

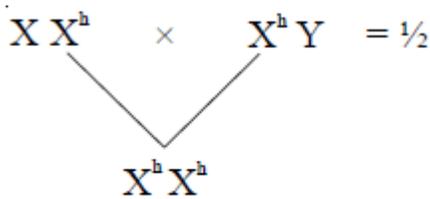
THIRD PRELIM EXAMINATION

FEBRUARY 2018

CLASS XII

Marking Scheme – BIOLOGY [THEORY]

Q.NO	Answers	Marks
		(with split up)
1.	Identify the two correct statements from the following (i) Apiculture means apical meristem culture. (ii) Spinach is iron –enriched. (iii) Green revolution has resulted in improved pulse-yields (iv) Aphids cannot infest rapeseed mustard. (ii) and (iv)	1
2.	Mention the role of Restriction Enzymes in Recombinant DNA technology. Ans. To cut DNA at specific sites / Molecular scissors (DNA)	1/2+1/2
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.	How many kinds of phenotypes would you expect in F ₂ generation in a monohybrid cross exhibiting co-dominance? Three	1 1
6.	Explain the events that occur during fertilization of an ovum in humans . How is it that only one sperm enters the ovum? Completion of meiotic division of secondary oocyte, haploid ovum and polar body is formed ,fusion of the two nuclei . (any 2) (1/2+1/2) Sperm induces the changes in zona pellucida and doesn’t allow the other sperms to enter (1)	2
7.	Why is the possibility of human female suffering from haemophilia rare? Explain.	1/2 × 2



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

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.

Attacks insect, and other arthropods

Nucleopolyhedrovirus

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)

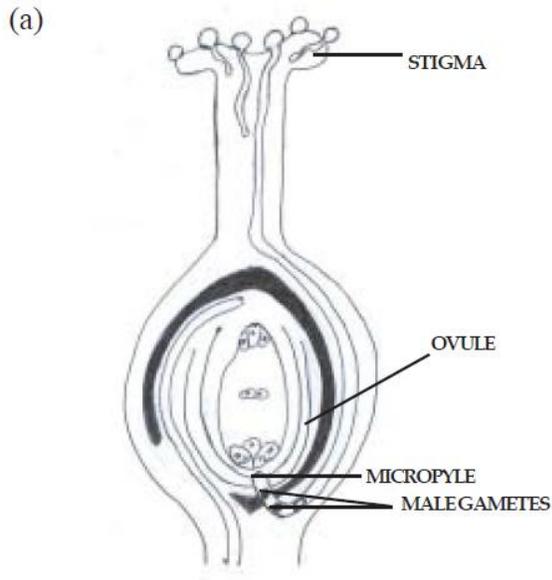
10. "Niche is a part of a habitat." Explain with the help of an example.

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)

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. Differentiate between 1+1+1

(a) Xenogamy and Geitonogamy

(b) Oviparous and Viviparous organisms

(c) Pathogenesis and Parthenocarpy

a) Xenogamy- transfer of pollen grains from anther to stigma of a different plant-brings genetically different pollen grains

Geitonogamy- Transfer of pollen grains from the anther to the stigma of another flower of same plant $\frac{1}{2} + \frac{1}{2} = 1$

b) oviparous- Animals that lay eggs

viviparous- Animals giving birth to young ones $\frac{1}{2} + \frac{1}{2} = 1$

c)

Parthenogenesis- female gamete undergoes development to form new organism without fertilization.

Parthenocarpy- fruits which develop without fertilization $\frac{1}{2} + \frac{1}{2} = 1$

24. Explain with the help of a suitable example the inheritance of a trait where

13. According to the Darwinian theory, the rate of appearance of new forms is linked to their life cycles. Explain.

Microbes divide fast/ they produce million within hours.

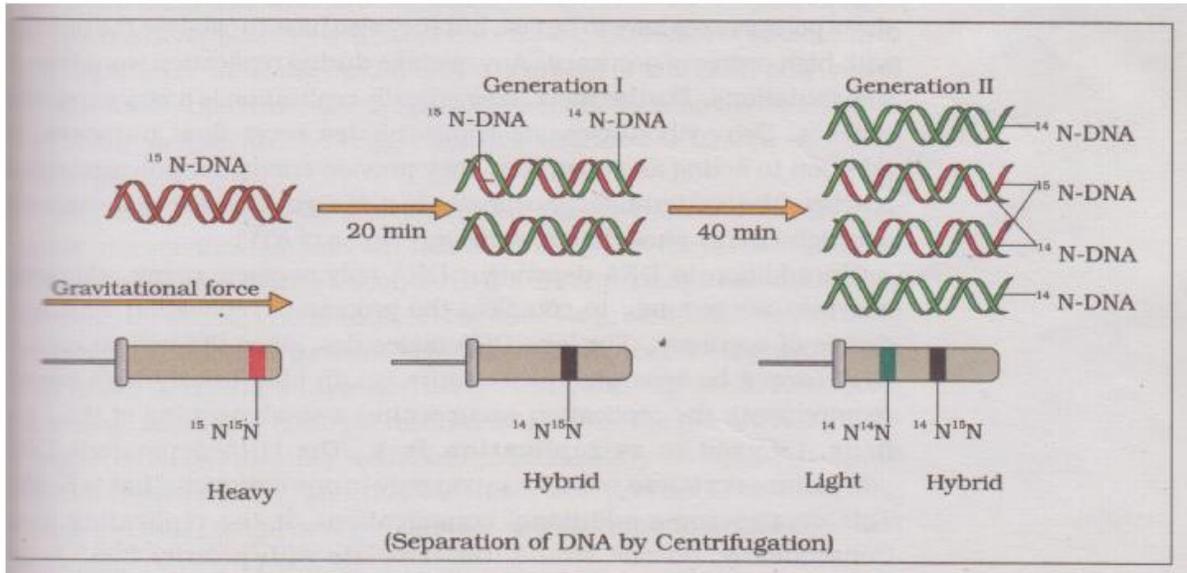
Easy to see variant population in less span of time

