1 Mark Questions

1. During seed development, the organelle oleosome functions for storage of
   (a) oil only
   (b) oil and starch
   (c) oil, starch and protein
   (d) oil and protein

2. From the single parent cell, how many times to process of mitosis/cell division occur to produce 512 cells?
   (a) 28 (b) 10
   (c) 9 (d) 128

3. Two criteria of most cork cells are
   (a) suberin and permeable
   (b) suberin and impervious
   (c) cutin and permeable
   (d) cutin and impervious

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

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

6. In angiosperms, adventive embryony develops form
   (a) diploid nucellar cells asexually
   (b) diploid nucellar cell sexually
   (c) megaspore mother cell sexually
   (d) any cell of the embryo sac asexually

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

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 Co-A
   (c) Fumarate to malate
   (d) Succinyl Co-A to succinate

9. The metal ion required for the enzymatic activity of nitrogenase is
   (a) zinc (b) cobalt
   (c) copper (d) molybdenum

10. The *rol* gene is present in
    (a) R_i plasmid (b) T_i plasmid
    (c) Both (a) and (b) (d) pUC

2 Marks Questions

11. If $A = 1$ micrometer, $B = 1$ nanometer and $C = 5$ Angstrom, find the product A/B and B/C.
    (a) (–) 2000 (b) 2000
    (c) 5000 (d) (–) 5000

12. Identify the correct set of three statements for cytoskeletal protein filaments from the following list.
    A. Actin filament is about 8 nm wide.
    B. Actin filament is 25 nm wide.
    C. Intermediate filaments have size intermediate between actin filaments and microtubules.
    D. Protofilaments of microtubules are composed of α/β tubulin heterodimer.
    E. Colchicine binds to the tubulin subunits in spindle microtuble causing disassembly to free units.
    (a) C, D and E (b) B, C and D
    (c) A, C and D (d) A, B and C

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′...CCTCGGCCC...3′	5′...CCTTGGCCC...3′
	3′...GGAGCCGGG...5′	3′...GGAACCGGG...5′
	↓	↓
***m*RNA**	5′...CCUCGGCCC...3′	5′...CCUUGGCCC...3′
	↓	↓
Peptide	...Pro Arg Pro...	...Pro Trp Pro...

(a) Frameshift mutation
(b) Non-sense substitution
(c) Same-sense substitution
(d) Mis-sense substitution

14. A mutant strain (*thi*$^-$) of *Neurospora* was crossed with the wild type (*thi*$^+$). A total of 132 asci were analysed.
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

15. In pea plant, the following cross was made

GGRR × ggrr
(Yellow, round) (Green, wrinkled)
↓
F_1 selfed

Mention the proportion of homozygous : heterozygous yellow, round seeds in F_2.
(a) 1 : 3 (b) 1 : 16
(c) 1 : 8 (d) 9 : 16

Q. No. 16 to 25 are Matching Exercises
In each question, each item A, B, C and D in Group I matches one of the items in Group II. Choose the correct match from the alternatives (a), (b), (c) and (d).

16.

Group I (Pathogen)	Group II (Infection Site)
A. *Puccinia graminis*	1. Blossom infection
B. *Ustilago hordei*	2. Seedling infection
C. *Trichothecium roseum*	3. Fruit infection
D. *Ustilago nuda*	4. Root infection
	5. Leaf infection
	6. Grain infection

Codes

	A	B	C	D		A	B	C	D
(a)	5	2	4	6	(b)	5	2	3	1
(c)	6	5	3	1	(d)	1	2	3	4

17.

Group I (Plant)	Group II (Product)
A. Mustard	1. Zygomorphic, bisexual, $P_{6(3+3)}$, $A_{1 or 2}$ $G_{(3)}$
B. Pea	2. Actinomorphic $K_{(5)}$ $C_{(5)}$ $A_{(5)}$
C. Cucumber	3. Actinomorphic, bisexual, $P_{(3+3)}$ A_{3+3} $G_{(3)}$
D. Orchid	4. Zygomorphic, bisexual, $K_{(5)}$ $C_5A_{(9)+1}$ G_1
	5. Actinomorphic, bisexual, K_{2+2} C_4 A_{2+4} $G_{(2)}$
	6. Actinomorphic, bisexual, $K_{(5)}$ C_5 $A(\infty)$ $G_{(5)}$

Codes

	A	B	C	D		A	B	C	D
(a)	5	4	2	1	(b)	2	4	6	3
(c)	5	6	3	2	(d)	5	3	4	1

18.

Group I (Enzyme)	Group II (Product)
A. Phoshoglucomutase	1. Fructose 6-PO_4
B. Hexokinase	2. Glucose 1-PO_4
C. Fructokinase	3. Glucose 6-PO_4
D. Sucrose phosphatase	4. UDP-glu + PPi
	5. Sucrose + Pi
	6. Sucrose 6-PO_4

Codes

	A	B	C	D		A	B	C	D
(a)	3	1	4	6	(b)	6	4	2	5
(c)	4	6	5	3	(d)	2	3	1	5

19.

