SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL

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SUBJECT: BOTANY **TENTATIVE ANSWER KEY** **MARKS : 70**

PART - I

Q.NO	TYPE-A	TYPE-B	15X1=15
1.	a) Cell division	c) Parenchyma	1
2.	a) Pores are blocked by callose	d) 2,4-D	1
3.	a) 7	a) Cell division	1
4.	d) 2,4-D	c) Trichoblasts	1
5.	a) CCG	c) Jatropha curcas	1
6.	d) Hydrophyte	d) 5	1
7.	b) Spirulina	c) Transaminase	1
8.	c) Trichoblasts	a) 400nm to 700nm	1
9.	c) Parenchyma	b) Spirulina	1
10.	c) Jatropha curcas	c) Camp and Gily	1
11.	c) Camp and Gily	a) 7	1
12.	c) Transaminase	a) Pores are blocked by callose	1
13.	d) 5	c) Vinca rosea	1
14.	c) Vinca rosea	d) Hydrophyte	1
15.	a) 400nm to 700nm	a) CCG	1

PART-II **6X2=12**

Answer any six questions(Q. No 24 is compulsory)

16.	**Systematic position of Arecaceae:** Class: Monocotyledonae Series: Calycinae Family: Arecaceae	2
17.	**Binomial name of rubber yielding plants :** 1.*Hevea brasiliensis* *2. Manihot glaziovii*	1 1

18. **Two unique facets of bio-patency:** **2**

1.Intellectual Property Protection (IPP)

2.Intellectual Property Rights (IPR)

19. **Uses of gene mapping :** **2**

1. It is useful to determine the location, arrangement and linkage of genes in a chromosomes.
2. It is useful to predict the results of dihybrid and trihybrid crosses.

20. **Transcription:** **2**

The process by which an enzyme system transfers the genetic information of DNA into RNA strand is called transcription. It is the process of copying of a complementary mRNA strand on a DNA strand .

21. **Name the enzymes involved in making hybrid DNA:** **2**

1.Restriction endonuclease

2. DNA ligase

22. **Over all equation of photosynthesis:** **2**

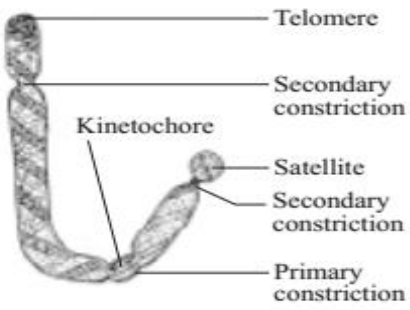
$$CO_2 + 2H_2O \xrightarrow[Chlorophyll]{Solar\ energy} (CH_2O)_n + H_2O + O_2$$

23. **Difference between photorespiration and dark respiration:** **2**

Photorespiration	Dark respiration
1. It takes place only in photosynthetic cells in the presence of light. 2. It is light dependent 3. It is the function of chloroplast, peroxisomes and mitochondria.	1. It takes place in all living cells in the mitochondria. 2. It takes place in the presence and in the absence of light. 3. It is the function ofmitochondria alone.

24. **Differentiate between meristematic tissue from permanent tissue:** **2**

Meristematic tissue	Permanent tissue
A meristematic tissue (meristos = divisible) is a group of identical cells that are in a continuous state of division. Some cells produced by meristematic tissue stop dividing and acquire certain changes to become permanent tissues of the plant. Meristematic cells are self-perpetuating	The cells, which are formed by apical meristem, are differentiated into different types of permanent tissues. These tissues have lost the power of dividing either permanently or temporarily

	PART–III Answer any six questions only (Q.No 33 compulsory)	6x3=18
25.	**Merits of Bentham and Hookers classification of plants:** 1. Bentham and Hooker's classification is the most natural system, based on actual examination of specimens. 2. The description of plants is quite accurate and reliable. 3. As it is easy to follow, it is used as a key for the identification of plants in Kew herbarium and several other herbaria of the world. 4. Although this system is natural, most of the aspects of this system show affinity to modern concepts of evolution. For example, the order Ranales, which is the first order in the arrangement of plants,has been given a primitive position in this system. Recent taxonomic findings also indicate that the members of Ranales are the most primitive living angiosperms. 5. The placement of monocotyledonae after the dicotyledonae also appears to be in accordance with the evolutionary trends.	5
26.	**Floral diagram and Floral formula of Hibiscus rosa-sinensis:** **Floral diagram**  Floral formula : ***Br., Brl.,*** ⊕, ♀ , $K_{(5)}$, C_5, $A_{(\infty)}$, $\underline{G}_{(5)}$	2 1
27	**Periderm formation:** The periderm is anotherprotective tissue that supplants the epidermis in the roots and stems thatundergo secondary growth. The fundamental tissue system includestissues that form the ground substance of the plant in which other permanenttissues are found embedded.	3
28.	**Structure of chromosome:**  	3

29. Any three genetically engineered products and mention their functions: — **3**

S.No	Products	Functions
1.	Human growth hormone	Promotes growth in children with hypopituitarism
2.	Interferon	Helps the cells resist viruses.
3.	Interleukin	Stimulates the proliferation of WBC sthat take part in immunity
4.	Insulin	Treats diabetes
5.	Renin inhibitors	Decreases blood pressure.

