



## CANARA VIKAAS PRE-UNIVERSITY COLLEGE, MANAGALURU

### II PUC BOARD EXAMINATION – MARCH 2024

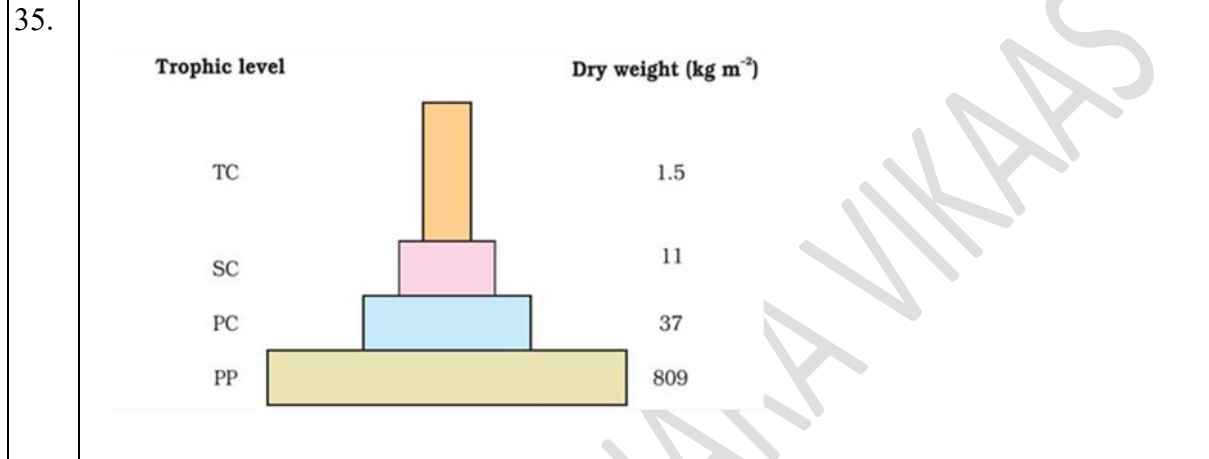
#### BIOLOGY (36) – ANSWER KEY

PART A - I	
1.	a) It nourishes the developing pollen grains
2.	b) Xenogamy
3.	c) Endometrium
4.	b) Spermatids
5.	b) A- Fallopian tube B- Tubectomy
6.	a) Both statement I and II
7.	b) Heterogametic
8.	b) A – S strain; B- R strain
9.	c) The original drifted population become founders
10.	a) MALT
11.	c) <i>Aspergillus niger</i>
12.	c) II and III
13.	d) Natality and immigration increases
14.	d) GPP-R
15.	b) Endemic
PART A - II	
16.	Polyembryony
17.	Oxytocin
18.	Honey bees
19.	Lichen
20.	Ectoparasite
PART – B	
21.	It is used to test for the presence of certain genetic disorders or infections during pregnancy in the foetus. Used to check chromosomal abnormalities. It can be also be used to determine sex of the foetus.
22.	Karyotype: 44 A + XXY (i.e 47 Chromosome) Symptoms: <ul style="list-style-type: none"> <li>• Overall masculine development</li> <li>• Feminine development. Eg: Gynaecomastia</li> <li>• Sterile male individual</li> </ul>
23.	<ul style="list-style-type: none"> <li>• To get rid of unwanted pregnancies due to unprotected intercourse or failure of the contraceptive used during coitus or rapes.</li> <li>• When pregnancy continuation could be harmful or even fatal to mother or foetus or both.</li> </ul>
24.	<ul style="list-style-type: none"> <li>• Brain size: 1400 cc</li> </ul>