But in higher organism life span is long so variations are not visible fast [1X3=3]

14. “DNA replication is semi-conservative”. Name the scientists who proposed it and who proved it .How was it proved experimentally? Explain.

3

Meselson & Stahl (1)



(three steps with DNA and centrifugation tubes-(1+1+2))

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 organisms for the following diseases:

3

- (i) Elephantiasis
- (ii) Ringworm
- (iii) Amoebiasis

(b) How can public hygiene help control such diseases?

(a) (i) Wuchereria ,

(ii) Microsporium / Epidermophyton/ Trichophyton

(iii) Entamoeba

(b) Proper disposal of waste/periodic cleaning/disinfection of water reservoirs, etc/standard practices of hygiene in public catering/eliminate vectors and their breeding places (any three)
(1/2x6=3)

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? 1/2 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 CH₄, H₂S, and CO₂ 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 rDNA 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 = 1/2 × 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) = 1/2 + 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) = 1/2 + 1/2

20. What are 'cloning sites' in a cloning vector? Explain their role. Name any two such sites in pBR322. 3
- Cloning sites are recognition sites.
- Role- where restriction enzyme will recognize and cut /ligation of alien DNA takes place here
any two examples- EcoRI, BamHI.
- OR
- Name the host plant and that *Meloidogyne incognita* infects. Explain the role of *Agrobacterium* in the production of ds-RNA in the host plant.
- Tobacco, Roots of tobacco plant
- Using *Agrobacterium* vectors, nematode specific genes were introduced into the host plant , because of introduction of DNA both sense & antisense RNA are produced in host cell, the 2 RNAs being complimentary form a ds-RNA (that initiated RNAi) ($1/2 \times 6 = 3$)
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 = $1/2 \times 6$
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 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). 3

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

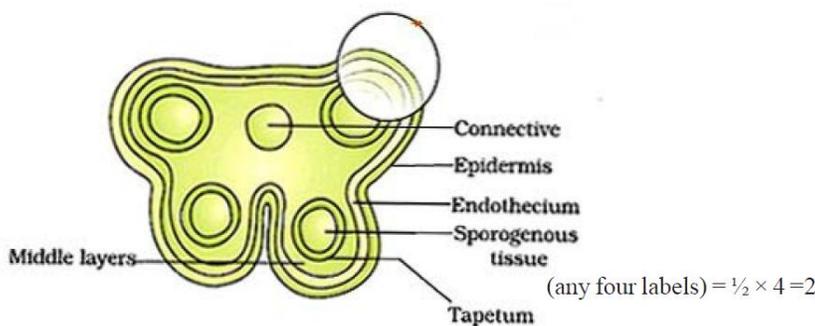
(b) - Emasculation

-Bagging

-Pollination by spraying desired pollen

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

(c)



