

12th
STD.

Register Number

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QUARTERLY COMMON EXAMINATION - 2019

TIME ALLOWED : 2.30 Hours

BIOLOGY

MAXIMUM MARKS : 70

BIO-BOTANY

(35 MARKS)

Instructions:

- Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
- Use **Blue** or **Black** ink to write and underline and **pencil** to draw diagrams:

SECTION – I

- Note :** (i) Answer **all** the questions: (8 × 1 = 8)
(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

- A plant called "X" possesses small flower with reduced perianth and versatile anther. The probable agent for pollination would be
 - Water
 - Air
 - Butterflies
 - Beetles
- "Gametes are never hybrid". This is a statement of
 - Law of dominance
 - Law of independent assortment
 - Law of segregation
 - Law of random fertilization
- Match the following

	Column-A		Column - B
i	Syngenesions	A	pollen grain
ii	Androecium	B	anther wall
iii	Male gametophyto	C	Asteraceae
iv	Primary Parietal Layer	D	Stamens

- | | | | | |
|-----|---|----|-----|----|
| | i | ii | iii | iv |
| (a) | D | A | B | C |
| (b) | C | D | A | B |
| (c) | C | D | B | A |
| (d) | C | A | D | B |

- Match the following

	Column-A		Column - B
i	Exonuclease	A	Add or remove phosphate
ii	Endonuclease	B	binding the DNA fragment
iii	Alkaline Phosphatase	C	cut the DNA at terminus
iv	Ligase	D	cut the DNA at middle

- | | | | | |
|-----|---|----|-----|----|
| | i | ii | iii | iv |
| (a) | A | B | C | D |
| (b) | C | D | B | A |
| (c) | A | C | B | D |
| (d) | C | D | A | B |

- Which of the following sentences are correct?
 - The offspring exhibit only parental combinations due to incomplete linkage.
 - The linked gene exhibit some crossing over in complete linkage.
 - The separation of the two linked genes are possible in incomplete linkage.
 - Crossing over is absent in complete linkage.
 - (1) and (2)
 - (2) and (3)
 - (3) and (4)
 - (1) and (4)
- Which of the following statement is correct?
 - Agar is not extracted from marine algae such as seaweeds.
 - Callus undergoes differentiation and produces somatic embryoids.
 - Surface sterilization of explants is done by using mercuric bromide.
 - pH of the culture medium is 5.0 to 6.0
- Solidifying agent used in plant tissue culture is
 - Nicotinic acid
 - Cobaltous chloride
 - EDTA
 - Agar

[1]

8. Which of the following soil water is available for plants?
- Gravitational water
 - Chemically bound water
 - Capillary water
 - Hygroscopic water

SECTION – II

Answer **any four** of the following questions.

(4 × 2 = 8)

- What is Micro propagation?
- What do you know about pleiotropy?
- How will you identify asymmetric cuts?
- What are Evergreen forests?
- How can we protect the cells or tissues from stress of freezing temperature in cryopreservation technique?
- Write any four ecologically important days.

SECTION – III

Answer any 3 questions. Question No. **19** is **compulsory**.

(3 × 3 = 9)

- Draw and label the T.S. of mature anther.
- Explain the type of crossing over.
- What are the materials used to grow microorganism like Spirulina?
- What is thermal stratification? Mention their types.
- What are the three parts of a patent? List out the general steps in patenting.

SECTION – IV

Answer **all the questions** (2 × 5 = 10)

- Bring out the inheritance of chloroplast gene with an example.

(OR)

Explain the steps involved in Recombinant DNA Technology with diagram.

- Explain the basic concepts involved in plant tissue culture.

(OR)

- Green algae are not likely to be found in the deepest strata of the ocean : Give at least one reason.
- What is vivipary? Name a plant group within exhibits vivipary.

ANSWERS

SECTION – I

- (b) Air
- (c) Law of segregation
- (b) i-C, ii-D, iii-A, iv-B
- (d) i-C, ii-D, iii-A, iv-B
- (c) (3) and (4)
- (b) Callus undergoes differentiation and produces somatic embryoids.
- (d) Agar
- (c) Capillary water

SECTION – II

9. Micropropagation:

- The regeneration of a whole plant from single cell, tissue or small pieces of vegetative structures through tissue culture is called micropropagation.
 - This is one of the modern methods used to propagate plants.
- (i) The single gene affects multiple traits and alter the phenotype of an organism.
 - (ii) The pleiotropic gene influences number of characters simultaneously and such genes are called pleiotropic gene.
Ex: sickle cell anaemia.

