DIRECTORATE OF GOVERNMENT EXAMINATIONS CHENNAI -6

HSE SECOND YEAR EXAMINATION-MARCH-2025

BOTANY ANSWER KEY - ENGLISH MEDIUM

Maximum Marks: 70

NOTE:

1. Answer written only in BLACK or BLUE should be evaluated.
   Pencil should be used for drawing pictures.
2. Choose the correct answer and write the option code with corresponding Answer

PART-1

Answer all questions **15×1=15**

Q. No	Option	TYPE - A	Q. No	Option	TYPE-B	Mark
1	(c)	Introduction	1	(a)	5' GAATTC 3' 3' CTTAAG 5'	1
2	(d)	Air	2	(d)	Meristem culture	1
3	(d)	Agrobacterium tumifaciens	3	(c)	Zea mays	1
4	(b)	Tropical African region	4	(d)	Air	1
5	(a)	5' GAATTC 3' 3' CTTAAG 5'	5	(c)	Skin colour in human	1
6	(c)	Zea mays	6	(a)	AUG	1
7	(d)	Meristem culture	7	(d)	Agrobacterium tumifaciens	1
8	(a)	Law of segregation	8	(b)	Tropical African region	1
9	(d)	2-10%	9	(a)	(1)-(ii), (2)-(iii), (3)-(i), (4)-(iv)	1
10	(a)	Capillary Water	10	(d)	Prosopis	1
11	(a)	(1)-(ii),(2)-(iii), (3)-(i), (4)-(iv)	11	(d)	2-10%	1
12	(a)	Rhizome – Musa	12	(a)	Law of segregation	1
13	(a)	AUG	13	(a)	Capillary Water	1
14	(d)	Prosopis	14	(a)	Rhizome - Musa	1
15	(c)	Skin colour in human	15	(c)	Introduction	1

PART-II

Answer any **six** questions. Question No. **24** is compulsory **6×2= 12**

Q. No	ANSWERS	Marks
16	**pseudo cereal:** Food that are prepared and eaten as a whole grain but are botanical outlier from grasses **Example:** Chenopodium quinoa	1 1
17	**Atavism:** Atavism is a modification of a biological structure whereby an ancestral trait reappears after having been lost through re-emergence of sexual reproduction in flowering plant.	2
18	**TATA Box** A specific sequence of DNA nucleotides called the promoter is necessary for transcription to take place. It consists of TATA BOX and transcription start site , where transcription begins. **(OR)** The transcription start site contains about 25 bp upstream, the sequence is TATAAT , known as TATA BOX or HOGNESS BOX , which is present in core promoter.	2
19	**Embryoids** Somatic embryogenesis is the formation of embryos from the callus tissue directly and these embryos are called Embryoids **(OR)** The callus cells undergo differentiation and produces somatic embryos, known as Embryoids.	2
20	**Seed ball:** Encasing seeds in a mixture of clay and soil humus (also in cow dung).	2
21	**Food chain:** The movement of energy from producer up to top carnivores is known as food chain.	2
22	**Ozone hole:** The decline in the thickness of the ozone layer over restricted area is called Ozone hole.	2
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

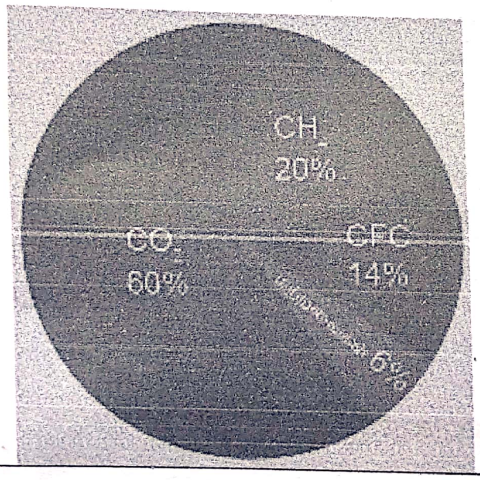
24	**Embryo sac structure :** Diagram Any two parts	1 1

PART- III

Answer any six questions. Questions No. 33 is compulsory **6×3=18**

Q. No.	ANSWERS	Marks
25	**Grafting and Layering Difference :** **GRAFTING** / **LAYERING** Parts of two different plants are joined so that they continue to grow as one plant / The stem of the parent plant is allowed to develop roots while still intact. The root develops rooted part is cut and planted to grow as a new plant Ex. Citrus, mango, Apple(any one) / Ex. Ixora, Jasminum (any one) **Any one example**	2 1
26	Continuous variation Discontinuous variation **(Any three Differences)**	3
27	**Linkage** / **Crossing over** 1. The genes present on chromosome stay close together / 1. It leads to separation of linked genes 2. It involves same chromosome of homologous chromosome / 2. It involves exchange of segments between non-sister chromatids of homologous chromosome. 3. It reduces new gene combinations / 3. It increases variability by forming new gene combinations. lead to formation of new organism	1 1 1

