

# THIRD PRELIM EXAMINATION

## FEBRUARY 2018

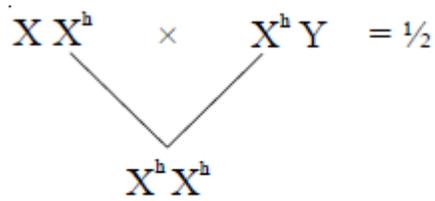
### CLASS XII

#### Marking Scheme – BIOLOGY [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	Write the importance of MOET. For herd development	1
2.	Why is the enzyme cellulose needed for isolating genetic material from plant cells and not from the animal cells?  Because plant cell wall is made of cellulose. The enzyme cellulose can digest (breakdown) cellulosic cell wall. The animal cell do not have cellulosic cell wall.	½+½
3.	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.  Test tube baby programme	1
4.	What is Biopiracy ?	1
5.	When does a geneticist need to carry a test cross ?  To know unknown genotype of the dominant trait (homozygous or heterozygous )	1
6.	What is amniocentesis? Justify the statutory ban on it.  Study of chromosomal pattern in amniotic fluid of foetus ,  It is misused to detect the sex of the foetus , ban to check female foeticide	1
7.	Why is the possibility of human female suffering from haemophilia rare? Explain.	2

½ × 2

1



haemophilic female , =  $\frac{1}{2}$

1

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?

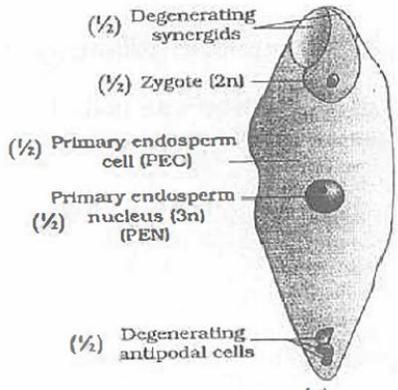
Fermentation of dough for dosa- bacteria/ fermentation of dough for bread is by yeast(Sacharomyces)

10. Evaluate the effect of loss of biodiversity in a region. Mention any four such effects.

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

- Decline in plant production/Decline in number of animal species
- Lowered resistance to environmental perturbations such as drought
- Increased variability in certain ecosystem processes such as plant productivity/ water use / pest & disease cycles
- Species may become endangered/increased rate of species extinction

11.



5X 1/2

1/2

Antipodals will degenerate.

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 × 3 = 3

14.

A true breeding tall plant is crossed with a true breeding dwarf plant. F1 progeny is 100% tall and F2 has tall : dwarf in the ratio 3:1 (i) Explain why F1 shows only one type of parental phenotype; (ii) Name the patterns of inheritance in which the ratio deviates from above. Also mention the deviated phenotypic ratio.

1 1/2 + 1/2

- (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

15. "A population has been exhibiting genetic equilibrium". 3 ½ x 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. Your classmate complains of headache and cough. On the basis of certain symptoms, the doctor confirms that he is suffering from Pneumonia and not common cold. List these symptoms. Mention any two precautions to be followed to prevent the spread of this disease. 3
- Doctor confirms pneumonia on the basis of the following symptoms - fever/chills/grey - blue lips and finger nails (any two); ½+½
- and not common cold as the following symptoms are not observed - Nasal congestion/sore throat/hoarseness (any two) ½+½
- Precautions –
- 1) Cover the nose when near the patient
  - 2) Do not share glasses and utensils / articles used by the infected person ½+½
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? ½ x 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 CH<sub>4</sub>, H<sub>2</sub>S, and CO<sub>2</sub> or biogas are evolved; which can be used as fuel.
18. Explain with reference to PCR 3
- (a) A specific enzyme helps in amplification in PCR. Name the bacterium from which it is isolated and state how its thermostable nature is helpful.

(b) Explain its use in molecular diagnosis.