11. Asymmetric cuts:

Some enzymes cut in a way producing protruding and recessed ends known as sticky or cohesive end. Such cut are called staggered or asymmetric cuts

12. Evergreen forests – Found where heavy rainfall occurs throughout the year.

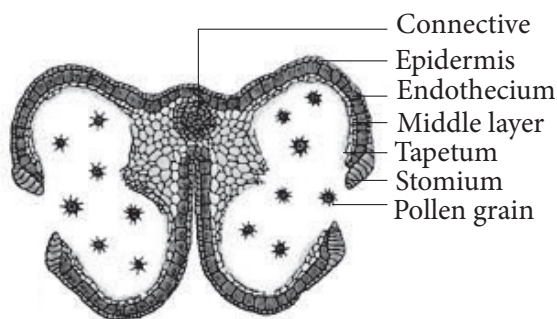
- Protective agents like dimethyl sulphoxide, glycerol or sucrose are added before cryopreservation process.
- These protective agents are called cryoprotectants, since they protect the cells or tissues from the stress of freezing temperature.

14. Any four ecologically important days :

- March 21 - World forest day
 April 22 - Earth day
 May 22 - World bio-diversity day
 June 05 - World environment day
 July 07 - Van Mohostav day
 September 16 - International Ozone day

SECTION – III

15.



16. Types of crossing over:

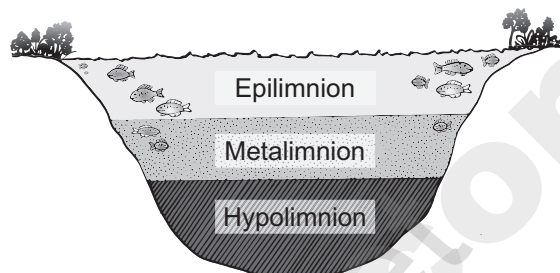
Depending upon the number of chiasmata formed crossing over may be classified into three types.

1. **Single cross over:** Formation of single chiasma and involves only two chromatids out of four.
2. **Double cross over:** Formation of two chiasmata and involves two or three or all four strands
3. **Multiple cross over:** Formation of more than two chiasmata and crossing over frequency is extremely low.

17. (i) *Spirulina* can be grown easily on materials like waste water from potato processing plants (containing starch), straw, molasses, animal manure and even sewage, to produce large quantities and can serve as food rich in protein, minerals, fats, carbohydrate and vitamins.
- (ii) Such utilization also reduces environmental pollution.
- (iii) 250 g of *Methylophilus methylotrophus*, as its high rate of biomass production and growth, can be expected to produce 25 tonnes of protein.

18. Thermal Stratification :

It is usually found in aquatic habitat. The change in the temperature profile with increasing depth in a water body is called thermal stratification.



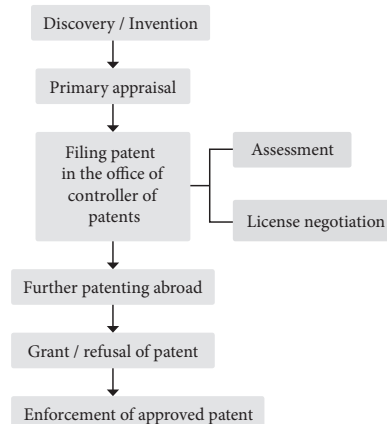
Thermal stratification of pond

3 kinds of thermal stratifications:

- (i) **Epilimnion** – The upper layer of warmer water.
- (ii) **Metalimnion** – The middle layer with a zone of gradual decrease in temperature.
- (iii) **Hypolimnion** – The bottom layer of colder water.

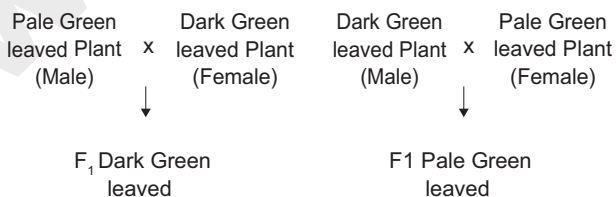
19. A patent consists of 3 parts :

- (a) **The grant** is filled at the patent office which is not published. It is a signed document, actually the agreement that grants patent right to the inventor.
- (b) **The specification** and claims are published as a single document which is made public from the patent office. The specification part is narrative in which the subject matter of invention is described as how the invention was carried out.
- (c) **The claim** specifically defines the scope of the invention to be protected by the patent which the others may not practice.



