

# THIRD PRELIM EXAMINATION

## FEBRUARY 2018

### CLASS XII

#### Marking Scheme – BIOLOGY [THEORY]

Q.NO.	Answers	Marks
		(with split up)
1.	<p>After a brief medical examination a healthy couple came to know that both of them are unable to produce functional gametes and should look for an ‘ART’ (Assisted Reproductive Technique). Name the ‘ART’ that you can suggest to them to help them bear a child.</p> <p>Test tube baby programme</p>	1
2.	<p>List any two characters of Pea plants used by Mendel in his experiments other than height of the plant and the colour of the seed.</p> <p>Flower colour / Flower position / Pod shape / Pod colour / Seed shape (Any two)</p>	½+½
3.	<p>Mention the role of Restriction Enzymes in Recombinant DNA technology.</p> <p>Ans. To cut DNA at specific sites / Molecular scissors (DNA)</p>	1
4.	<p>What is Biopiracy ?</p>	1
5.	<p>Write the importance of MOET.</p> <p>For herd development</p>	1
6.	<p>What is amniocentesis? Justify the statutory ban on it.</p> <p>Study of chromosomal pattern in amniotic fluid of foetus ,</p> <p>It is misused to detect the sex of the foetus , ban to check female foeticide</p>	1
7.	<p>Why is the possibility of human female suffering from haemophilia rare? Explain.</p> <div style="text-align: center; margin: 10px 0;"> <math display="block">\begin{array}{ccc} X X^h &amp; \times &amp; X^h Y \\ &amp; \diagdown \quad \diagup &amp; \\ &amp; X^h X^h &amp; \end{array}</math> </div> <p>haemophilic female , = ½</p>	½ × 2
		1

rare because mother should be atleast carrier and father haemophilic (non viable at later stage) = 1

8. What is the pathogenic property of baculovirus, used as a biological agents ? Name the genus of these organisms. 1

Attacks insect, and other arthropods

Nucleopolyhedrovirus

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

OR

Mycorrhizal association exists between fungi (Glomus sp) and roots of higher plants. How is

this association beneficial to each member ?

The Glomus helps the plant in absorption of essential nutrients / phosphorus from the soil , and the plant in turn provide the fungus with energy yielding carbohydrate

9. a) Why is small amount of curd added to milk?

Acts as inoculum / which carry bacterium for converting milk into curd.

b) what is the difference between fermentation of dough for making dosa and bread?

Fermentation of dough for dosa- bacteria/ fermentation of dough for bread is by yeast(Sacharomyces)

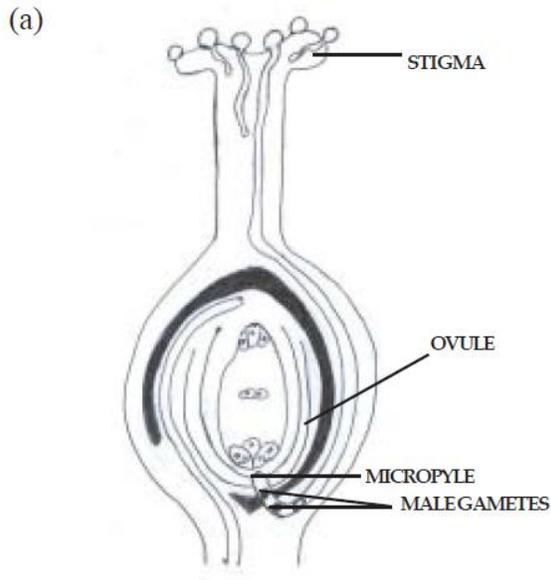
10. "Niche is a part of a habitat." Explain with the help of an example.  $\frac{1}{2} \times 4 = 2$

A single habitat may have different kind of organisms in it but within the habitat every organism has defined range of condition that it can tolerate , resources it utilises and plays a distinct functional role - all these together comprise its niche , for example pond is a habitat for variety of plants and animals , but in it Gambusia fish is found in its peripheral parts which is its niche. (Any other suitable example with explanation) =  $\frac{1}{2} \times 4$

11. (a) Draw a diagram of Pistil showing pollen tube growth in angiosperm and label (i) 3

Stigma; (ii) male gametes; (iii) micropyle and (iv) Ovule.

