct labelsexine, intine, vegetative cell, generative cell ½ X4=2  
Note (Mark only if diagram is drawn correctly)  
(c) Difference between vegetative cell and generative cell  
Vegetative cell:- Bigger, abundant cytoplasm, large irregularly shapes nucleus (any two)  
Generative cell:- Smaller, dense cytoplasm, spindle shaped cell ( any two)  
(and two differences ) ½ + ½=1

Or

(a) Spermatogenesis	oogenesis	
(i) At puberty	At embryonic stage	
(ii) In the testes	In the oviduct/fimbriae	
(iii) equal division	unequal division	1x3 = 3

(b)

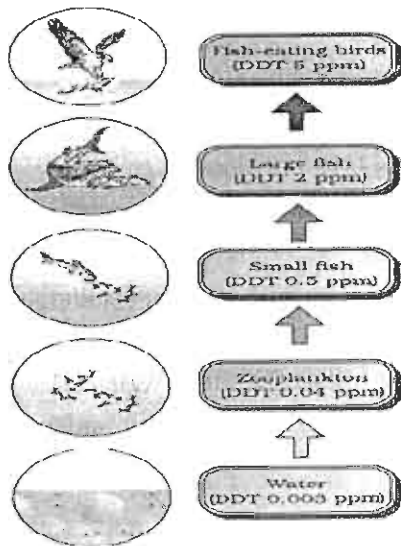


correct labels

- (i) Primary/Secondary follicle
- (ii) Tertiary/Graafian follicle
- (iii) Graafian follicle
- (iv) Corpus luteum

$$\frac{1}{2} \times 4 = 2$$

30. (a)



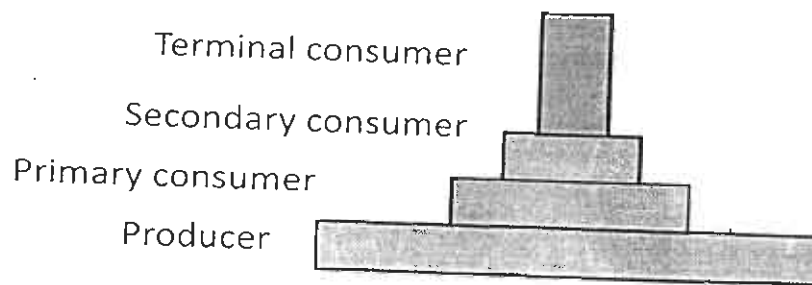
$$\frac{1}{2} \times 6 = 3$$

(b) This happens because a toxic substance accumulated by an organism cannot be metabolized or excreted, and is thus passed on to the next higher trophic level and the concentration of toxic substance increases tremendously at the highest trophic level. 1

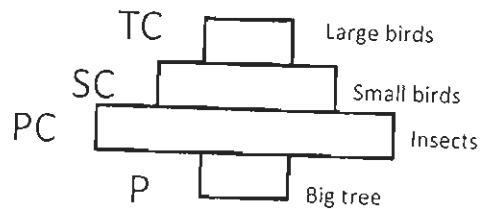
(c) High concentration of DDT affects calcium metabolism in the birds, causing thinning of egg shells and their premature breaking leading to decline in bird population. 1

Or

(a) Pyramid of biomass;



Pyramid of number →



Correct diagrams drawn

 $1 + 1 = 2$ 

(b) Pyramid of biomass is upright, because producers are more in biomass than the herbivores (insects) and herbivores are more in biomass than the small carnivores/small birds and large carnivore's birds.

$$\frac{1}{2} + \frac{1}{2} = 1$$

- Pyramid of number is inverted, because there is a single big tree with large number of insects feeding on it and fewer birds feeding on the insects.

$$\frac{1}{2} + \frac{1}{2} = 1$$

(c) Pyramid of energy, when energy flows from one trophic level to the next there is always some loss at each step (in the form of heat).

$$\frac{1}{2} + \frac{1}{2} = 1$$