SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL

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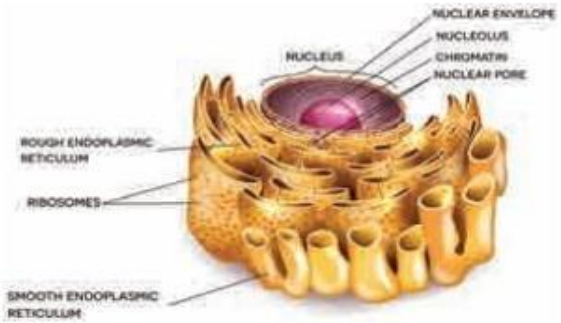
PUBLIC TENTATIVE ANSWER KEY– MAR - 2019

STD: XI-PURE SCIENCE **DATE:18.03.2019**

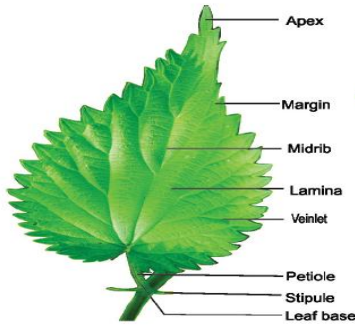
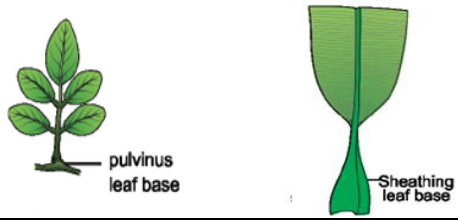
SUBJECT: BOTANY **MARKS : 70**

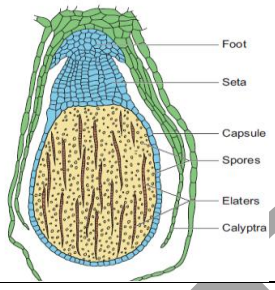
Q. NO	ANSWERS		MARKS
	SECTION -I		**15x1=15**
	TYPE - A	**TYPE - B**	
1.	a) Symport	a) Chromosome number is increased	1
2.	b) Alkaloids	a) Acetyl CoA	1
3.	d) Rubber - Hevea brasiliensis	a) Symport	1
4.	a) Acetyl CoA	d) Hans Molisch	1
5.	b) Bast fibres	b) Tamarindus - Palmately compound	1
6.	c) T.S. of Adiantum petiole	a) Br, Ebrl, $\oplus$, φ^{σ}, $K_{(5)}$, $\overset{\frown}{C_5}$, A_5, $\underline{G_2}$	1
7.	d) Zn	c) 3 inches	1
8.	d) Hans Molisch	a) Quantasomes	1
9.	a) Chromosome number is increased	d) Zn	1
10.	b) Tamarindus - Palmately compound	a) Virus	1
11.	a) Virus	d) Rubber - Hevea brasiliensis	1
12.	c) 3 inches	b) Alkaloids	1
13.	a) Br, Ebrl, $\oplus$, φ^{σ}, $K_{(5)}$, $\overset{\frown}{C_5}$, A_5, $\underline{G_2}$	d) 1-iii, 2-iv, 3-i, 4-ii	1
14.	d) 1-iii, 2-iv, 3-i, 4-ii	c) T.S. of Adiantum petiole	1
15.	a) Quantasomes	b) Bast fibres	1
	SECTION -II **(Answer any 6 questions. Q.No. 24 is compulsory)**		**6x2=12**
16.	**Types of Bacteria:** *(Any one)* **1. Aerobic respiration** **2. Anaerobic respiration** **1. Aerobic respiration** These bacteria require oxygen asterminal acceptor and will not grow under anaerobic conditions (i.e. in the absence ofO_2) **Example:** *Streptococcus* **2. Anaerobic respiration** These bacteria do not use oxygen for growth and metabolism but obtain the irenergy from fermentation reactions. **Example:** *Clostridium*		1 1
17.	**Characteristic features of leaf: (Any 2 points)** **1.** Leaf is a lateral appendage of the stem. **2.** It is borne at the node of the stem. **3.** It is exogenous in origin. **4.** It has limited growth. **5.** It does not possess apical bud. **6.** It has three main parts namely, leaf base, petiole and lamina. **7.** Lamina of the leaf is traversed by vascular strands, called **veins.**		2