30. Richmond Lang effect: — **3**

The application of cytokinin delays the process of ageing in plants. This is also known as Richmond Lang effect.

31. Medicinal value of Aegle marmelos: (Any three) — **3**

1. The unripe fruit is used to treat problems of stomach indigestion.
2. It kills intestinal parasites.
3. It is used also to cure chronic diarrhoea and dysentery.
4. It is used as a tonic for the betterment of heart and brain.

32. Importance of E.coli in biotechnology: — **3**

A lowly bacterium that is found in the bowels of everyone namely Escherichia coli is drawing the attention of all scientists and learned people. This bacterium has become one of the potentially most powerful tools known to science in genetic manipulation

(or)

They are attached to a suitable replicon. Such replicon is known as vector or cloning vehicle, which is nothing but the extra chromosomal circular DNA found in the cytoplasm of Eschrichia coli is called plasmid. The plasmids are the most suitable vectors. (Any one)

33. "C_4 plants shows segregation of photosynthetic work": — **3**

The C_4 plants contain dimorphic chloroplasts i.e. chloroplasts in mesophyll cells are granal (with grana) whereas in bundle sheath chloroplasts are agranal (without grana). The presence of two types of cells leads to segregation of photosynthetic work i.e. light reactions and dark reactions separat*ely.*

PART–IV
Answer the following questions — **5x5=25**

34 Floral characters of *Musa paradisiaca:*

Flowers: Brateate, ebractiolate, sessile, trimerous, unisexual or bisexual, when unisexual, the flowers are monoecious. The flowers are zygomorphic and epigynous. — **½**

Perianth: Tepals 6, arranged in two whorls of 3 each. The three tepals of the outer whorl and the two lateral tepals of the inner whorl are fused by valvate aestivation to form 5 toothed tube like structure. The inner posterior tepal is alone free. It is distinctly broad and membranous. — **½**

Androecium: Stamens 6, in two whorls of 3 each, arranged opposite to the tepals. Only 5 stamens are fertile and the inner posterior stamen is either — 1

absent or represented by a staminode. Anthers are dithecous and they dehisce by vertical slits. The filament is filiform and rudimentary ovary or pistillode is often present in the male flower.

Gynoecium: Ovary inferior, tricarpellary, syncarpous, trilocular, numerous ovules on axile placentation. The style is simple and filiform. The stigma is three lobed. — 1

Fruit: An elongated fleshy berry and the seeds are not produced in cultivated varities. — ½

Floral formula — ½

$$\text{Br., Ebrl., } \otimes, \ \varphi, \ P_{(3+2)+1}, A_{3+3}, \overline{G}_{(3)}.$$

Floral diagram

1

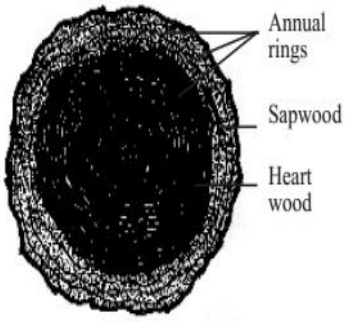
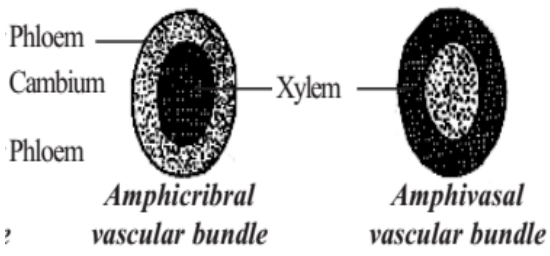
(OR)

