



ISLAMIAH MAT HR SEC SCHOOL, KILAKARAI, RAMANATHAPURAM DT.

XII COMMON PUBLIC EXAMINATION, MARCH -2025 (18-03-2025)

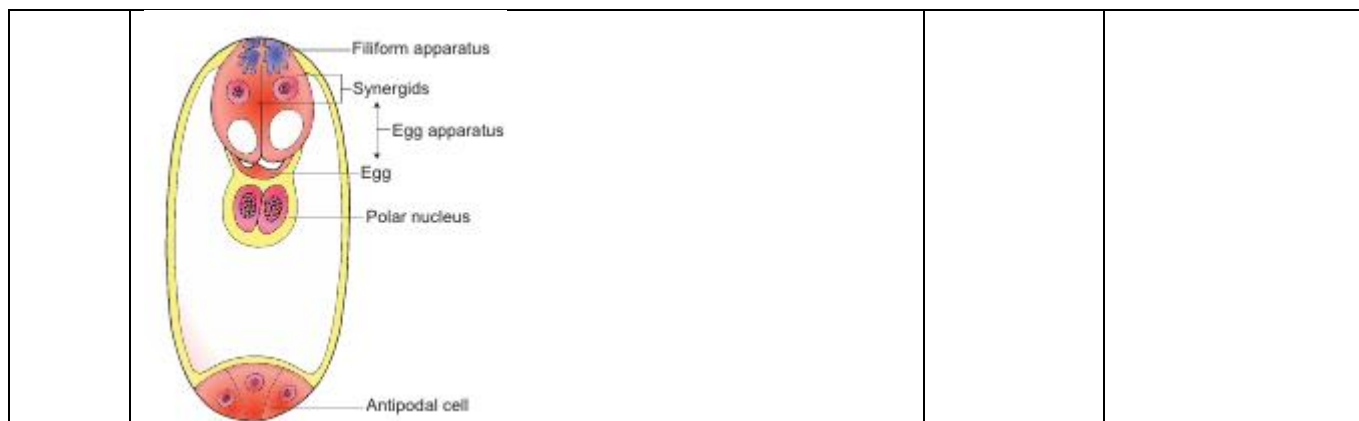
TENTATIVE ANSWER KEY
Question type A

SUB: BOTANY

MARKS: 70

Q.NO	CONTENT	MARKS	MODE OF QUESTION
PART -I			
I.	CHOOSE THE CORRECT ANSWER	15 X 1 =15	BOOK BACK / BOOK INSIDE/ CREATIVE
1	c. Introduction	1	BOOK BACK
2	d. Air	1	BOOK BACK
3	d. Agrobacterium tumifaciens	1	BOOK INSIDE
4	b. Tropical Africa region	1	BOOK BACK
5	a. 5' GAATTC 3' 3' CTTAAG 5'	1	BOOK BACK
6	c. Zea mays	1	BOOK BACK
7	d. Meristem culture	1	BOOK BACK
8	a. Law of segregation	1	BOOK BACK
9	d. 2-10 %	1	BOOK BACK
10	a. Capillary Water	1	BOOK BACK
11	a. (1)-(ii), (2)-(iii), (3)-(i), (4)-(iv)	1	BOOK BACK
12	a. Rhizome - Musa	1	BOOK BACK
13	a. AUG	1	BOOK BACK
14	d. Prosopis	1	BOOK BACK
15	c. Skin colour in human	1	BOOK BACK

Q.NO	CONTENT	MARKS	MODE OF QUESTION
II.	PART -II ANSWER ANY SIX OF THE FOLLOWING QUESTION NUMBER 24 IS COMPULSORY	6 X 2 = 12	BOOK BACK / BOOK INSIDE/ CREATIVE
16	Pseudo-cereal The term pseudo-cereal is used to describe foods that are prepared and eaten as a whole grain, but are botanical outliers from grasses. Example: quinoa.	2	BOOK BACK
17	Atavism Atavism is a modification of a biological structure whereby an ancestral trait reappears after having been lost through evolutionary changes in the previous generations	2	BOOK INSIDE
18	TATA Box The transcription start site contains about 25 bp (basepairs) upstream, the sequence is TATAAT known as TATA or Hogness box	2	BOOK BACK
19	Embryoides The callus cells undergoes differentiation and produces somatic embryos, known as Embryoids	2	BOOK BACK
20	Seed ball seeds in a mixture of clay and soil humus (also in cow dung)	2	BOOK BACK
21	Food chain Refers movement of energy from producers up to top carnivores	2	BOOK BACK
22	Ozone hole The decline in the thickness of the ozone layer over restricted area is called Ozone hole.	2	BOOK BACK
23	Bonsai Bonsai is a Japanese art form using miniature trees grown in containers that mimic the shape and scale of full size trees.	2	BOOK BACK
24	Embryo sac	2	BOOK INSIDE