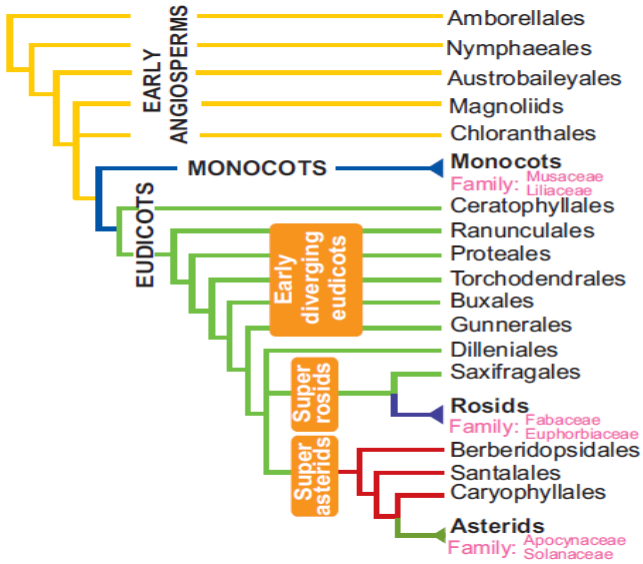
18.	**Differences between Classical and Modern Taxonomy: (Any 2 points)** **Classical Taxonomy** / **Modern Taxonomy** It is called old systematics or Alpha (α) taxonomy or Taxonomy / It is called Neosystematics or Biosystematics or Omega (Ω) taxonomy It is pre Darwinean / It is post Darwinean Species is considered as basic unit and is static / species is considered as dynamic entity and ever changing Classification is mainly based on morphological characters / Classification is based on morphological, reproductive characters and phylogenetic (evolutionary) relationship of the organism This system is based on the observation of a few samples/ individuals / This system is based on the observation of large number of samples/individuals	2
19.	**Draw the structure of endoplasmic reticulum**  	**2**
20.	**Reasons for arresting of cells in G_1 phase:** 1. Nutrient deprivation 2. Lack of growth factors or density dependant inhibition 3. Undergo metabolic changes and enter into G0 state.	**2**
21.	**Competitive inhibitors :** Molecules that resemble the shape of the substrate and may compete to occupy the active site of enzyme are known as **competitive inhibitors**. **For Example:** the enzyme that catalyses the reaction between carbon di oxide and the CO_2 acceptor molecule in photosynthesis, known as **ribulose biphosphate carboxylase oxygenase (RUBISCO)** is competitively inhibited by **oxygen/carbon-di-oxide** in the chloroplast. The competitive inhibitor is **malonate** for **succinic dehydrogenase**	**2**
22.	**Select good quality of timber:** Timber is derived from wood logs through the process of sawing. There are many methods of sawing. Among them, rib sawing is the most common method in making timber. Timber is mainly used for carpentry and building houses. In order to enrich the quality of timber, seasoning of wood is done. Timber is the most important tissue that sequestrates atmospheric carbon and this reduces global warming.	2
23.	**Significance of plasmolysis:** Plasmolysis is exhibited only by living cells and so it is used to test whether the cell is living or dead.	2