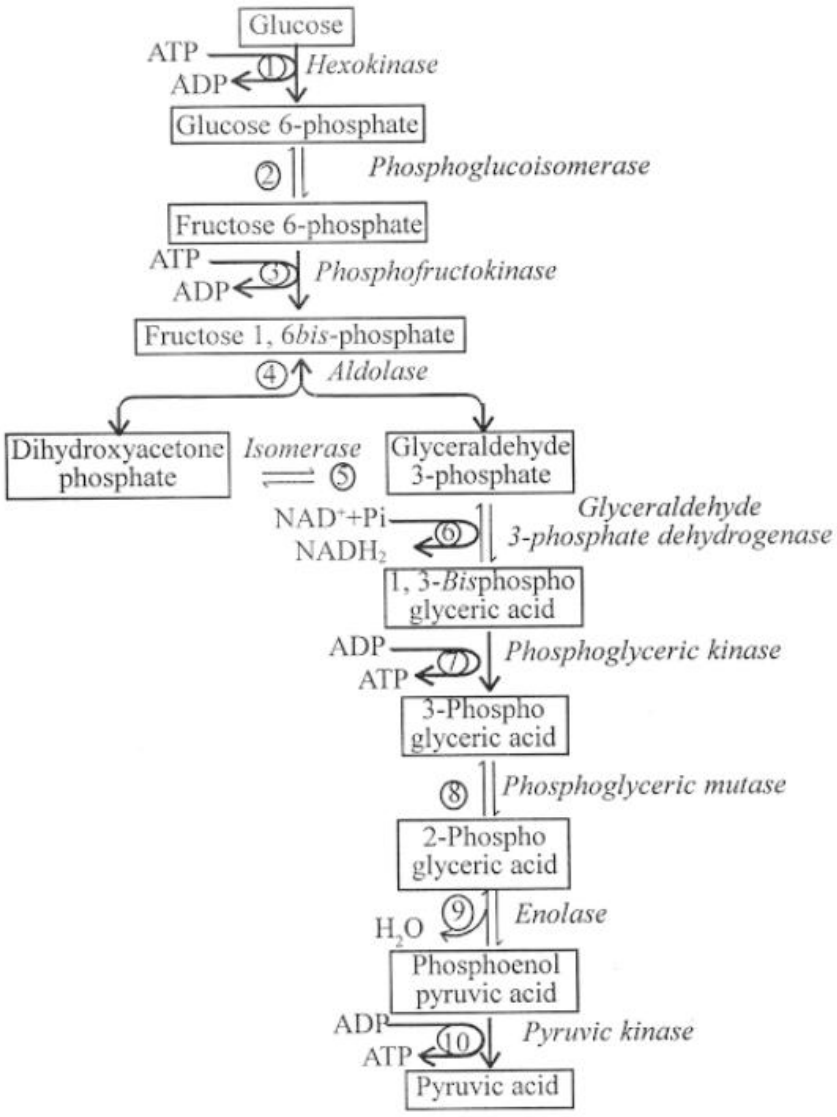
Herbarium:

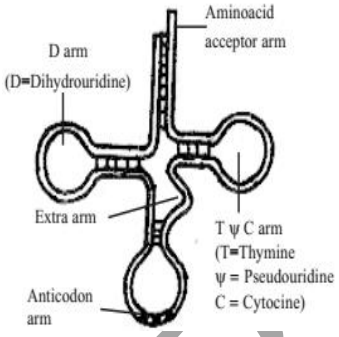
Herbarium is a collection of pressed, dried plant specimens mounted on specified sheets, identified and arranged in the order of an approved and well known system of classification. It also refers to the institution where dried plant specimens are maintained and studied. eg. Herbarium of Botanical Survey of India, Coimbatore. — **1**

Significance of herbarium:(Any four) — **4**

1. Herbarium is a source of knowledge about the flora of a region or a locality or a country.
2. It is a data store in which the information on plants are available.
3. The type specimens help in the correct identification of plants.
4. It provides materials for taxonomic and anatomical studies.
5. Typical pollen characters have been well emphasized in taxonomy. Morphological characters of the pollen remain unaltered even after storage upto nearly 200 years.
6. It is very much useful in the study of cytology, structure of DNA,numerical taxonomy, chaemotaxonomy, etc. It acts as a reservoir of gene pool studies.

35.	**Annual rings:** During the spring and the summer seasons vegetative growth of a tree is induced and more leaves are produced. So there is a dire need of efficient transport of water and mineral salts. So the vessels produced during these seasons are larger and wider than those produced in the winter and the autumn seasons. Xylem elements of spring wood are larger, thin-walled and lighter in colour. On the other hand, during the winter and the autumn seasons less amount of xylem elements is produced. These xylem and darker in colour. The xylem(wood) formed during the spring and the summer is called early wood or spring wood and that produced during the winter and the autumn is called late wood or autumn wood. These two kinds of wood appear together as aconcentric ring called annual ringor growth ring. Each annual ring refers to one year's growth. By counting the total number of annual rings, the age of the plant can approximately be calculated. The determination of the age of a tree by counting the annual rings is called Dendrocronology. The section taken at the base of the trunk of American Sequoia dendron has revealed that the tree is about 3500 years old.  	**4** **1**
	(or) **Concentric vascular bundles:** The bundle in which either phloem surrounds the xylem or xylem surrounds the phloem completely is known as concentric vascular bundle. This is of two types amphicribral and amphivasal. In amphicribralconcentric vascular bundles, the phloem completely surrounds the xylem.eg. Polypodium. In amphivasal concentric vascular bundles, the xylem completely surrounds the phloem. eg. Acorus  	**1** **1** **1** **1+1**