Group I (Characteristic)	Group II (Species)
A. Edible fungi	1. *Mucor mucedo*
B. Deadly poisonous fungi	2. *Candida albicans*
C. Alkaloid producing fungi	3. *Claviceps purpurea*
D. Fungi pathogenic to human	4. *Amanita verna*
	5. *Morchella conica*
	6. *Aspergillus flavus*

Codes

	A	B	C	D		A	B	C	D
(a)	5	3	4	1	(b)	5	4	1	2
(c)	5	4	3	2	(d)	4	1	3	6

20.

Group I (Property)	Group II (Transposon)
A. Cointegrate	1. Tn5
B. LTRs	2. P elements
C. Hybrid dysgenesis	3. Tn3
D. Controlling elements	4. Ty1
	5. IS elements
	6. Ac/Ds

Codes

	A	B	C	D
(a)	3	4	2	6
(b)	6	5	2	1
(c)	4	5	2	3
(d)	1	3	2	5

21.

Group I	Group II
A. Photochemical smog	1. Carbon dioxide
B. Ozone hole	2. Ozone
C. Global warming	3. Formaldehyde
D. Metal pollution	4. Chlorofluorocarbons
	5. Phytochelatins
	6. Radon

Codes

	A	B	C	D
(a)	6	4	1	3
(b)	2	4	1	5
(c)	3	4	1	5
(d)	2	4	1	6

22.

Group I (Pigment)	Group II (Absorption Maxima)
A. Chlorophyll-*a*	1. 1020 nm
B. *c*-phycoerythrin	2. 350 nm
C. *c*-phycocyanin	3. 615 nm
D. Bacteriochlorophyll-*b*	4. 750 nm
	5. 680 nm
	6. 550 nm

Codes

	A	B	C	D
(a)	5	6	3	1
(b)	1	2	3	4
(c)	1	3	6	5
(d)	5	6	1	2

23.

Group I (Metabolite)	Group II (Chemical Nature)
A. Menthol	1. Diterpene
B. Ajmalicine	2. Tetraterpene
C. Caffeine	3. Purine alkaloid
D. Carotene	4. Phenyl propanoid
	5. Indole alkaloid
	6. Monoterpene

Codes

	A	B	C	D
(a)	6	5	2	3
(b)	5	6	3	2
(c)	6	5	3	2
(d)	1	2	3	4

24.

Group I (Plant/Organ)	Group II (Vascular Bundle)
A. Dicot stem	1. Numerous, scattered in ground tissue
B. Monocot stem	2. Polyarch, xylem exarch
C. Dicot root	3. Open, arranged in a ring, xylem endarch
D. Monocot root	4. Diarch to hexarch, xylem exarch

Codes

	A	B	C	D
(a)	3	2	1	4
(b)	3	1	4	2
(c)	2	4	3	1
(d)	2	3	1	4

25.

Group I (Transgenic Plant)	Group II (Relevant Gene)
A. Glyphosate resistance	1. psbA
B. Insect resistance (Bollgard)	2. tfdA
C. Delayed ripening	3. cry I Ac
D. Insect resistance (Yieldgard)	4. pg (Antisense)
	5. cry I Ab
	6. aroA

Codes

	A	B	C	D
(a)	6	3	4	5
(b)	1	2	3	4
(c)	6	5	1	3
(d)	2	3	4	5

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)
A. 2, 4-D	1. IAA and TIBA
B. IAA	2. 2, 4-D and BAP
	3. IAA and BAP
	4. 2, 4-D and ABA

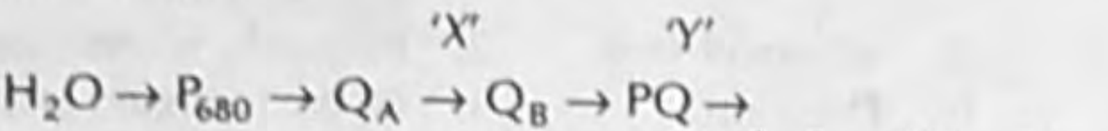
(a) B-2 (b) A-1
(c) B-4 (d) A-3

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
A. Glycerol, DMSO and proline	1. (–) 80°C
B. Glyerol, acetic acid and ethanol	2. (–) 4°C
	3. (–) 196°C
	4. 0°C

(a) B-3 (b) A-1
(c) A-2 (d) B-4

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



A. DCMU
B. CO
C. Paraquat
D. DBMIB

(a) A-C (b) B-C
(c) A-B (d) A-D

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

(a) *Bam* HI (b) *Eco* RI
(c) *Alu* I (d) *Hael* II

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

(a) Barbara McClintock and Susumu Tonegawa
(b) Barbara McClintock and Kary Mullis
(c) Barbara McClintock and Paul Berg
(d) Kary Mullis and Paul Berg