

K: Botany

Q.1 – 10 carry one mark each

- Q.1 During seed development, the organelle functions for storage of
- (A) Oil only (B) Oil and starch
(C) Oil, starch and protein (D) Oil and protein
- Q.2 From the single parent cell how many times the process of mitosis/cell division occur to produce 512 cells
- (A) 28 (B) 10
(C) 9 (D) 128
- Q.3 Two criteria of most cork cells are
- (A) Suberin and permeable (B) Suberin and impervious
(C) Cutin and permeable (D) Cutin and impervious
- Q.4 In gynostegium
- (A) Stamens adnate to corolla (B) Stamens adnate to perianth
(C) Stamens adhere to carpels (D) Stamens are united by their filaments
- Q.5 Which of the staining procedure is NOT followed to determine the viability of cells?
- (A) FDA staining (B) TTC staining
(C) Evan's blue staining (D) Methyl blue staining
- Q.6 In angiosperms adventive embryony develops from
- (A) Diploid nucellar cells asexually
(B) Diploid nucellar cell sexually
(C) Megaspore mother cell sexually
(D) Any cell of the embryosac asexually
- Q.7 Phytoremediation is
- (A) Remedial measure in deforestation
(B) Removal of pollutants by plants
(C) Remedial measure in soil erosion using plants
(D) Curing of disease by phytochemicals

- Q.8 Given below are the enzymatic reactions of Krebs cycle. In which of the following steps GTP is generated?
- | | |
|---------------------------|---|
| (A) Citrate to isocitrate | (B) α -ketoglutarate to succinyl-CoA |
| (C) Fumarate to malate | (D) Succinyl-CoA to succinate |
- Q.9 The metal ion required for the enzymatic activity of nitrogenase is
- | | |
|------------|----------------|
| (A) Zinc | (B) Cobalt |
| (C) Copper | (D) Molybdenum |
- Q.10 The *rol* gene is present in
- | | |
|----------------------------|--|
| (A) R ₁ plasmid | (B) Both R ₁ and T ₁ plasmid |
| (C) T ₁ plasmid | (D) ρ UC |

Q.11 –30 carry two marks each

- Q.11 If A = 1 micrometer, B = 1 nanometer and C = 5 Angstrom, find the product of A/B and B/C
- | | |
|--------------|--------------|
| (A) (-) 2000 | (B) 2000 |
| (C) 5000 | (D) (-) 5000 |
- Q.12 Identify the correct set of three statements for cytoskeletal protein filaments from the following list
1. Actin filament is about 8 nm wide
 2. Actin filament is 25 nm wide
 3. Intermediate filaments have size intermediate between actin filaments and microtubules
 4. Protofilaments of microtubules are composed of α/β tubulin heterodimer
 5. Colchicine binds to the tubulin subunits in spindle microtubule causing disassembly to free units.
- | | |
|-----------|-----------|
| (A) 3,4,5 | (B) 2,3,4 |
| (C) 1,3,4 | (D) 1,2,3 |

Q.13 The nucleotide and peptide sequences mentioned in column I were changed after mutation, and now shown in column II. Name the type of mutation.

	Column I	Column II
DNA	5'.....CCTCGGCC...3' 3'.....GGAGCCGGG...5'	5'.....CCTGGGCC...3' 3'.....GGAAACGGG...5'
	↓	↓
mRNA	5'.....CCUCGGCC...3'	5'.....CCUUGGCC...3'
	↓	↓
PeptidePro Arg Pro.....Pro Trp Pro.....

- (A) Frameshift mutation (B) Non-sense substitution
(C) Same-sense substitution (D) Mis-sense substitution

Q. 14 A mutant strain (*thi*) of *Neurospora* was crossed with the wild type (*thi*⁺). A total of 132⁺ ascii were analyzed.

First division segregation : 104
Second division segregation : 28

Find out the map distance (cM) of *thi* gene from the centromere.

- (A) 10.6 (B) 21.2
(C) 5.3 (D) 8.3

Q.15 In pea plants the following cross was made

GGRR x ggrr
(Yellow, round) (Green, wrinkled)

↓
F₁ selfed

Mention the proportion of homozygous:heterozygous yellow, round seeds in F₂.