(b) Write the function of micropyle.



(b) the pollen tube enters the ovule through micropyle , it facilitates the entry of oxygen and water for seed germination. =  $\frac{1}{2} + \frac{1}{2}$

12. Give reason :-

1+1+1

(a) A liverwort plant is unable to complete its life cycle in a dry environment.

(b) Number of male gametes produced is much more than the female gametes produced.

(c) Organisms exhibiting external fertilization show great synchrony between the sexes and release a large number of gametes into surrounding medium.

a) They need water as a medium of gamete transfer for fertilization.

b) A larger number of the male gametes fail to reach the female gametes

c) To enhance the chances of syngamy

13. How is Darwin's theory of natural selection different from Hugo deVries theory of mutation? Explain

Darwin's theory	Hugo de Vries
(i) Directional	Directionless
(ii) Gradual / slow	sudden
(iii) Continuous variation	Random

$1 \times 3 = 3$

14. Write the three basic facts that are highlighted in Mendel's Law of Dominance.

3

Ans. (i) Characters are controlled by discrete units called factors = 1

(ii) Factors occur in pairs = 1

(iii) In a dissimilar pair of factors one member of a pair dominates (dominant) the other (recessive)= 1

15. "A population has been exhibiting genetic equilibrium". 3

$\frac{1}{2} \times 6$   
= 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 equilibrium of the population.

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

(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 greater reproduction of certain/ alleles gene flow. migration genetic drift : alleles move out of gene pool

16. (a) Name the causative agent of amoebiasis and mention its symptoms. 3

(b) Write how does it spread.

Ans. (a) *Entamoeba histolytica* = 1

Symptoms - Constipation / abdominal pain / cramps / stool with excess mucus and

blood clot (Any two) =  $\frac{1}{2} + \frac{1}{2}$

(b) Spreads through housefly / drinking water contaminated with faecal matter / eating food

contaminated with faecal matter (Any one) = 1

17. 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?  $\frac{1}{2} \times 6$

Heterotrophic 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  $\text{CH}_4$ ,  $\text{H}_2\text{S}$ , and  $\text{CO}_2$  or biogas are evolved; which can be used as fuel.

18. What was the challenge for production of insulin using rDNA techniques ? How did Eli Lilly produce insulin using rDNA technology ? 3

Ans The challenge for production of insulin using r DNA technique was getting insulin

assembled into a mature form = 1

- Prepared two DNA sequence corresponding to A and B chains of human insulin.
- introduced them in plasmids of E.coli to produce insulin chains.
- chains A and B were produced separately.
- extracted and combined by creating disulfide bonds to form human insulin =  $\frac{1}{2} \times 4$

19. (a) What is an “allergic reaction” ? 3

(b) Name any two drugs used to quickly reduce the symptoms of allergy.

(c) Why do more and more children in metro cities of India suffer from allergies and asthma ?

a) The exaggerated response of the immune system to certain antigens present in the environment (is called allergic reaction) = 1

b) anti-histamine / adrenalin / steroids ( Any two) =  $\frac{1}{2} + \frac{1}{2}$

c) due to deteriorating air quality / sensitivity to the environment /allergens / lowering of immunity

due to modern day life style ( which could be due to the protected environment provided largely in life) =  $\frac{1}{2} + \frac{1}{2}$

20. Explain the role(s) of the following in Biotechnology : 3

(a) Restriction endonuclease

(b) Gel - electrophoresis

(c) Selectable markers in pBR322.

Ans. (a) Cuts at specific position within the DNA / cuts DNA at specific nucleotide / cuts at palindromic nucleotide sequence = 1

(b) Separation of DNA fragments (under the influence of electric field ) = 1

(c) Helps in identifying and eliminating non-transformants from transformants / selection of transformants = 1

OR

Write the steps you would suggest to be undertaken to obtain a foreign-gene-product.