	<ul style="list-style-type: none"> <li>Lived in East and Central Asia between 1 lakh – 40,000 years ago</li> <li>Used hides to protect their body</li> <li>Buried their dead.</li> </ul>								
25.	Histamine and Serotonin								
26.	The amount of the oxygen that would be consumed if all the organic matter in one liter of water were oxidized by the bacteria. It is a measure of the organic matter present in the water.								
27.	<table border="1"> <thead> <tr> <th>Endonuclease</th> <th>Exonuclease</th> </tr> </thead> <tbody> <tr> <td>It makes cut at specific positions within the DNA</td> <td>It removes nucleotides from the ends of the DNA.</td> </tr> <tr> <td>Do not require a free 3' or 5' end for their action.</td> <td>It requires 3' or 5' end for their action.</td> </tr> </tbody> </table>	Endonuclease	Exonuclease	It makes cut at specific positions within the DNA	It removes nucleotides from the ends of the DNA.	Do not require a free 3' or 5' end for their action.	It requires 3' or 5' end for their action.		
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28.	<p><u>Decomposition</u>: Break down of complex organic matter into inorganic substances like CO<sub>2</sub>, H<sub>2</sub>O and nutrients by decomposers. This process is called as decomposition.</p> <p><u>Detritus</u>: dead plant remains such as leaves, bark and dead animals remain including fecal matter constitute detritus.</p>								
<b>PART - C</b>									
29.	<p>a)</p> <table border="1"> <thead> <tr> <th>False fruit</th> <th>True fruit</th> </tr> </thead> <tbody> <tr> <td>Fruit developed other than ovary by thalamus. Ex: Apple, Strawberry</td> <td>Fruit developed from ovary of the flower. Ex: Mango.</td> </tr> </tbody> </table> <p>b) Parthenocarpic fruit: Fruit developed without fertilization. Ex: Banana</p>	False fruit	True fruit	Fruit developed other than ovary by thalamus. Ex: Apple, Strawberry	Fruit developed from ovary of the flower. Ex: Mango.				
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30.	<p>Chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit between developing embryo and maternal body and is called as placenta.</p> <p>Hormones secreted by placenta are – hcG ( Human chronic gonadotropin), hpL (Human placental lactogen), Estrogen, Progestogen.</p>								
31.	<ul style="list-style-type: none"> <li>It should be able to generate its replica.</li> <li>It should be stable chemically and structurally.</li> <li>It should provide scope for slow changes (mutation) that are required for evolution.</li> <li>It should be able to express itself in the form of mendelian characters</li> </ul>								
32.	<table border="1"> <thead> <tr> <th>Homologous Organs</th> <th>Analogous organs</th> </tr> </thead> <tbody> <tr> <td>The organs that have similar origin and anatomical structures but perform different functions</td> <td>The organs that are different in origin but perform same functions</td> </tr> <tr> <td>Show divergent evolution</td> <td>Show convergent evolution</td> </tr> <tr> <td>Examples: The fore-limbs of man, Cheetah, Whale and Bat.</td> <td>Examples: Wings of butterfly and birds, ye of Octopus and mammals, Flippers of Penguins and Dolphins.</td> </tr> </tbody> </table>	Homologous Organs	Analogous organs	The organs that have similar origin and anatomical structures but perform different functions	The organs that are different in origin but perform same functions	Show divergent evolution	Show convergent evolution	Examples: The fore-limbs of man, Cheetah, Whale and Bat.	Examples: Wings of butterfly and birds, ye of Octopus and mammals, Flippers of Penguins and Dolphins.
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33.	<ul style="list-style-type: none"> <li>It makes crops more tolerant to abiotic stresses (cold, drought, salt, heat etc).</li> <li>Pest-resistant crops reduce the use of chemical pesticides.</li> <li>It helps to reduce post-harvest losses.</li> </ul>								

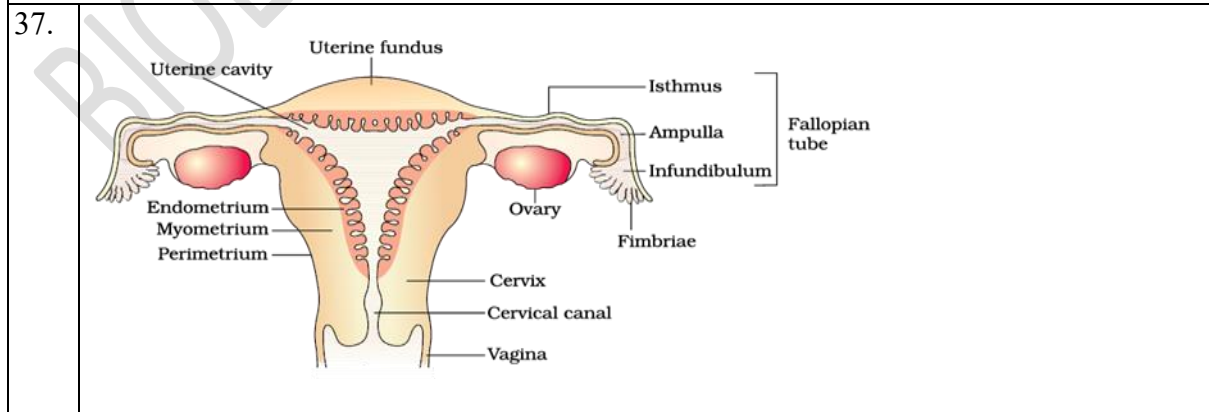
- It increases efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil).
- It enhances nutritional value of food. E.g. Vitamin 'A' enriched rice (Golden Rice).
- GM is used to create tailor-made plants to supply alternative resources to industries, in the form of starches, fuels and pharmaceuticals.