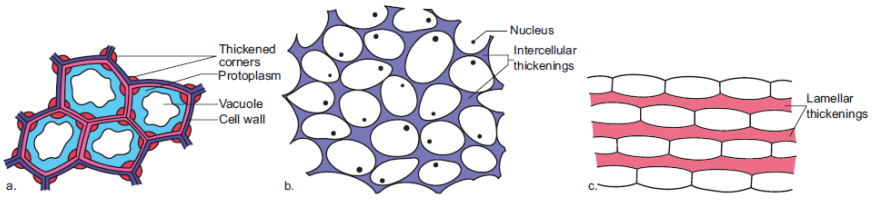
24.	**Identify the mineral deficiency of plant A and B:** ➢ **Plant A** in nutritent medium shows whiptail disease: **Mineral deficiency is due to Molybdenum** ➢ **Plant B** in a nutrient medium shows little leaf disease : **Mineral deficiency is due to zinc**	1 1
	SECTION -III **(Answer any six. Q.No. 33 is compulsory)**	**6x3=18**
25.	**Bacterial nitrogen fixation :** Nitrogen fixation — 1. *Azotobacter* 2. *Clostridium* 3. *Rhizobium* (i) Converting atmospheric nitrogen in to organic nitrogen (ii) The nitrogenous compounds are also oxidized to nitrogen (iii) All these activities of bacteria increase soil fertility	**1** **1** **1**
26.	**Sorosis :** A fleshy multiple fruit which develops from a spike or spadix. The flowers fused together by their succulent perianth and at the same time the axis bearing them become fleshy or juicy and the whole inflorescence forms a compact mass. **Example:** Pineapple, Jack fruit, Mulberry	2 1
27.	**Umbellule :** It is a branched umbel. Each smaller unit is called **umbellule**. **Example:** *Daucas carota*, *Coriandrum sativum, Memecylon edule.*	3
28.	**Three Binomial names of Ornamental plants in Fabaceae family: (Any 3)** ***Butea frondosa*** (Flame of the forest), ***Clitoria ternatea***, ***Lathyrus odoratus*** (Sweet pea) and ***Lupinus hirsutus*** (Lupin)	3
29.	**Significance of meiosis:** ❖ This maintains a definite constant number of chromosomes in organisms. ❖ Crossing over takes place and exchange of genetic material leads to variations among species. These variations are the raw materials to evolution. Meiosis leads to genetic variability by partitioning different combinations of genes into gametes through independent assortment. ❖ Adaptation of organisms to various environmental stress.	1 1 1
30.	**Difference between Diffuse Porous Wood and Ring Porous Wood:**	

Diffuse porous wood	**Ring porous wood**	
This type of wood is formed where the climatic conditions are uniform.	This type of wood is formed where the climatic conditions are not uniform.	1
The vessels are more or less equal in diameter in any annual ring.	The vessels are wide and narrow within any annual ring.	1
The vessels are uniformly distributed throughout the wood.	The vessels are not uniformly distributed throughout the wood.	1

31.	**a) Structure of leaf and its parts:**  **b) Structure of pulvinus leaf base and sheathing leaf base:**  	1½ 1½
32.	**a) Significance of photorespiration:** 1. Glycine and Serine synthesised during this process are precursors of many biomolecules like chlorophyll, proteins, nucleotides. 2. It consumes excess NADH + H^+ generated. 3. Glycolate protects cells from Photo oxidation. **b) Carotenes:** Orange, Red, Yellow and Brownish pigments, hydrocarbons (Lipids) and most of them are tetraterpenes($C_{40}H_{56}$). Carotene is the most abundant Carotene in plants and it is a precursor of Vitamin A. Lycopene is the red pigment found in the fruits of tomato, red peppers and roses.	1½ 1½
33.	**GS / GOGAT Pathway:** Glutamate amino acid combines with ammonia to form the amide glutamine. $\text{Glutamate} + NH_4^+ \xrightarrow[\text{ATP}\quad\text{ADP + Pi}]{\text{Glutamine Synthetase (GS)}} \text{Glutamine.}$ Glutamine reacts with α ketoglutaric acid to form two molecules of glutamate. $\text{Glutamine} + \underset{\text{(2- oxoglutarate)}}{\alpha\text{ Ketoglutaric acid}} \xrightarrow[\text{NADH+H}^+\quad\text{NAD}^+]{\text{GOGAT (enzyme)}} 2\text{ Glutamate}$ (GOGAT- Glutamine-2-Oxoglutarate aminotransferase)	3