Insert a piece of alien or desired or foreign DNA into a cloning vector , transfer it into a bacterial /

plant / animal cell , the alien DNA gets multiplied , optimised condition (temperature pH , substrate , salts , vitamins , O<sub>2</sub> ) provided to the culture / culture in bioreactor / in continuous culture

system to induce the expression of the target product , extracting the desired product ,  
purifying it by

using different separation techniques =  $\frac{1}{2} \times 6$

21. Why do lepidopterans die when they feed on Bt cotton plant ? Explain how does it happen. 3

Ans. Bt cotton contains inactive toxin protein / protoxin / insecticidal protein / crystal protein , once the insect ingest it the inactive protoxins are converted into active form due to alkaline pH in gut , which solubilise the crystals , activated toxins binds to surface of midgut (epithelial cells) , create pores causes cell swelling ,lysis eventually leading the death of the insect pest =  $\frac{1}{2} \times 6$

22. Explain with the help of two examples how certain plants have evolved morphological and chemical defenses against primary consumers such as cows and goats. 3

Thorns of Acacia / Cactus are morphological means of defence against cows & goats = 1

- Plants produce & store chemicals that make herbivore sick when they are eaten inhibit feeding or digestion and disrupt its reproduction or even kill it = 1

- Calotropis produces highly poisonous cardiac glycosides so cows and goats can never browse on these plants / Chemical substances like nicotine / caffeine / defences / strychnine / opium are actually defences against grazers & browsers = 1

23. A son persuades his father to replace his old mobile phone with the latest model 3

launched in the market. He also shares the latest features it has and explains how it can be of a help to him in the modern technological world. Father is reluctant in buying a new one and tries to explain about its environmental impact. How do you think, the biologist father would try to convince his son? Justify the arguments of father and son both, by mentioning positive aspects of the behavior displayed by both of them in the situation concerned (three each).

Father explains that it will lead to generation of e - waste;

Difficulty in recycling e - waste / hazardous nature of recycling of e - waste / exposing workers to toxic substances present in e - waste (Any one) 1

Son's wish to update his father with modern techniques, Awareness about trends and technologies, well versed with their applicability in daily life (any other similar / appropriate values)  $\frac{1}{2} \times 3 = 1\frac{1}{2}$

Concern for environment, scientific thinking, inquisitive nature, social awareness, judicious use of money, sense of responsibility (any other similar /appropriate values)  $\frac{1}{2} \times 3 = 1\frac{1}{2}$

24. (a) What are the benefits of choosing a dioecious plant species for plant breeding

experiments ?

(b) How would you proceed to cross-pollinate a monoecious flower ?

(c) Draw a labelled schematic diagram of T.S. of an anther of an angiosperm.

Ans (a) (Unisexual) self pollination avoided , emasculation not required =  $\frac{1}{2} + \frac{1}{2} = 1$

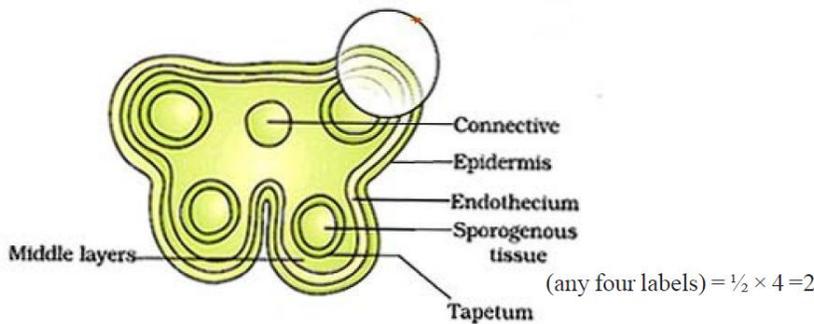
(b) - Emasculation

-Bagging

-Pollination by spraying desired pollen

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

(c)