- 34.
- Providing the best catalyst in the form of improved organism usually a microbe or pure enzyme.
  - Creating optimal conditions through engineering for a catalyst to act.
  - Downstream processing technologies to purify the protein/organic compound.



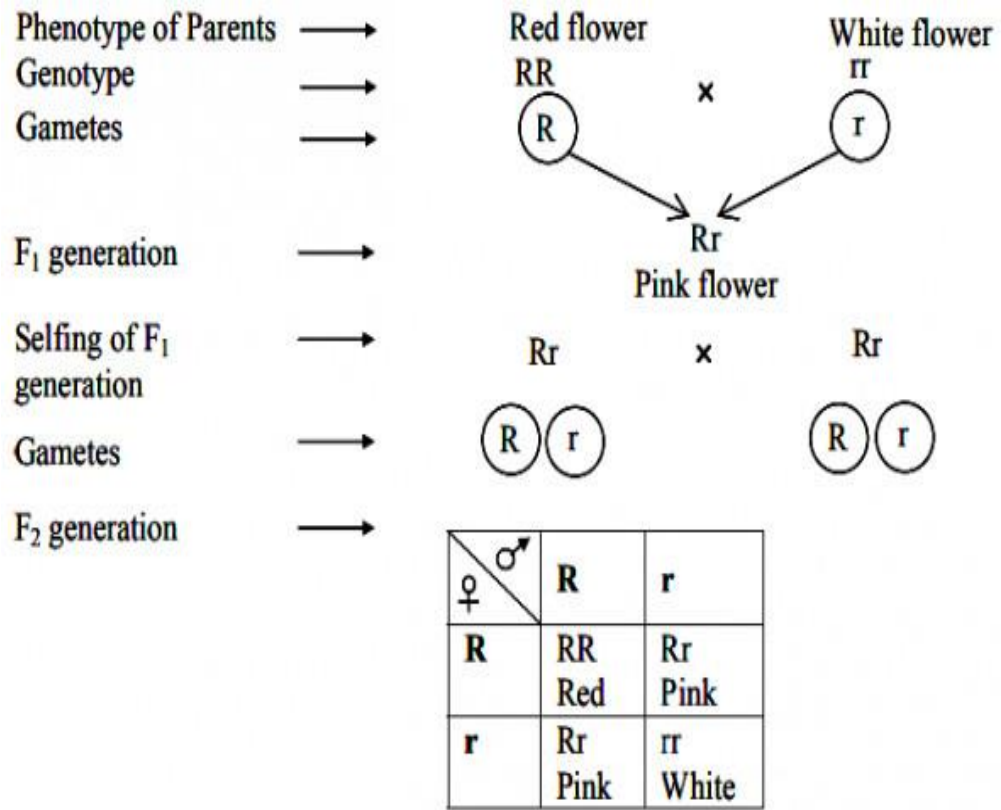
36. Alien species invasion: When Alien species are introduced unintentionally or deliberately for whatever purpose, some of them turn invasive, and cause decline or extinction of indigenous species
- Examples:
- Nile Perch introduced in Lake Victoria (East Africa) caused extinction of more than 200 species of cichlid fish.
  - Invasive weed species like *Parthenium* (carrot grass), Lantana and *Eicchornia* (water hyacinth) caused damage to our native species.
  - Illegal introduction of the African Catfish (*Clarias gariepinus*) for aquaculture is posing a threat to the indigenous catfishes in our rivers.

**PART – D – SECTION I**



38. Incomplete dominance: It is an inheritance in which heterozygous offspring shows intermediate character b/w two parental characteristics.

Ex: Flower colour in snapdragon (dog flower or *Antirrhinum sp.*) and *Mirabilis jalapa* (4'O clock plant).



Here, phenotypic and genotypic ratios are same. Phenotypic ratio= 1 Red: 2 Pink: 1 White Genotypic ratio= 1 (RR): 2 (Rr): 1(rr)  
This means that R was not completely dominant over r.  
Pea plants also show incomplete dominance in other traits.