	Section-IV (Answer the following questions)	5x5=25
34.	**a) Strucutre of marchantia Sporophyte:** ❖ The sporophyte is not free-living but attached to the photosynthetic gametophyte and derives nutrition from it. ❖ Sporophyte is differentiated into foot, seta and capsule. The foot is bulbous and is embedded in the gametophyte. ❖ It derives nutrition from the gametophyte and transfers to the sporophyte. Seta is short and connects foot and capsule. ❖ The capsule consists of single layered jacket layer and encloses numerous haploid spores and elaters. ❖ The capsule is covered by protective covering called calyptra. On maturation the capsule dehisces and spores are released. Elaters helps in the dispersal of spores.  	1 1 1 2
	(OR) **b) Placentation and their types:**  **Marginal** It is with the placentae along the margin of a unicarpellate ovary. Example:Fabaceae.  **Axile** The placentae arises from the column in a compound ovary with septa. Example: Hibiscus,tomato lemon  **Superficial** Ovules arise from the surface of the septa. Example: Nymphaeceae  **Parietal** It is the placentae on the ovary walls or upon intruding partitions of a unilocular, compound Ovary. Example: Mustard, Argemone, cucumber.  **Free-central** It is with the placentae along the column in a compound ovary without septa. Example: Caryophyllaceae, Dianthus,Primrose  **Basal** It is the placenta at the base of the ovary. Example: Sunflower (asteraceae) Marigold	5

35.	**a) Angiosperm phylogeny group classification :**  	5
	(OR) **b) Functions of Lysosome: (Any 5 points)** ❖ **Intracellular digestion:** They digest carbohydrates, proteins and lipids present in cytoplasm. ❖ **Autophagy:** During adverse condition they digest their own cell organelles ❖ like mitochondria and endoplasmic reticulum ❖ **Autolysis:** Lysosome causes self destruction of cell on insight of disease they destroy the cells. ❖ **Ageing:** Lysosomes have autolytic enzymes that disrupts intracellular molecules. ❖ **Phagocytosis:** Large cells or contents are engulfed and digested by macrophages, thus forming a phagosome in cytoplasm. These phagosome fuse with lysosome for further digestion. ❖ **Exocytosis:** Lysosomes release their enzymes outside the cell to digest other cells	1 1 1 1 1
36.	**a) Characteristic features of DNA: (Any 5 points)** ❖ If one strand runs in the 5′-3′ direction, the other runs in 3′-5′ direction and thus are antiparallel (they run in opposite direction). The 5′ end has the phosphate group and 3'end has the OH group. ❖ The angle at which the two sugars protrude from the base pairs is about 120°, for the narrow angle and 240° for the wide angle. The narrow angle between the sugars generates a **minor groove** and the large angle on the other edge generates **major groove.**	1 1

	❖ Each base is 0.34 nm apart and a complete turn of the helix comprises 3.4 nm or 10 base pairs per turn in the predominant B form of DNA. ❖ DNA helical structure has a diameter of 20 A° and a pitch of about 34 A°. X-ray crystal study of DNA takes a stack of about 10 bp to go completely around the helix (360°). ❖ Thermodynamic stability of the helix and specificity of base pairing includes (i) the hydrogen bonds between the complementary bases of the double helix (ii) stacking interaction between bases tend to stack about each other perpendicular to the direction of helical axis. Electron cloud interactions (Π – Π) between the bases in the helical stacks contribute to the stability of the double helix. ❖ The phosphodiester linkages gives an inherent polarity to the DNA helix. They form strong covalent bonds, gives the strength and stability to the polynucleotide chain ❖ Plectonemic coiling - the two strands of the DNA are wrapped around each other in a helix, making it impossible to simply move them apart without breaking the entire structure. Where as in paranemic coiling the two strands simply lie alongside one another, making them easier to pull apart. ❖ Based on the helix and the distance between each turns, the DNA is of three forms – **A DNA, B DNA and Z DNA**	1 1 1 1
	(OR) **b) Types of Collenchyma:** **1. Angular collenchyma** It is the most common type of collenchyma with irregular arrangement and thickening at the angles where cells meets. **Example**:Hypodermis of *Datura* and *Nicotiana* **2. Lacunar collenchyma** The collenchyma cells are irregularly arranged. Cell wall is thickening on the walls bordering intercellular spaces. **Example**:Hypodermis of *Ipomoea* **3. Lamellar collenchyma** The collenchyma cells are arranged compactly in layers(rows). The Cell wall is thickening is at tangential walls.These thickening appear as successsive tangential layers. **Example**:Hypodermis of *Helianthus*  	3 2