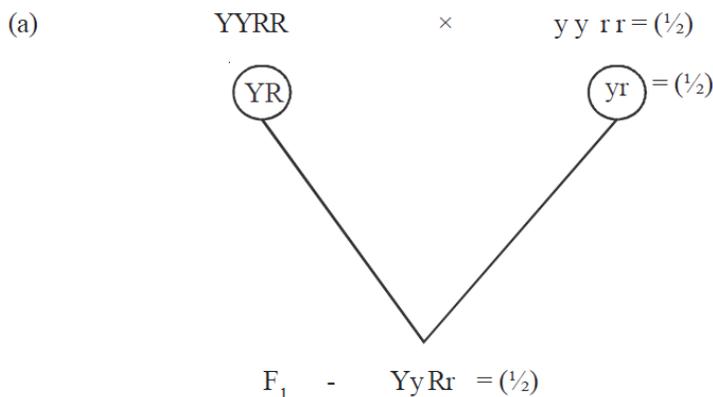


25. State and explain the “law of independent assortment” in a typical Mendelian dihybrid cross.

5

Law of Independent Assortment : when two pair of traits are combined in a hybrid , inheritance of one pair of characters is independent of the other pair of characters / when two pairs of contrasting characters or genes or traits are inherited together in a dihybrid cross (in a pea plant ) the inheritance of one pair of character is independent of inheritance of the other character in the progeny = 1

Explanation : Mendel took homozygous pea plant producing yellow and round seeds and crossed them with homozygous pea plant producing green and wrinkled seeds / shown in a flow chart of a dihybrid cross given



↓

	YR	Yr	yR	y $\bar{r}$ } (= 1/2)	
(1/2) YR	YYRR	YYRr	YyRR	YyRr	}
Yr	YYRr	YYrr	YyRr	Yyrr	
yR	YyRR	YyRr	yyRR	yyRr	
y $\bar{r}$	YyRr	Yyrr	yyRr	yyrr	

F<sub>2</sub>  
(1/2)

Phenotypes – Yellow round : Yellow wrinkled : Green round : Green wrinkled

Phenotype ratio – 9 : 3 : 3 : 1

(Four different types of phenotypes in correct ratio) = 1/2 + 1/2

(Formation of new phenotypes along with parental phenotypes is possible because inheritance of two pairs of contrasting traits or genes in the progeny is independent of each other)

OR

(a) How do the observations made during moth collection in pre- and post-industrialized era in England support evolution by Natural Selection ?

(b) Explain the phenomenon that is well represented by Darwin's finches other than natural selection.

Ans. (a) • Before industrialisation white coloured lichen covered the trees in which white winged

moths camouflaged themselves from predators ,

- More white winged moths existed on trees than dark winged or melanised moths ,
- After industrialisation there were more dark winged moths in the same area i.e. proportion was reversed ,
- Predators would spot a moth easily against a contrasting background ,
- During post industrialisation tree trunks became dark due to industrial smoke and soot ,
- White winged moth did not survive due to detection by predators whereas dark winged survived = 1/2 × 6

(b) The process of evolution of different species in a given geographical area starting from a point , radiating to other areas of geography (habitats) is called adaptive radiation , finches

evolved in the same island from original seed eating features , many other altered beaks arose enabling them to become insectivorous and vegetarian finches = 1/2 × 4

26. (a) Write the percentage of land area that was covered by forests by the end of the last century.
- (b) Describe any two practices that led to deforestation.
- (c) State the consequences of deforestation.
- (d) Suggest a method to overcome deforestation.

Ans (a) 19.4% =  $\frac{1}{2}$

(b) -Trees are axed for timber / firewood / land for industrial requirement

-Slash and burn agriculture

- habitat loss and fragmentation- clearing of forest land into grass land for raising cattle

(Any two) = 1+1

(c) -Deterioration of our environment in terms of air - water and soil quality.

-causes loss of bio diversity

- disturbance in hydrological cycle / biogeochemical cycle

(Any two) = 1 + 1

(d) Reforestation or any other appropriate alternative =  $\frac{1}{2}$

OR

(a) Comment on the pattern in which all communities undergo a change in composition and structure with changing environmental conditions.

(b) Explain 'Climax community' and 'sere'.

(c) Differentiate between primary and secondary succession with examples.

Ans (a) Orderly and sequential changes parallel with changes in physical environment =1

(b) climax community-changes finally lead to a community that is in equilibrium with environment =1

Sere-the entire sequence of communities that successively change in a given area =1

(c) Primary succession Secondary succession

(i) occurs in newly cooled lava / occurs in abandoned / destroyed forest  
bare rock / newly created pond.

(ii) Slow process Fast Process  $\frac{1}{2} \times 4 = 2$