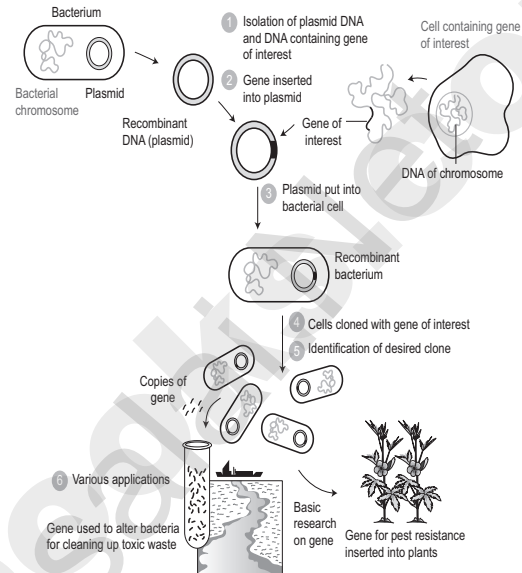
SECTION – IV**20. Chloroplast Inheritance:**

- (i) DNA is the universal genetic material. Genes located in nuclear chromosomes follow Mendelian inheritance. But certain traits are governed either by the chloroplast or mitochondrial genes known as extra nuclear inheritance.
- (ii) It is a kind of Non-Mendelian inheritance. Since it involves cytoplasmic organelles such as chloroplast that act as inheritance vectors, it is also called Cytoplasmic inheritance.
- (iii) It is based on independent, self-replicating extra chromosomal unit called plasmogene located in the chloroplast.
- (iv) It is found in 4 O' Clock plant (*Mirabilis jalapa*).
- (v) Two types of variegated leaves namely (i) Dark green leaved plants (ii) Pale green leaved plants.
- (vi) When the pollen of dark green leaved plant (male) is transferred to the stigma of pale green leaved plant (female) and pollen of pale green leaved plant is transferred to the stigma of dark green leaved plant, the F_1 generation of both the crosses must be identical as per Mendelian inheritance.
- (vii) But in the reciprocal cross the F_1 plant differs from each other.
- (viii) In each cross, the F_1 plant reveals the character of the plant which is used as female plant.
- (ix) This inheritance is not through nuclear gene. It is due to the chloroplast gene found in the ovum of the female plant which contributes the cytoplasm during fertilization since the male gamete contribute only the nucleus but not cytoplasm.

**Chloroplast inheritance****(OR)**

The steps involved in recombinant DNA technology are :

- (i) Isolation of a DNA fragment containing a gene of interest that needs to be cloned. This is called an insert.

**Steps involved in r-DNA Technology**

- (ii) Generation of recombinant DNA (rDNA) molecule by insertion of the DNA fragment into a carrier molecule called a vector that can self-replicate within the host cell.
- (iii) Selection of the transformed host cells that is carrying the rDNA and allowing them to multiply thereby multiplying the rDNA molecule.
- (iv) The entire process thus generates either a large amount of rDNA or a large amount of protein expressed by the insert.
- (v) Wherever vectors are not involved the desired gene is multiplied by PCR technique. The multiple copies are injected into the host cell protoplast or it is shot into the host cell protoplast by shot gun method.

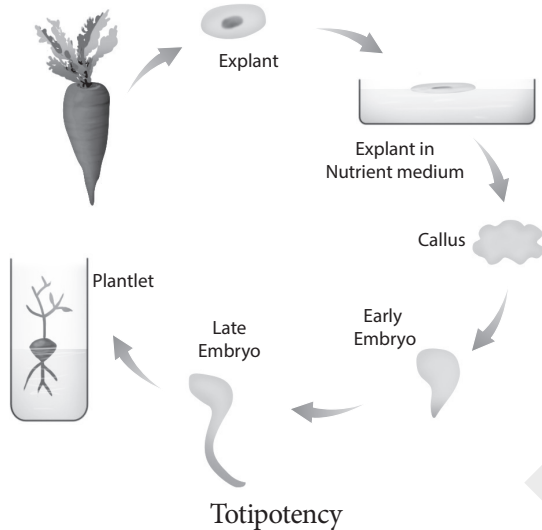
21. Basic concepts of plant tissue culture are totipotency, differentiation, dedifferentiation and redifferentiation.

Totipotency :

The property of live plant cells that they have the genetic potential when cultured in nutrient medium to give rise to a complete individual plant.

Differentiation :

The process of biochemical and structural changes by which cells become specialized in form and function.

**Redifferentiation :**

The further differentiation of already differentiated cell into another type of cell.

For example, when the component cells of callus have the ability to form a whole plant in a nutrient medium, the phenomenon is called redifferentiation.

Dedifferentiation :

The phenomenon of the reversion of mature cells to the meristematic state leading to the formation of callus is called dedifferentiation. These two phenomena of redifferentiation and dedifferentiation are the inherent capacities of living plant cells or tissue. This is described as totipotency.

(OR)

- (i) (i) Green algae not likely to be found in the deepest strata of the ocean because deep inside the sea presence of sufficient light for photosynthesis and brackish water are not available.
- (ii) So green algae are not present at this level.
- (iii) Instead algae inhabits littoral zone of water.
- (ii) (i) If seeds or embryos begin to develop before they detach from the parent. The Phenomenon is described as vivipary.
- (ii) Seeds germinate in the fruits of mother plant itself. Halophytes exhibit vivipary.

Example : *Avicennia*