(a) *Thermus aquaticus* = 1

It remains active during the high temperature induced denaturation = 1

(b) Very low concentration of a bacteria or virus can be detected by amplification of their nucleic acid by PCR = 1

19. A doctor prescribed morphine as a sedative and pain killer to your cousin who had undergone a surgery. Even after recovery, he indiscriminately took the medicines and later craved for the same. What do you conclude about his condition? What measures will you suggest to him to overcome this problem? Briefly explain any two. 3

Drug dependence - is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs is abruptly discontinued / because of perceived benefits, drugs are frequently used repeatedly from which the person may not be able to get out. 1 mark

Measures:

- Education and counseling - to face problems and stresses/ to channelize the energy into healthy pursuits like reading, music, yoga and other extracurricular activities
- Seeking help from parents - to guide the person appropriately and immediately
- Seeking professional and medical help – to help the person to get rid of the problem completely with sufficient efforts and will power (any two) 1 mark each

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

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

Ans. 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. (a) **“Organisms may be conformers or regulators.” Explain this statement and give one example of each.** 3

**(b) Why are there more conformers than regulators in the animal world ?**

Ans (a) Conformers- organisms which cannot maintain a constant internal environment under varying external environmental conditions // change body temperature and osmotic concentration with change in external environment eg. all plants / fishes / amphibians / reptiles (**Any one**) =  $\frac{1}{2} + \frac{1}{2}$

Regulators - organisms which can maintain homeostasis (by physiological means or behavioural means ) // maintain constant body temperature and osmotic concentration eg. birds /mammals =  $\frac{1}{2} + \frac{1}{2}$

b) Thermoregulation is energetically expensive for animals = 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 =  $\frac{1}{2} + \frac{1}{2} = 1$

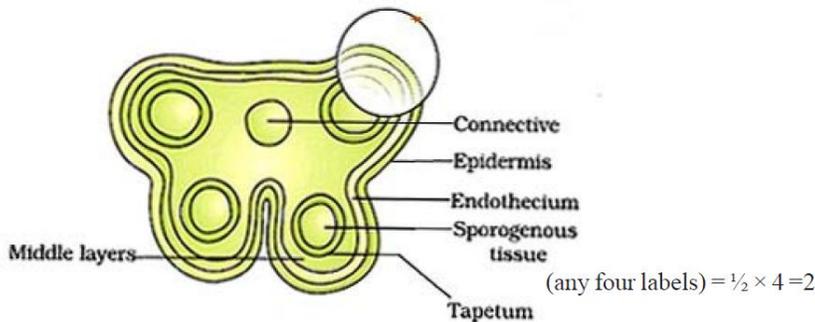
(b) - Emasculation

-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

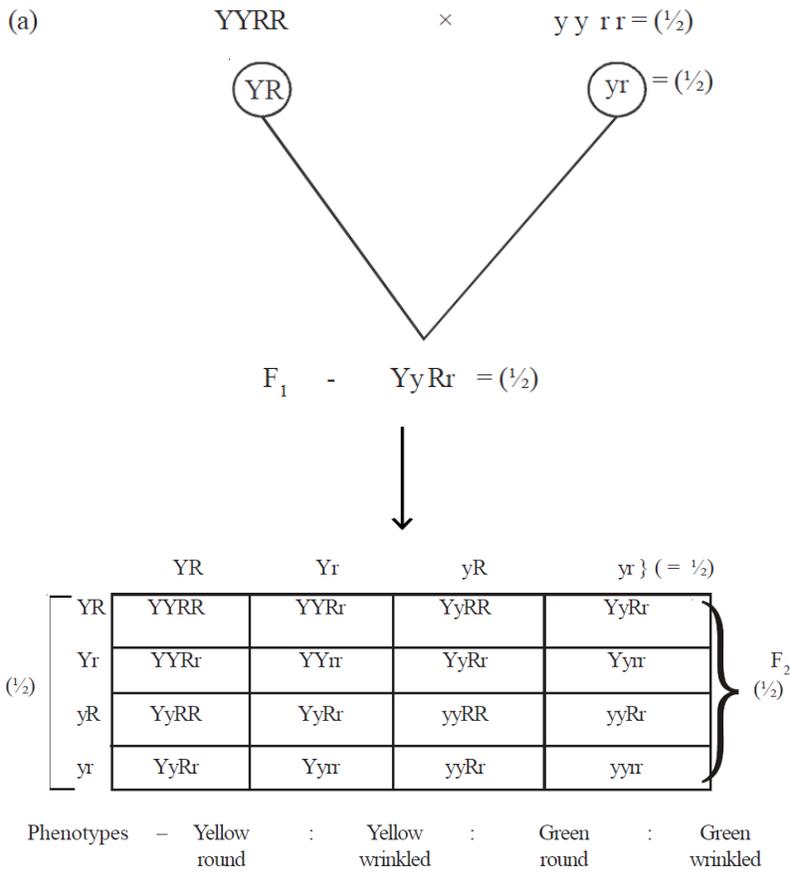
Law of Independent Assortment : when two pair of traits are combined in a hybrid , inheritance of one pair of characters is independent of the other pair of characters / when two pairs of contrasting characters or genes or traits are inherited together in a dihybrid cross (in a pea plant ) the inheritance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