Q.NO	CONTENT	MARKS	MODE OF QUESTION								
III.	<p>PART -III</p> <p>ANSWER ANY SIX OF THE FOLLOWING</p> <p>QUESTION NUMBER 33 IS COMPULSORY</p>	6 X 3 = 18	BOOK BACK / BOOK INSIDE CREATIVE								
25	<table><tr><td colspan="2">Differentiate grafting and layering</td></tr><tr><td>Grafting</td><td>Layering</td></tr><tr><td>In grafting, two different plants (stock & Scion) are used to develop a new plant.</td><td>In layering, only one plant is used to develop a new plant.</td></tr><tr><td>The new plant will support to possess the characters of both the parents or new variation can be noticed.</td><td>Variation cannot be expected. The new individual is exactly similar to a parent plant.</td></tr></table>	Differentiate grafting and layering		Grafting	Layering	In grafting, two different plants (stock & Scion) are used to develop a new plant.	In layering, only one plant is used to develop a new plant.	The new plant will support to possess the characters of both the parents or new variation can be noticed.	Variation cannot be expected. The new individual is exactly similar to a parent plant.	3	BOOK BACK
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26	<table><tr><td colspan="2">Continuous & discontinuous variation</td></tr><tr><td>Continuous</td><td>discontinuous</td></tr><tr><td>This variation may be due to the combining effects of environmental and genetic factors. In a population most of the characteristics exhibit a complete gradation, from one extreme to the other without any break. Inheritance of phenotype is determined by the combined effects</td><td>Within a population there are some characteristics which show a limited form of variation. Example: Style length in Primula, plant height in garden pea. In discontinuous variation, the characteristics are controlled by one or two major genes which may</td></tr></table>	Continuous & discontinuous variation		Continuous	discontinuous	This variation may be due to the combining effects of environmental and genetic factors. In a population most of the characteristics exhibit a complete gradation, from one extreme to the other without any break. Inheritance of phenotype is determined by the combined effects	Within a population there are some characteristics which show a limited form of variation. Example: Style length in Primula, plant height in garden pea. In discontinuous variation, the characteristics are controlled by one or two major genes which may	3	BOOK BACK		
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	<p>many genes, (polygenes) and environmental factors. This is also known as quantitative inheritance. Example: Human height and skin color.</p>	<p>have two or more allelic forms. These variations are genetically determined by inheritance factors. Individuals produced by this variation show differences without any intermediate form between them and there no overlapping between the two phenotypes. The phenotypic expression is unaffected by environmental conditions. This is also called as qualitative inheritance</p>										
27	<p>Differences Linkage and Crossing over</p> <table><thead><tr><th>Linkage</th><th>Crossing over</th></tr></thead><tbody><tr><td>1. The genes present on chromosome stay close together</td><td>It leads to separation of linked genes</td></tr><tr><td>2. It involves same chromosome of homologous chromosome</td><td>It involves exchange of segments between non-sister chromatids of homologous chromosome.</td></tr><tr><td>3. It reduces new gene combinations</td><td>It increases variability by forming new gene combinations, lead to formation of new organism</td></tr></tbody></table>		Linkage	Crossing over	1. The genes present on chromosome stay close together	It leads to separation of linked genes	2. It involves same chromosome of homologous chromosome	It involves exchange of segments between non-sister chromatids of homologous chromosome.	3. It reduces new gene combinations	It increases variability by forming new gene combinations, lead to formation of new organism	3	BOOK INSIDE
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28	<p>Applications of Biotechnology</p> <p>Any 3 points</p> <ul style="list-style-type: none">• Biotechnology is one of the most important applied interdisciplinary sciences of the 21st century. It is the trusted area that enables us to find the beneficial way of life.• Biotechnology has wide applications in various		3	BOOK BACK								