36.	**Inoculation** Transfer of explant (root, stem, leaf, etc.) on to a culture medium is called inoculation. The inoculation is carried out under aseptic condition for which an apparatus called laminar air flow chamber is used. Flamed and cooled forceps are used for transfer of plant materials to different culture media kept in glasswares. **Morphogenesis** Formation of new organs from the callus under the influence of auxin and cytokinin is called morphogenesis. Roots and shoots are differentiated from the callus. Such embryos are called somatic embryos result in the formation of young plantlet. **Embryogenesis** Formation of embryos (ie. bipolar structure having shoot and root) from the callus is called embryogenesis. These embryos arise from somatic callus tissue and are called somatic embryos or embryoids or somaclonal embryos. **Hardening** Exposing the plantlets to the natural environment in a stepwise manner is known as hardening. Finally the plantlets are gradually transferred to the soil.	**2** **1** **1** **1**
	(or) **Flow chart of Glycolysis:**  	**5**

37.	**Significance of pentose phosphate pathway** . provides alternative route for carbohydrate breakdown. . It generates $NADPH_2$ molecules which are used as reductants in biosynthetic processes. Production of $NADPH_2$ is not linked to ATP generation in pentose phosphate pathway. . It provides ribose sugar for the synthesis of nucleic acids. . It provides erythrose phosphate required for the synthesis of aromatic compounds. . It plays an important role in fixation of CO_2 in photosynthesis through Ru5P.	**5**
	(or) **Structure of tRNA:** The tRNA has a cloverleaf like structure. It is synthesized in the nucleus on a small part of DNA. In 1965, R.W. Holley suggested the clover leaf model of tRNA. Though tRNA molecule consists of a single strand, it assumes clover leaf like structure folding. There are three folds in the clover leaf tRNA. It has four arms namely anticodon arm, D arm, T C arm and aminoacid acceptor arm. The tRNA molecules are made up of 73 to 93 ribonucleotides. The acceptor arm carries an amino acid. The anticodon arm has three anticodon nucleotides, which will join with the complementary codon in mRNA during protein synthesis i.e. three nucleotides in the tRNA pairs with three nucleotides of mRNA. In certain tRNAs in addition to these four arms an extra arm called variable arm occurs as shown in the figure. The aminoacid acceptor and the anticodon arms are oriented in opposite directions.  	**3** **2**
38.	i). Binomial name of ground nut – *Arachis hypogea.* Family - Fabaceae ii).**Economic importance ground nut :(Any five)** 1. Groundnut oil is one of the important edible oils. It is extensively used incookery as a salad oil. It is used for the manufacture of vanaspathi. 2. Groundnut kernel is rich and cheap source of vegetable protein. Kernels are eaten, fried and salted and added to a number of dishes. 3. Peanut butter is prepared by grinding roasted and blanched kernels. It is nutritious. 4. Groundnut oil is used to a limited extent in soap making. 5. Oil is used as illuminant, lubricant. 6. Oil cake is used as animal feed and organic manure. 7. Groundnut shell is used in the manufacture of activated carbon. 8. The groundnut cake is a good cattle feed. The plant after removing the pod, both dried and fresh is a good cattle feed.	**1½+1=2 ½** **5x½=2½**

	(or) **Recombinant DNA technology** It is a technique where the selected DNA of one organism(Donor) is introduced to combine with the DNA of another organism called recipient organism. As a result, the recipient organism acquires the genetic abilities of the donor. Altering the genome of an organism by introducing genes of interest is known as gene manipulation or DNA recombinant technology. As this mechanism has the ability to engineer new organisms, it is known as genetic engineering. **The events of recombinant DNA technology** 1. The DNA of donor organism or gene of interest is isolated and cut into fragments using restriction endonucleases. 2. They are attached to a suitable replicon. Such replicon is known as vector or cloning vehicle, which is nothing but the extra chromosomal circular DNA found in the cytoplasm of Eschrichia coli is called plasmid. The plasmids are the most suitable vectors. 3. The DNA of the vector is cut into fragments using the samerestriction endonucleases. Using the enzyme DNA ligase, the DNA fragments of donor and vector are joined together. This process is called splicing. As a result of splicing hybrid DNA or recombinant DNA (rDNA) is obtained. 4. The rDNA is introduced into the host cells such as E.coli,Bacillus subtilis, Streptomyces sp. etc., 5. For this the host cells are treated with the enzyme cellulase. So that the cell wall of host becomes permeable to the entry of rDNA.	**1** **4**

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