- (A) 1:3 (B) 1:16
(C) 1:8 (D) 9:16

Q.16- 25 are matching exercises. Choose the correct one from among the alternatives A, B, C and D

Q.16	Group 1 (Pathogen)	Group 2 (Infection site)	
P	<i>Puccinia graminis</i>	1. Blossom infection	
Q	<i>Ustilago hordei</i>	2. Seedling infection	
R	<i>Trichothecium roseum</i>	3. Fruit infection	
S	<i>Ustilago nuda</i>	4. Root infection	
		5. Leaf infection	
		6. Grain infection	
(A)	(B)	(C)	(D)
P-5	P-5	P-6	P-1
Q-2	Q-2	Q-5	Q-2
R-4	R-3	R-3	R-3
S-6	S-1	S-1	S-4

Q.17	Group 1 (Plant)	Group 2 (Floral Formula)	
P	Mustard	1. Zygomorphic, bisexual, $P_{(1+3)} A_{1 \times 2} \overline{G}_{(3)}$	
Q	Pea	2. Actinomorphic, $\overline{\sigma}$, $K_{(5)} C_{(5)} A_{(5)}$	
R	Cucumber	3. Actinomorphic, bisexual, $P_{(1+3)} A_{3+3} \overline{G}_{(3)}$	
S	Orchid	4. Zygomorphic, bisexual, $K_{(5)} C_5 A_{(9+1)} \overline{G}_1$	
		5. Actinomorphic, bisexual, $K_{2+2} C_4 A_{2+1} \overline{G}_{(2)}$	
		6. Actinomorphic, bisexual, $K_{(5)} C_5 A^{(6)} \overline{G}_{(5)}$	
(A)	(B)	(C)	(D)
P-5	P-2	P-5	P-5
Q-4	Q-4	Q-6	Q-3
R-2	R-6	R-3	R-4
S-1	S-3	S-2	S-1

Q.18	Group 1 (Enzyme)	Group 2 (Product)	
P	Phosphoglucomutase	1. Fructose-6- PO_4	
Q	Hexokinase	2. Glucose-1- PO_4	
R	Fructokinase	3. Glucose-6- PO_4	
S	Sucrose Phosphatase	4. UDP-glu + PP_i	
		5. Sucrose + Pi	
		6. Sucrose 6- PO_4	
(A)	(B)	(C)	(D)
P-3	P-6	P-4	P-2
Q-1	Q-4	Q-6	Q-3
R-4	R-2	R-5	R-1
S-6	S-5	S-3	S-5

Q.19 Group 1 (Characteristics)

- P Edible fungi
- Q Deadly poisonous fungi
- R Alkaloid producing fungi
- S Fungi pathogenic to human

- | | |
|-----|-----|
| (A) | (B) |
| P-5 | P-5 |
| Q-3 | Q-4 |
| R-4 | R-1 |
| S-1 | S-2 |

Group 2 (Species)

1. *Mucor mucedo*
2. *Candida albicans*
3. *Claviceps purpurea*
4. *Amanita verna*
5. *Morchella conica*
6. *Aspergillus flavus*

- | | |
|-----|-----|
| (C) | (D) |
| P-5 | P-4 |
| Q-4 | Q-1 |
| R-3 | R-3 |
| S-2 | S-6 |

Q.20 Group 1 (Property)

- P Cointegrate
- Q I.TRs
- R Hybrid dysgenesis
- S Controlling elements

- | | |
|-----|-----|
| (A) | (B) |
| P-3 | P-6 |
| Q-4 | Q-5 |
| R-2 | R-2 |
| S-6 | S-1 |

Group 2 (Transposon)

1. Tn5
2. P elements
3. Tn3
4. Ty1
5. IS elements
6. Ac/Ds

- | | |
|-----|-----|
| (C) | (D) |
| P-4 | P-1 |
| Q-5 | Q-3 |
| R-2 | R-2 |
| S-3 | S-5 |

Q.21 Group 1

- P Photochemical smog
- Q Ozone hole
- R Global warming
- S Metal pollution

- | | |
|-----|-----|
| (A) | (B) |
| P-6 | P-2 |
| Q-4 | Q-4 |
| R-1 | R-1 |
| S-3 | S-5 |

Group 2

1. Carbon dioxide
2. Ozone
3. Formaldehyde
4. Chlorofluorocarbons
5. Phytochelatins
6. Radon

- | | |
|-----|-----|
| (C) | (D) |
| P-3 | P-2 |
| Q-4 | Q-4 |
| R-1 | R-1 |
| S-5 | S-6 |

Q.22 Group 1 (Pigment)