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

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

26. (a) What is an age-pyramid ?

(b) Name three representative kinds of age-pyramids for human population and list the characteristics for each one of them.

Ans. (a) If the age distribution (per cent individuals of a given age or age group) is plotted for the

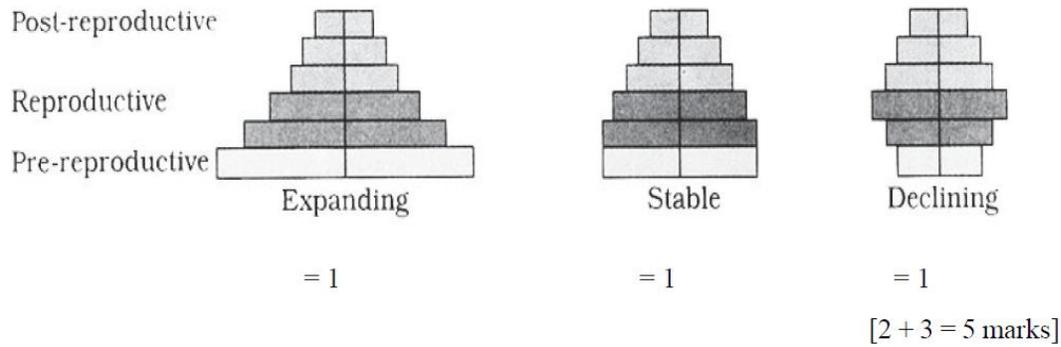
population the resulting structure is called the age pyramid = 2

(b) Expanding =  $\frac{1}{2}$  : pre reproductive population is greater than reproductive or post reproductive population / growing with maximum no. of individuals in pre reproductive phase and least no. in post reproductive phase =  $\frac{1}{2}$

Stable =  $\frac{1}{2}$  : Pre-reproductive & reproductive population are almost similar / ideal for population / maintains balanced continuity / no. of individuals in reproductive and pre reproductive phase is almost same and less no. of individuals in post reproductive phase =  $\frac{1}{2}$

Declining =  $\frac{1}{2}$  : Pre-reproductive population is less than reproductive population / less no. of individuals in pre reproductive phase than reproduction phase =  $\frac{1}{2}$

In lieu of the above explanation the following diagram can be considered



OR

Discuss the role of healthy ecosystem services as a pre-requisite for a wide range of economic, environmental and aesthetic goods and services.

Ans. Purify air and water , mitigate droughts and floods , cycle nutrients , generate fertile soils , provide

wild life - habitat , maintain biodiversity , pollinate crops , provide storage site for carbon , provide

aesthetic cultural and spiritual value recreation , climate regulation