39. a – *Samonella typhi*  
b- *Streptococcus pneumoniae*  
c – Rhino virus  
d – *Plamodium vivax* (*P. malaria*, *P. falciparum*)  
e – Entamoeba hystolytica

- 40.
- Human genome contains 3164.7 million nucleotide bases.
  - Total number of genes= about 30,000.
  - Average gene consists of 3000 bases, but sizes vary. Largest known human gene (dystrophin on X- chromosome) contains 2.4 million bases.
  - 99.9% nucleotide bases are identical in all people. Only 0.1% difference makes every individual unique.
  - Functions of over 50% of discovered genes are unknown.
  - Chromosome I has most genes (2968) and Y has the fewest (231).
  - Less than 2% of the genome codes for proteins.
  - Repeated sequences make up very large portion of human genome. Repetitive sequences are stretches of DNA sequences that are repeated many times. They

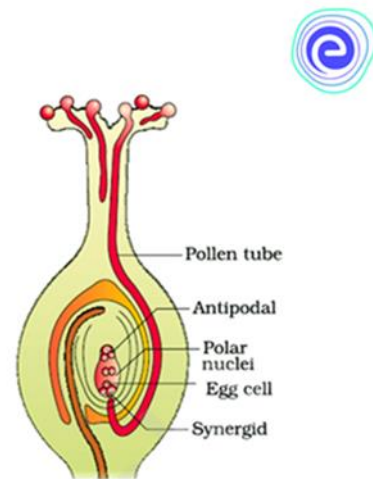
	<p>have no direct coding functions. They shed light on chromosome structure, dynamics and evolution.</p> <ul style="list-style-type: none"> <li>About 1.4 million locations where single-base DNA differences (SNPs- Single nucleotide polymorphism or 'snips') occur in humans.</li> </ul>						
41.	<p>a)</p> <p style="text-align: center;">Schematic structure of a transcription unit</p> <p>b)</p> <table border="1"> <thead> <tr> <th>Point mutation</th> <th>Frame shift mutation</th> </tr> </thead> <tbody> <tr> <td>Mutation arises due to change in a single base pair of DNA.</td> <td>Deletion and insertion of base pairs of DNA.</td> </tr> <tr> <td>Ex: Sickle cell anemia</td> <td>Ex: Cystic fibrosis</td> </tr> </tbody> </table>	Point mutation	Frame shift mutation	Mutation arises due to change in a single base pair of DNA.	Deletion and insertion of base pairs of DNA.	Ex: Sickle cell anemia	Ex: Cystic fibrosis
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Ex: Sickle cell anemia	Ex: Cystic fibrosis						
42.	<p>Biofertilisers are organisms that enrich nutrient quality of the soil. E.g. Bacteria, fungi, cyanobacteria etc.</p> <ul style="list-style-type: none"> <li>Rhizobium (symbiotic bacteria in root nodules of leguminous plants) fix atmospheric <math>N_2</math>.</li> <li>Free-living bacteria in the soil (E.g. <i>Azospirillum</i> and <i>Azotobacter</i>) enrich the nitrogen content of the soil.</li> <li>Mycorrhiza: Symbiotic association of fungi (E.g. the genus of <i>Glomus</i>) with plants. The fungus gets food from the plant. The fungal symbiont provides following functions; <ul style="list-style-type: none"> <li>a. Absorb phosphorous from soil and passes it to the plant.</li> <li>b. Give resistance to root-borne pathogens and tolerance to salinity and draught.</li> <li>c. Give overall increase in plant growth and development.</li> </ul> </li> <li>Cyanobacteria (Blue green algae): Autotrophic microbes. They can fix atmospheric nitrogen. E.g. <i>Anabaena</i>, <i>Nostoc</i>, <i>Oscillatoria</i> etc. In paddy fields, Cyanobacteria serve as an important biofertilisers. It also adds organic matter to the soil and increases its fertility.</li> </ul>						
43.	<p>a – Plasmid  b – Micro-injection  c – Biolistics or Gene gun  d – “Ori” site  e – Ligase (DNA ligase)</p>						
44.	<p>Mutualism: The interaction confers benefits on both the interacting species.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>Lichen: It is an intimate mutualistic relationship between a fungus &amp; photosynthesizing algae or cyanobacteria.</li> <li>Mycorrhizae are associations between fungi &amp; the roots of higher plants. The fungi help the plant in the absorption of essential nutrients from the soil while the plant provides the fungi with carbohydrates.</li> </ul>						