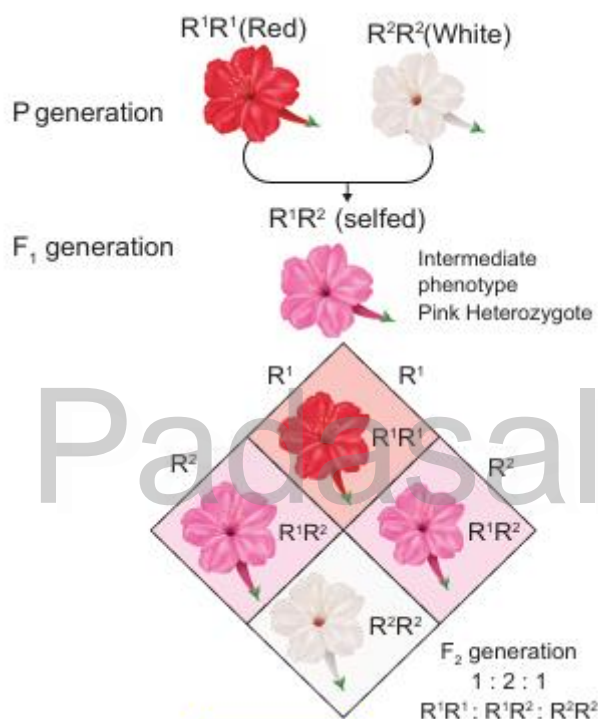
	<p>sectors like agriculture, medicine, environment and commercial industries.</p> <ul style="list-style-type: none"> • This science has an invaluable outcome like transgenic varieties of plants e.g. transgenic cotton (Bt-cotton), rice, tomato, tobacco, cauliflower, potato and banana. • The development of transgenics as pesticide resistant, stress resistant and disease resistant varieties of agricultural crops is the immense outcome of biotechnology. • The synthesis of human insulin and blood protein in E.coli and utilized for insulin deficiency disorder human is a breakthrough in biotech industries in medicine. • The synthesis of vaccines, enzymes, antibiotics, dairy products and beverages are the products of biotech industries. • Biochip based biological computer is one of the successes of biotechnology. • Genetic engineering involves genetic manipulation, tissue culture involves aseptic cultivation of totipotent plant cell into plant clones under controlled atmospheric conditions. • Single cell protein from Spirulina is utilized in food industries. • Production of secondary metabolites, biofertilizers biopesticides and enzymes. • Biomass energy, biofuel, Bioremediation, phytoremediation for environmental biotechnology 		
29	<p>Cell Suspension Culture</p> <p>Step 1: Growing of cells/callus in medium (Single or aggregates).</p> <p>Step 2: Transfer of callus to a liquid medium.</p> <p>Step 3: Agitation of callus using rotary shaker.</p> <p>Step 4: Filtration and separation of cells.</p>	3	BOOK BACK
30	<p>Albedo effect</p> <p>Gases let out to atmosphere causes climatic change. Emission of dust and aerosols from industries, automobiles, forest fire, SO₂ and DMS (dimethyl sulphur) play an important role in disturbing the temperature level of any region. Aerosols with small particles is reflecting the solar radiation entering the atmosphere. This is known as Albedo</p>	3	BOOK BACK

	effect.		
31	Productivity of profundal zone will be low The producers of the pond ecosystem depends on phytoplankton through photosynthesis. Profundal zone lies below the limnetic zone with no effective light penetration, hence productivity rate is very low	3	BOOK BACK
32	CFC Carbon capture and storage is a technology of capturing carbondioxide and injects it deep into the underground rocks into a depth of 1 km or more and it is an approach to mitigate global warming by capturing CO ₂ from large point sources such as industries and power plants and subsequently storing it instead of releasing it into the atmosphere	3	BOOK INSIDE
33	Relative contribution of green house gases 	3	BOOK INSIDE

Q.NO	CONTENT	MARKS	MODE OF QUESTION
	PART –IV		
IV.	ANSWER ALL THE QUESTION	5 X 5 = 25	BOOK BACK / BOOK INSIDE CREATIVE
34 (a)	T.S of Mature anther 	5	BOOK INSIDE

