J : BOTANY

Q. 1 – Q. 10 carry one mark each.

Q.1 Nuclear membrane is absent in

(A) *Chlamydomonas*
(B) *Nostoc*
(C) *Volvox*
(D) *Chlorella*

Q.2 An organized and differentiated cell having cytoplasm but no nucleus is found in

(A) Companion cell
(B) Xylem parenchyma
(C) Sieve tube element
(D) Phloem parenchyma

Q.3 Double haploids in plants can be induced by

(A) Mitomycin-C
(B) Mirin
(C) Colchicine
(D) 5-Azacytidine

Q.4 During fatty acid biosynthesis, the first intermediate malonyl-CoA is formed from

(A) Acetyl-CoA and bicarbonate
(B) Two acetyl-CoA molecules
(C) Acetyl-CoA and biotin
(D) Palmitoyl CoA and acyl-carrier protein (ACP)

Q.5 Which of the following techniques is **NOT** applicable for evaluating the expression of a transgene?

(A) Northern blot
(B) RT-PCR
(C) Western blot
(D) Southern blot

Q.6 Identify the **CORRECT** family possessing the following characters: presence of glucosinolates, tetradynamous stamens, superior ovary with parietal placentation and siliqua type fruit

(A) Brassicaceae
(B) Capparidaceae
(C) Fumariaceae
(D) Papavaraceae

Q.7 Which of the following reduces the transpiration rate when applied to aerial parts of plants?

(A) Phosphon-D
(B) Paraquat
(C) Phenyl mercuric acetate
(D) Valinomycin

Q.8 A tube like membrane structure that forms the connection between the endoplasmic reticulum of neighboring cells through plasmodesmata is

(A) Desmotubule (B) Desmosome (C) Dictyosome (D) Microtubule

Q.9 Which one of the followings is **NOT** a cryoprotectant for plant tissue?

(A) Dimethyl sulfoxide
(B) Glycerol
(C) Ethylene glycol
(D) Liquid nitrogen

Q.10 Two similar holotypes are called

(A) Monotype (B) Neotype (C) Isotype (D) Syntype

Q. 11 – Q. 20 carry two marks each.

Q.11 A cross was made between AABBCCDDEE and aabbccddee. The resultants F_1 were selfed. Applying Mendelian principle, **PREDICT** the proportion of phenotype showing all the recessive characters in F_2 generation.

(A) $^1/_{64}$ (B) $^1/_{256}$ (C) $^1/_{512}$ (D) $^1/_{1024}$

Q.12 Identify the **CORRECT** statements with respect to functioning of ecosystem.

P. A food chain is a series of organisms, each one feeding on the organism succeeding it
Q. Food web presents a complete picture of the feeding relationships in any given ecosystem
R. In ecosystem, energy flows in unidirectional way, whereas nutrients flow in cyclic fashion
S. In biogeochemical cycles, nutrients do not alternate between organisms and environment

(A) P, Q (B) P, R (C) R, S (D) Q, R

Q.13 Match the name of the diseases with their causal organisms.

Disease	**Causal Organism**
P. Loose smut of wheat	1. *Cercospora personata*
Q. Wart disease of potato	2. *Alternaria solani*
R. Panama disease of banana	3. *Synchytrium endobioticum*
S. Tikka disease of groundnut	4. *Ustilago tritici*
	5. *Fusarium oxysporum*
	6. *Erwinia amylovora*

(A) P-6, Q-4, R-3, S-2 (B) P-4, Q-6, R-1, S-3
(C) P-4, Q-3, R-5, S-1 (D) P-2, Q-3, R-2, S-6

Q.14 Match the plant products with their sources and the plant parts from which they are obtained.

Product	**Source**	**Plant part**
P. Annatto	1. *Acacia catechu*	i. Seed
Q. Cutch	2. *Rubia tinctorum*	ii. Leaf
R. Henna	3. *Bixa orellana*	iii. Root
S. Alizarin	4. *Lawsonia inermis*	iv. Stem

(A) P-3-ii, Q-4-i, R-2-iii, S-1-iv
(B) P-3-i, Q-1-iv, R-4-ii, S-2-iii
(C) P-2-ii, Q-1-iii, R-4-iv, S-3-i
(D) P-4-ii, Q-3-iv, R-1-iii, S-2-i

Q.15 Match the floral structures with the families and representative plant species.

Floral structure	**Family**	**Plant**
P. Gynostegium	1. Orchidaceae	i. *Ocimum sanctum*
Q. Gynostemium	2. Lamiaceae	ii. *Cleome gynandra*
R. Gynobasic style	3. Capparidaceae	iii. *Calotropis procera*
S. Gynophore	4. Asclepiadaceae	iv. *Vanilla planifolia*

(A) P-2-i, Q-3-iii, R-4-ii, S-1-iv
(B) P-3-ii, Q-4-I, R-2-iii, S-1-iv
(C) P-4-iii, Q-1-iv, R-2-i, S-3-ii
(D) P-4-ii, Q-2-iii, R-1-iv, S-3-i

Q.16 Identify the **INCORRECT** statements with respect to plastid transformation.

P. Antibiotic used for selection of trasplastomic plant is spectinomycin
Q. Chances of gene escape from transplastomic plants are high
R. Microprojectile bombardment is the method of DNA delivery
S. Levels of transgene expression are low

(A) P, R (B) P, Q (C) Q, S (D) R, S

Q.17 Which of the following statements are **TRUE** with regard to the similarities between Crassulacean Acid Metabolism (CAM) and C_4 cycle?

P. Stomata open during night and remain closed during the day
Q. PEPcase is the carboxylating enzyme to form C_4 acid
R. C_4 acid is decarboxylated to provide CO_2 for C_3 cycle
S. Kranz anatomy is predominant in both CAM and C_4 plants

(A) P, S (B) Q, R (C) P, Q (D) R, S

Q. 18 With respect to germination of seeds, the **CORRECT** sequence of events is

P. Seed imbibes water
Q. Mobilization of starch reserve to embryo
R. Diffusion of gibberellin from embryo to aleurone layer
S. Synthesis of α-amylase in the aleurone layer

(A) P, Q, S, R
(B) P, R, S, Q
(C) R, P, Q, S
(D) R, Q, P, S

Q.19 Identify the **CORRECT** statements with regard to the function of plant hormones

P. ABA is synthesized from chorismate and promotes viviparous germination
Q. Auxin induces acidification of cell wall followed by turgour-induced cell expansion
R. Gibberellin-reponsive genes become activated by the repression of DELLA protein
S. Cytokinin regulates the G_2 to M transition in the cell cycle

(A) P, Q (B) Q, R (C) Q, S (D) P, R

Q.20 Statements given below are either **TRUE** (T) or **FALSE** (F). Find the correct combination.

P. Somatic embryo is unipolar in nature
Q. Heterokaryon can be selected using a fluorescence-activated cell sorter (FACS)
R. The term somaclonal variation is coined by Larkin and Scowcroft
S. Differentiation of shoot buds during *in vitro* culture is known as somatic embryogenesis

(A) P-T, Q-F, R-T, S-F
(B) P-F, Q-T, R-F, S-T
(C) P-T, Q-F, R-F, S-T
(D) P-F, Q-T, R-T, S-F

END OF THE QUESTION PAPER