- Many fig trees & wasps. The fig species is pollinated only by its 'partner' wasp species and no other species. The female wasp pollinates the fig inflorescence while searching for suitable egg-laying sites in fruits. The fig offers the wasp some developing seeds, as food for the wasp larvae.
- Orchids show diversity of floral patterns. They can attract the right pollinator insect (bees & bumblebees) to ensure pollination. Not all orchids offer rewards.
- 'Sexual deceit' of Ophrys (the Mediterranean orchid). One petal of its flower resembles female bee in size, colour & markings. So male bee 'pseudocopulates' with the flower. The bee is dusted with pollen from the flower. When the same bee 'pseudocopulates' with another flower, it transfers pollen to it. If the female bee's colour patterns change slightly during evolution, pollination success will be reduced unless the orchid flower co-evolves to maintain the resemblance of its petal to the female bee.

### PART – D – SECTION II

45.

- It is a dynamic process involving pollen recognition followed by promotion or inhibition of the pollen.
- This interaction takes place through the chemical components produced by them. If the pollen is compatible (right type), the pistil accepts it and promotes post-pollination events. The pollen grain germinates on the stigma to produce a pollen tube through one of the germ pores. The contents of the pollen grain move into the pollen tube. Pollen tube grows through the tissues of the stigma and style and reaches the ovary.
- If the pollen is incompatible (wrong type), the pistil rejects the pollen by preventing pollen germination on the stigma or the pollen tube growth in the style.
- In some plants, pollen grains are shed at 2-celled condition (a vegetative cell & a generative cell). In such plants, the generative cell divides and forms the two male gametes during the growth of pollen tube in the stigma.
- In plants which shed pollen in the 3-celled condition, pollen tubes carry 2 male gametes from the beginning. Pollen tube, after reaching the ovary, enters the ovule through the micropyle and then enters one of the synergids through the filiform apparatus. The filiform apparatus present at the micropylar part of the synergids guides the entry of pollen tube.



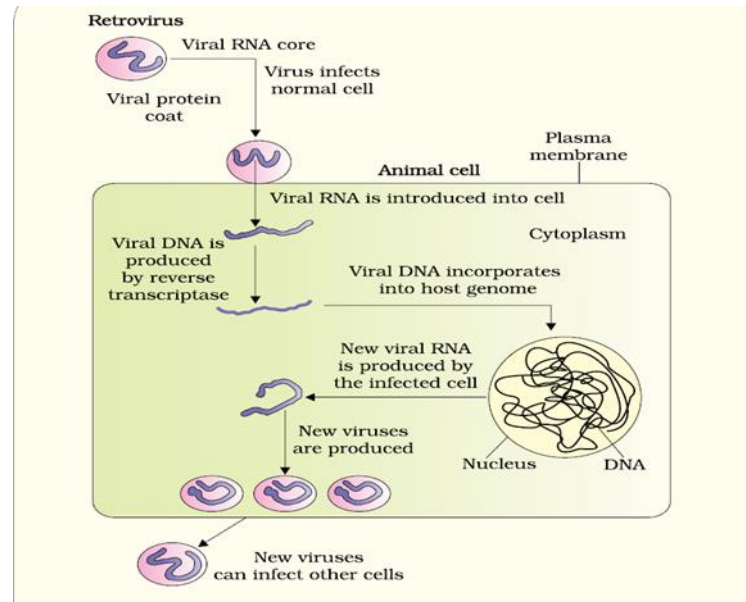
46.

Haemophilia (Royal disease):

- It is a sex linked (X-linked) recessive disease.
- In this, a protein involved in the blood clotting is affected.
- A simple cut results in non-stop bleeding.
- The disease is controlled by a pair of allele, H & h. H is normal allele whereas h is responsible for haemophilia.

- The heterozygous female (carrier, XH Xh) for haemophilia may transmit the disease to sons.
- In females, haemophilia is very rare because it happens only when mother is at least carrier and father haemophilic (unviable in the later stage of life).

47.



HIV enters into body → To macrophages (acts as HIV factory) → RNA genome replicates in presence of Reverse transcriptase to form viral DNA → Viral DNA incorporates into host DNA → Infected cells produce virus particles → HIV enters into helper T-cells (TH) → Replicates & produce progeny viruses → Attack other helper T-cells → T-cells decrease → Weaken immunity.

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