34 (b)	help to protect ecosystem (I) Buying and using only ecofriendly products and recycle them. (II) Growing more trees. (III) Choosing sustained farm products (vegetables, fruits and greens, etc.) (IV) Reducing the use of natural resources. (V) Recycling the waste and reduce the amount of waste you produce. (VI) Reducing consumption of water and electricity. (VII) Reducing or eliminating the use of house-hold chemicals and pesticides. (VIII) Maintaining your cars and vehicles properly to reduce carbon emission. (IX) Creating awareness and educate about ecosystem protection among your friends and family members and ask them to find out solution to minimise this problem.	5	BOOK BACK
35 (a)	The German Botanist Carl Correns's (1905) Experiment - In 4 O' clock plant, <i>Mirabilis jalapa</i> when the pure breeding homozygous red (R_1R_1) parent is crossed with homozygous white (R_2R_2), the phenotype of the F ₁ hybrid is heterozygous pink (R_1R_2). The F ₁ heterozygous phenotype differs from both the parental homozygous phenotype. This cross did not exhibit the character of the dominant parent but an intermediate colour pink. When one allele is not completely dominant to another allele it shows incomplete dominance. Such allelic interaction is known as incomplete dominance. F ₁ generation produces intermediate phenotype pink coloured flower. When pink coloured plants of F ₁ generation were interbred in F ₂ both phenotypic and genotypic ratios were found to be identical as 1 : 2 : 1 (1 red : 2 pink : 1 white). Genotypic ratio is 1 R_1R_1 : 2 R_1R_2 : R_2R_2 . From this we conclude that the alleles themselves remain discrete and unaltered proving the Mendel's Law of Segregation. The phenotypic and genotypic ratios are the same. There is no blending of genes. In the F ₂ generation R_1 and R_2 genes segregate and recombine to produce red, pink and	5	BOOK INSIDE

white in the ratio of 1 : 2 : 1. R¹ allele codes for an enzyme responsible for the formation of red pigment. R² allele codes for defective enzyme. R¹ and R² genotypes produce only enough red pigments to make the flower pink. Two R¹R¹ are needed for producing red flowers. Two R²R² genes are needed for white flowers. If blending had taken place, the original pure traits would not have appeared and all F₂ plants would have pink flowers. It is very clear that Mendel's particulate inheritance takes place in this cross which is confirmed by the reappearance of original phenotype in F₂



35 (b) **Secondary metabolites and its plant resources**

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BOOK INSIDE

Secondary metabolites	Plant source	Uses
Digoxin	<i>Digitalis purpurea</i>	Cardiac tonic
Codeine	<i>Papaver somniferum</i>	Analgesic
Capsaicin	<i>Capsicum annum</i>	Rheumatic pain treatment
Vincristine	<i>Catharanthus roseus</i>	Anti-carcinogenic
Quinine	<i>Cinchona officinalis</i>	Antimalarial

36 (a) **Sex is determined in monoecious plants**
Zea mays (maize) is an example for monoecious, which means male and female flowers are present on the same plant. There are two types of

5

BOOK BACK

inflorescence. The terminal inflorescence which bears staminate florets that develops from shoot apical meristem called tassel. The lateral inflorescence which develop pistillate florets from axillary bud is called ear or cob. Unisexuality in maize occurs through the selective abortion of stamens in ear florets and pistils in tassel florets. A substitution of two single gene pairs 'ba' for barren plant and 'ts' for tassel seed makes the difference between monoecious and dioecious (rare) maize plants. The allele for barren plant (ba) when homozygous makes the stalk staminate by eliminating silk and ears. The allele for tassel seed (ts) transforms tassel into a pistillate structure that produce no pollen. The table is the resultant sex expression based on the combination of these alleles. Most of these mutations are shown to be defects in gibberellin biosynthesis. Gibberellins play an important role in the suppression of stamens in florets on the ears.

Genotype	Dominant/ recessive	Modification	Sex
ba/ba ts/ts	Double recessive	Lacks silk on the stalk, but transformed tassel to pistil	Rudimentary female
ba/ba ts ⁺ /ts ⁺	Recessive and dominant	Lacks silk and have tassel	Male
ba ⁺ /ba ⁺ ts ⁺ /ts ⁺	Double dominant	Have both tassel and cob	Monoecious
ba ⁺ /ba ⁺ ts/ts	Dominant and recessive	Bears cob and lacks tassel	Normal female