28	**Applications of Biotechnology** 1. 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. 2. Biotechnology has wide applications in various sectors like agriculture, medicine, environment and commercial industries. 3. This science has an invaluable outcome like **transgenic varieties** of plants e.g. transgenic cotton (Bt-cotton), rice, tomato, tobacco, cauliflower, potato and banana. 4. The development of transgenics as pesticide resistant, stress resistant and disease resistant varieties of agricultural crops is the immense outcome of biotechnology. 5. The synthesis of **human insulin** and blood protein in *E.coli*and utilized for insulin deficiency disorder in human is a breakthrough in biotech industries in medicine. 6. The synthesis of vaccines, enzymes, antibiotics, dairy products and beverages are the products of biotech industries. 7. **Biochip** based biological computer is one of the successes of biotechnology. 8. Genetic engineering involves genetic manipulation, tissue culture involves aseptic cultivation of totipotent plant cell into plant clones under controlled atmospheric conditions. 9. **Single cell protein** from Spirulina is utilized in food industries. 10. Production of **secondary metabolites**; biofertilizers, biopesticides and enzymes. 11. Biomass energy, biofuel, Bioremediation, phytoremediation for environmental biotechnology. **(Any Three Points)**	3
29	**Cell suspension culture:** • The culture of single cells or aggregates of cells *in vitro* in liquid medium. • The cell suspension is prepared by transferring a portion of callus to the liquid medium and agitated using rotary shaker instrument. • The cells are separated from the callus tissue and used for cell suspension culture	1 1 1

30	**Albedo effect:** Aerosols with small particles is reflecting the solar radiation entering the atmosphere is called albedo effect. **Effects:** 1.It reduces the temperature limits, photosynthesis and respiration. 2.The sulphur compounds are responsible for **acid rain.** 3.It destroy the ozone layer. **(Any Two effects)**	1 2
31	**Productivity of profundal zone will be low:** The deeper region of pond with no effective light penetration and predominance of heterotrophs. Hence the Productivity of profundal zone will be low.	3
32	**Carbon capture and storage:** It is a technology of capturing carbondioxide and injects it deep into the underground rocks to a depth of 1 km or more.	3
33	**Flow chart of relative Contribution of Green house gases:**  	3

PART-IV

Answer all the questions. **5×5=25**

Q.No	ANSWERS	Marks
34 (a)	**Structure of T.S. of mature anther** Diagram Any four Parts **(OR)**	3 2
34 (b)	**As a student how will you help to protect the ecosystem** 1. Buy and use only eco-friendly products and recycle them. 2. Grow more trees 3. Choose sustained farm products (vegetables, fruits, greens, etc.) 4. Reduce the use of natural resources.	5

5. Recycle the waste and reduce the amount of waste you produce.
6. Reduce consumption of water and electricity.
7. Reduce or eliminate the use of house-hold chemicals and pesticides.
8. Maintain your cars and vehicles properly. (In order to reduce carbon emission)
9. Create awareness and educate about ecosystem protection among your friends and family members and ask them to find out solution to minimize this problem.

(Any five points)

35 (a)

Incomplete dominance

Definition — 1
Example — 1
Cross with checker board (or) Explanation — 2
Ratio — 1

(OR)

35 (b)

Secondary metabolites:

	Secondary metabolites	Plant source	Uses
1	Digoxin	Digitalis purpurea	Cardiac tonic
2	Codeine	Papaver somniferum	Analgesic
3	Capsaicin	Capsicum annum	Rheumatic pain treatment
4	Vincristine	Catharanthus roseus	Anti-carcinogenic
5	Quinine	Cinchona officinalis	Antimalarial

5×1

36 (a)

Sex determination in monoecious plants.

Explanation — 3

Geno type	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 & dominant	Lacks silk and have tassel	Male
ba^+ / ba^+ **ts^+ / ts^+**	Double dominant	Have both tassel and cob	Monoecious
ba^+/ ba^+ ts / ts	Dominant & recessive	Bears cob and lacks tassel	Normal female

2

(OR)

36 (b)	**Benefits & risk of Genetically Modified Foods:** **Benefits - Any two** • High yield without pest • 70% reduction of pesticide usage • Reduce soil pollution problem • Conserve microbial population in soil **Risk - Any Three** • 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.	2 3
37 (a)	**Benefits of agro forestry:** 1. It is an answer to the problem of soil 2. Water conservation to stabilise the soil (salinity and water table) reduce landslide and water run-off problem. 3. Nutrient cycling between species is improves and organic matter is maintained. 4. Trees provide micro climate for crops. 5. Maintain $O_2 - CO_2$ balanced, atmospheric temperature and relative humidity. 6. Suitable for dry land where rainfall is minimum 7. Multipurpose tree are used for wood pulp, tanning, paper and firewood industries. 8. It can be used in Farm Forestry for the extension of forest, mixed forestry, Shelter belts and linear strip plantation. **(Any five points)**	5
	(OR)	
37 (b)	**Solution to water crisis and its advantages** **<u>Solution – Rain water harvesting</u>** • Rainwater can be collected from rivers, roof tops 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 urban area but also in agricultural fields, which is an important economical cost effective method for the future	2 3

	Advantages • Promotes adequacy of underground water and water conservation. • Mitigates the effect of drought. • Reduces soil erosion as surface run-off is reduced. • Reduces flood hazards. • Improves groundwater quality and water table / decreases salinity. • Avoid land wastage for storage purpose and no population displacement is involved. • Stores water underground as an eco-friendly measure and is a part of sustainable water storage strategy for local communities. **(Any Three points)**	
38 (a)	**Types of hybridization** 1.Intravarietal hybridization - Explanation. 2. Intervarietal hybridization - Explanation. 3. Interspecific hybridization - Explanation. Ex: Gossypium hirsutum x Gossypium arboreum. 4. Intergeneric hybridization -Explanation. Ex: Raphanobrassica, (or) Triticale.	1 1 1 ½ 1 ½
	(OR)	
38 (b)	**Preparation of an organic pesticide:** 1. Mix 120g of hot chillies with 110g of garlic or onion. Chop them thoroughly. 2. Blend the vegetables together manually or using an electric grinder until it forms a thick paste. 3. Add the vegetable paste to 500ml of warm water. Give the ingredients a stir to thoroughly mix them together. 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. 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. 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 it of any potential contaminants. Use a funnel to transfer the liquid into the squirt bottle and replace the nozzle. 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.	5