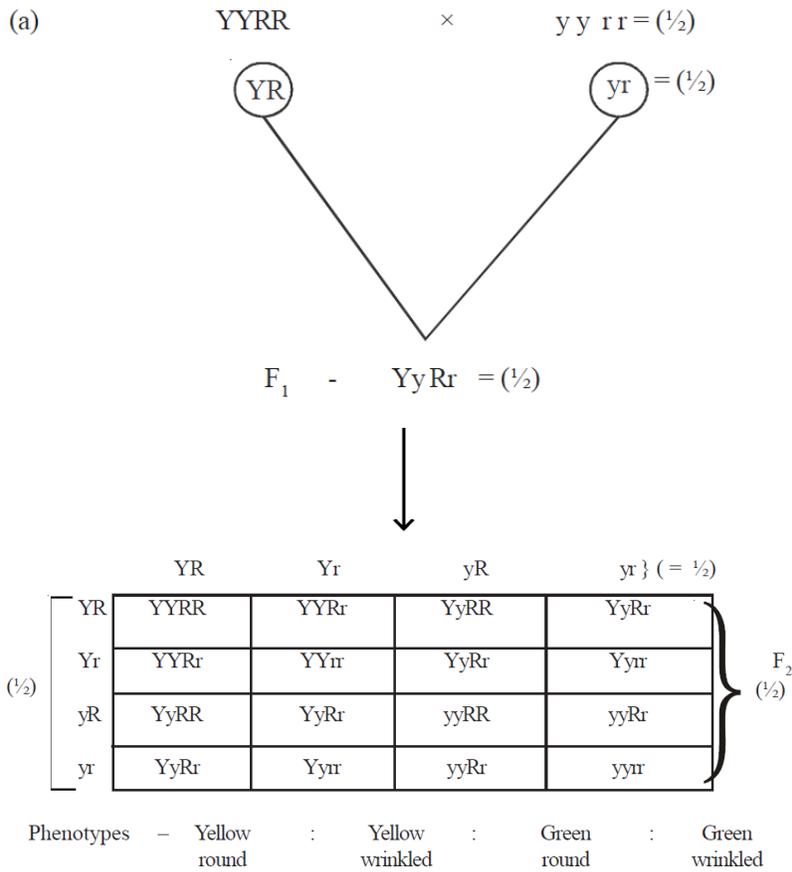
25. State and explain the “law of independent assortment” in a typical Mendelian dihybrid cross.

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 ,

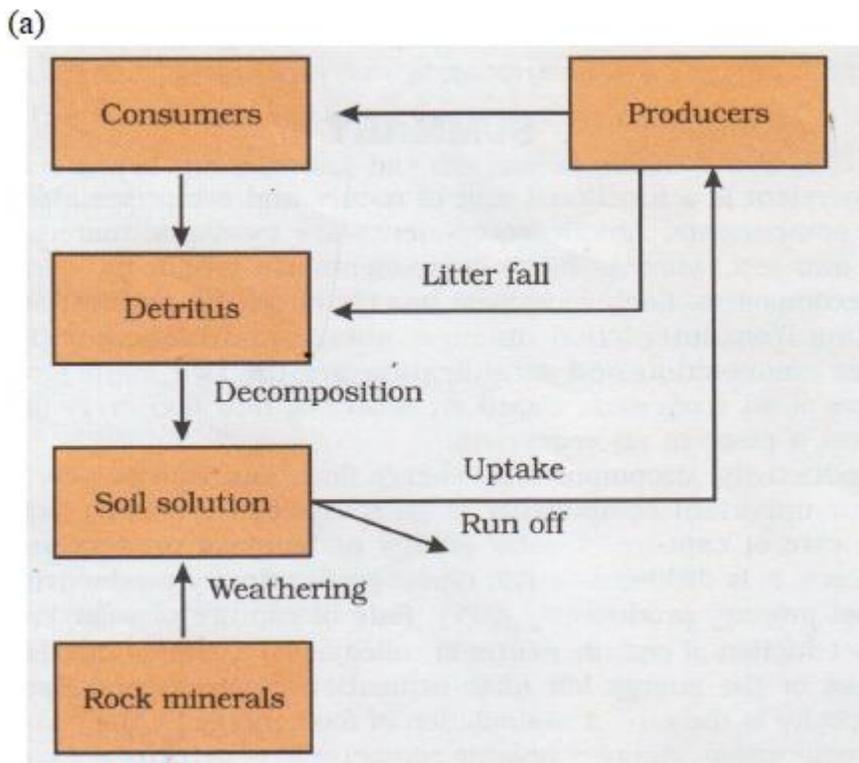
• More white winged moths existed on trees than dark winged or melanised moths ,

- 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) Draw a simplified model of phosphorus cycling in a terrestrial ecosystem.
 (b) Write the importance of such cycles in ecosystems.



(any 8 labels)

[1/2X8 = 4]

(b) Recycling of nutrients time & again [1]

OR

(a) Explain the narrowly utilitarian, broadly utilitarian and ethical arguments in favor of conservation of biodiversity.

(b) How is designation of certain areas as hotspots a step towards biodiversity conservation? Name any two hotspots in India.

(a) Narrowly utilitarian – Humans derive countless economic benefits from nature (food, firewood, fibre, construction material, industrial products (tannins, lubricants, dyes, rennin, perfumes), medicines)

Broadly utilitarian – Role in many ecosystem services that nature provides eg – 20% O₂ from Amazon

forest, pollination (any other ecosystem service)

Ethical argument – what humans owe to the millions of organisms with whom we share this planet

eg philosophically/spiritually – every species has an intrinsic value [1/2 X 6 = 3]

(b) As these regions have very high levels of species richness & high degree of endemism, they need to be

identified for maximum protection. [1/2 X 2 = 1]

Hotspots – Western Ghats & Sri Lanka, Indo- Burma, Himalayas (Any two) [1/2 X 2 = 1]