- P Chlorophyll *a*
 Q C-phycoerythrin
 R C-phycoerythrin
 S Bacteriochlorophyll *b*

- | | |
|-----|-----|
| (A) | (B) |
| P-5 | P-1 |
| Q-6 | Q-2 |
| R-3 | R-3 |
| S-1 | S-4 |

Group 2 (Absorption maxima)

- 1020 nm
- 350 nm
- 615 nm
- 750 nm
- 680 nm
- 550 nm

- | | |
|-----|-----|
| (C) | (D) |
| P-1 | P-5 |
| Q-3 | Q-6 |
| R-6 | R-1 |
| S-5 | S-2 |

Q.23 Group 1 (Metabolite)

- P Menthol
 Q Ajmalicine
 R Caffeine
 S Carotene

- | | |
|-----|-----|
| (A) | (B) |
| P-6 | P-5 |
| Q-5 | Q-6 |
| R-2 | R-3 |
| S-3 | S-2 |

Group 2 (Chemical nature)

- Diterpene
- Tetraterpene
- Purine alkaloid
- Phenyl propanoid
- Indole alkaloid
- Monoterpene

- | | |
|-----|-----|
| (C) | (D) |
| P-6 | P-1 |
| Q-5 | Q-2 |
| R-3 | R-3 |
| S-2 | S-4 |

Q.24 Group 1 (Plant/Organ)

- P Dicot stem
 Q Monocot stem
 R Dicot root
 S Monocot root

- | | |
|-----|-----|
| (A) | (B) |
| P-3 | P-3 |
| Q-2 | Q-1 |
| R-1 | R-4 |
| S-4 | S-2 |

Group 2 (Vascular bundles)

- Numerous, scattered in ground tissue.
- Polyarch, xylem exarch
- Open, arranged in a ring, xylem endarch.
- Diarch to hexarch, xylem exarch

- | | |
|-----|-----|
| (C) | (D) |
| P-2 | P-2 |
| Q-4 | Q-3 |
| R-3 | R-1 |
| S-1 | S-4 |

Q.25 Group 1 (Transgenic plant)		Group 2 (Relevant gene)	
P	Glyphosate resistance	1.	psb A
Q	Insect resistance (Bollgard)	2.	hda
R	Delayed ripening	3.	cryI Ac
S	Insect resistance (Yieldgard)	4.	pg (Antisense)
		5.	cryI Ab
		6.	atoA
(A)	(B)	(C)	(D)
P-6	P-1	P-6	P-2
Q-3	Q-2	Q-5	Q-3
R-4	R-3	R-1	R-4
S-5	S-4	S-3	S-5

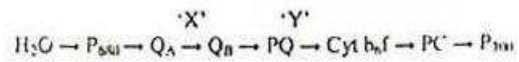
Q.26 With the objective of raising somatic embryos via friable callusing choose the best combination of growth regulators for medium I and II.

Medium I (Callusing)		Medium II (Embryogenesis)	
P	2,4-D	1.	t-AA and TIBA
Q	IAA	2.	2,4-D and EAP
		3.	IAA and BAP
		4.	2,4-D and ABA
(A)	Q-2	(B)	P-1
(C)	Q-4	(D)	P-3

Q.27 For cryopreservation of plant cells/tissues, maintaining viability over longest period of time, select the best possible combination of cryoprotectants (I) and temperature (II).

I		II	
P	Glycerol, DMSO and proline	1	(-)80°C
Q	Glycerol, acetic acid and ethanol	2.	(-)4°C
		3.	(-)96°C
		4.	0°C
(A)	Q-3	(B)	P-1
(C)	P-2	(D)	Q-4

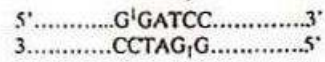
Q.28 Identify the inhibitors for the steps 'X' and 'Y' from the following list



- P DCMU
- Q CO
- R Paraquat
- S DBMIB

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

Q.29 Identify the restriction enzyme suitable for the following restriction digestion



- (A) BamH1
- (B) EcoR1
- (C) Alu1
- (D) HaeIII

Q.30 The two scientists who were awarded the Nobel Prize for transposable genetic elements and polymerase chain reaction

- (A) Barbara McClintock and Susumu Tonegawa
- (B) Barbara McClintock and Kary Mullis
- (C) Barbara McClintock and Paul Berg
- (D) Kary Mullis and Paul Berg