36 (b)	GM Food – Benefits and Risks GM Food - Benefits <ul style="list-style-type: none"> • High yield without pest • 70% reduction of pesticide usage • Reduce soil pollution problem • Conserve microbial population in soil Risks - believed to	5	BOOK BACK
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	<ul style="list-style-type: none"> • Affect liver, kidney function and cancer • Hormonal imbalance and physical disorder • Anaphylactic shock (sudden hypersensitive reaction) and allergies. • Adverse effect in immune system because of bacterial protein. • Loss of viability of seeds show in terminator seed technology of GM crops 		
37 (a)	<p>Benefits of agroforestry</p> <p>(i) It is an answer to the problem of soil and water conservation and also to stabilize the soil (salinity and water table) reduce landslide and water run-off problem.</p> <p>(ii) Nutrient cycling between species improves and organic matter is maintained.</p> <p>(iii) Trees provide a microclimate for crops and maintain O₂ - CO₂ balanced, atmospheric temperature and relative humidity.</p> <p>(iv) Suitable for dry land where rainfall is minimal and hence it is a good system for alternate land use pattern.</p> <p>(v) Multipurpose tree varieties like Acacia are used for wood pulp, tanning, paper, and firewood industries.</p> <p>(vi) Agroforestry is recommended for the following purposes. It can be used as Farm Forestry for the extension of forests, mixed forestry, shelterbelts, and linear strip plantation</p>	5	BOOK BACK
37 (b)	<p>Suggest a solution to water crisis and its advantages</p> <p>Rainwater harvesting is the accumulation and storage of rainwater for reuse in-site rather than allowing it to run off. Rainwater can be collected from rivers, rooftops and the water collected is directed to a deep pit. The water percolates and gets stored in the pit. RWH is a sustainable water management practice implemented not only in the urban area but also in agricultural fields, which is an important economic cost-effective method for the future.</p> <p>Environmental benefits of Rain Water Harvesting</p> <p>(i) Promotes adequacy of underground water and</p>	5	BOOK BACK

	<p>water conservation.</p> <p>(ii) Mitigates the effect of drought.</p> <p>(iii) Reduces soil erosion as surface run-off is reduced.</p> <p>(iv) Reduces flood hazards.</p> <p>(v) Improves groundwater quality and water table / decreases salinity.</p> <p>(vi) No land is wasted for storage purpose and no population displacement is involved.</p> <p>(vii) Storing water underground is an eco- friendly measure and a part of sustainable water storage strategy for local communities.</p>		
38 (a)	<p>Different types of hybridization</p> <p>i. Intravarietal hybridization - The cross between the plants of same variety. Such crosses are useful only in the self-pollinated crops.</p> <p>ii. Intervarietal hybridization - The cross between the plants belonging to two different varieties of the same species and is also known as intraspecific hybridization. This technique has been the basis of improving self-pollinated as well as cross pollinated crops</p> <p>iii. Interspecific hybridization - The cross between the plants belonging to different species belonging to the same genus is also called intragenic hybridization. It is commonly used for transferring the genes of disease, insect, pest and drought resistance from one species to another. Example: <i>Gossypium hirsutum</i> <i>Gossypium arboreum</i> – Deviraj</p> <p>iv. Intergeneric hybridization – The crosses are made between the plants belonging to two different genera. The disadvantages are hybrid sterility, time consuming and expensive procedure. Example: <i>Raphanobrassica</i>, <i>Triticale</i>.</p>	5	BOOK BACK
38 (b)	<p>Prepare an organic pesticide</p> <p>Step 1: Mix 120 g of hot chillies with 110 g of garlic onion. Chop them thoroughly.</p> <p>Step 2: Blend the vegetables together manually or using an electric grinder until it forms a thick paste.</p> <p>Step 3: Add the vegetable paste to 500 ml of warm water. Give the ingredients a stir to thoroughly mix them together.</p>	5	BOOK BACK

	<p>Step 4: Pour the solution into a glass container and leave it undisturbed for 24 hours. If possible, keep the container in a sunny location. If not, at least keep the mixture in a warm place.</p> <p>Step 5: Strain the mixture. Pour the solution through a strainer, remove the vegetables and collect the vegetable-infused water and pour into another container. This filtrate is the pesticide. Either discard the vegetables or use it as a compost.</p> <p>Step 6: Pour the pesticide into a squirt bottle. Make sure that the spray bottle has first been cleaned with warm water and soap to get rid of any potential contaminants. Use a funnel to transfer the liquid into the squirt bottle and replace the nozzle.</p> <p>Step 7: Spray your plants with the pesticide. Treat the infected plants every 4 to 5 days with the solution. After 3 or 4 treatments, the pest will be eliminated. If the area is thoroughly covered with the solution, this pesticide should keep bugs away for the rest of the season.</p>		
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