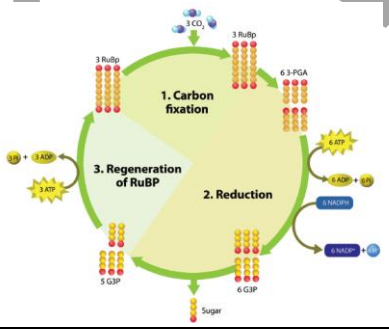
37. **a) Differentiate between Active Absorption and Passive Absorption:**

Active absorption	Passive absorption	
Active absorption takes place by the activity of root and root hairs	The pressure for absorption is not developed in roots and hence roots play passive role	1
Transpiration has no effect on active absorption	Absorption regulated by transpiration	1
The root hairs have high DPD as compared to soil solution and therefore water is taken by tension	The absorption occurs due to tension created in xylem sap by transpiration pull, thus water is sucked in by the tension	1
Respiratory energy needed	Respiratory energy not required	1
It involves symplastic movement of water	Both symplast and apoplast movement of water involved	1

(OR)

b) Photosynthetic Carbon Reduction Cycle:

Biosynthetic phase of photosynthesis utilises assimilatory powers (ATP and NADPH + H^+) produced during light reaction are used to fix and reduce carbon dioxide into carbohydrates. This reaction does not require light. Therefore, it is named Dark reaction. Ribulose 1,5 bisphosphate (RUBP) act as acceptor molecule of carbon dioxide and fix the CO_2 by RUBISCO enzyme. The first product of the pathway is a 3- carbon compound (Phospho Glyceric Acid) and so it is also called as C_3 Cycle. It takes place in the stroma of the chloroplast. **M. Melvin Calvin, A.A. Benson** and their co-workers in the year 1957 found this path way of carbon fixation. Melvin Calvin was awarded Nobel Prize for this in 1961 and this pathway named after the discoverers as **Calvin-Benson** Cycle. Dark reaction is temperature dependent and so it is also called thermo-chemical reaction. — 3



— 2

38 **a) Significance of pentose phosphate pathway:** — 5

- ❖ HMP shunt is associated with the generation of two important products, NADPH and pentose sugars, which play a vital role in anabolic reactions.
- ❖ Coenzyme NADPH generated is used for reductive biosynthesis and counter damaging the effects of oxygen free radicals
- ❖ Ribose-5-phosphate and its derivatives are used in the synthesis of DNA, RNA, ATP, NAD1, FAD and Coenzyme A.
- ❖ Erythrose is used for synthesis of anthocyanin, lignin and other aromatic compounds.

	(OR) **b) Physiological effects of Auxin and their role in Agriculture:** ❖ They promote cell elongation in stem and coleoptile. ❖ At higher concentrations auxins inhibit the elongation of roots but induce more lateral roots. Promotes growth of root only at extremely low concentrations. ❖ Suppression of growth in lateral bud by apical bud due to auxin produced by apical bud is termed as **apical dominance**. ❖ Auxin prevents abscission. ❖ It is responsible for initiation and promotion of cell division in cambium, which is responsible for the secondary growth and tumor. This property of induction of cell division has been exploited for tissue culture techniques and for the formation of callus. ❖ Auxin stimulates respiration. ❖ Auxin induces vascular differentiation.	2½
	Agricultural role ❖ It is used to eradicate weeds. Example: 2,4-D and 2,4,5-T. ❖ Synthetic auxins are used in the formation of seedless fruits (Parthenocarpic fruit). ❖ It is used to break the dormancy in seeds. ❖ Induce flowering in Pineapple by NAA & 2,4-D. ❖ Increase the number of female flowers and fruits in cucurbits.	2½

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