

**Model answer paper**  
**FY-BIOTECHNOLOGY**  
**(Tissue culture and scientific communication)**

Q.1.DO as directed (Any 15)

1. Mechanical / enzymatic
2. Totipotency
3. MS / Gamborg/B12 media
4. Checks the contamination
5. Gottlieb Haberlandt
6. Undifferentiated mass of plant cells
7. Medium salts, Low auxins, Medium cytokines, High organic nutrients.
8. The cells growing in cultures exhaust the nutrients from the medium and this needs periodic replenishment by changing the spent medium with a fresh lot.
  
9. Splitting of confluent growing cultures
10. True
11. True
12. DNA transcription, protein synthesis, energy metabolism, drug metabolism, cell cycle, differentiation, apoptosis etc.
13. Harrison (1907), Carrel (1912)
14. Frog
15. False
16. Plagiarism is using someone else's idea or work may be published or unpublished without consent of original person or acknowledgement of them in publication or report.
17. Yes
18. Any two correct examples
19. Body language
20. Two

Q.2. A. Transfer Area

08

- Open bench under clean and dry atmosphere
- Encloses plastic glove box, U.V. , swabbing area, surface 95% ethyl alcohol
- Laminar air flow
- Role: for aseptic transfer of the plant cells and tissue.
- Culture room
- Humidity , temperature and light controls
- Glass and wooden shelves, wire mesh- storing
- Temp: 25°C
- Diffused light :1 klx
- Humidity: 20-98%
- Racks for culture tubes
- Incubators
- Role: for growing the plant cells under controlled parameters into callus, organogenesis.

Q.2.B. The importance of totipotency in plant science.

(7 Marks)

- Reconstruction of whole plant
- Production of homozygous diploid/haploid plants
- Germplasm conservation
- In horticulture, agriculture

OR

Q.2C) Appropriate elaboration of following with definition of macronutrients (8 Marks)

Nutrients added to medium in the amount of  $25 \text{ mmol}^{-1}$  or more are called macronutrients.

Role of N,P,K,S, Mg in plant growth.

Role of Auxins, cytokines. Giberllic acids, absisic acids

Q.2D) Protocol for callus culture of the carrot root in detail.

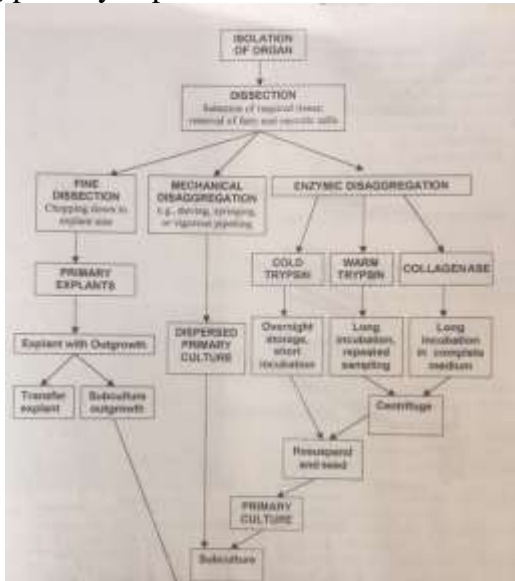
(7Marks)

Fresh carrot root

- Surface sterilization
- Cutting of callus 1 mm thick
- Inoculation in medium
- Labelling
- Transfer the culture tube to culture room and incubation at respective parameters.

**Q3A. Define primary culture (2M) Explain how to obtain a primary cell culture (6M) (08)**

Ans- Primary cell cultures can be set up either by disaggregating the cells from tissues or by making primary explants cultures.



Schematic or descriptive format is accepted

**Process to obtain primary cell culture:** Primary cell cultures are prepared from fresh tissues. Pieces of tissues from the organ are removed aseptically; which are usually minced with a sharp intercellular cement. The obtained cell suspension is then washed with a physiological buffer (to

remove the proteolytic enzymes used). The cell suspension is spread out on the bottom of a flat surface, such as a bottle or a Petri dish. This thin layer of cells adhering to the glass or plastic dish is overlaid with a suitable culture medium and is incubated at a suitable temperature.

**Aseptic techniques:** Bacterial infections, like Mycoplasma and fungal infections commonly occur in cell culture creating a problem to identify and eliminate. Thus, all cell culture work is done in a sterile environment with proper aseptic techniques. Work should be done in laminar flow with constant unidirectional flow of HEPA filtered air over the work area. All the material, solutions and the whole atmosphere should be of contamination-free.

**Cryopreservation:** If a surplus of cells is available from sub-culturing, they should be treated with the appropriate protective agent (e.g., DMSO or glycerol) and stored at temperatures below  $-130^{\circ}\text{C}$  until they are needed. This stores cell stocks and prevents original cell from being lost due to unexpected equipment failure or biological contaminations. It also prevents finite cells from reaching senescence and minimizes risks of changes in long term cultures.

When thawing the cells, the frozen tube of cells is warmed quickly in warm water, rinsed with medium and serum and then added into culture containers once suspended in the appropriate media.

**Q3B. Give/Explain methods of sterilization of animal tissue culture media** (07)

Ans- Sterile filtration through microporus filters (04M) Autoclaving (03M)

OR

**Q3C. Write a note on any eight applications of animal tissue culture.** (08)

Ans-

1. In understanding basic cell biology
2. For the study of external agents like drugs, contaminants etc.
3. To study the effect of radiation
4. To study population kinetics
5. Cell-cell & cell-matrix interaction
6. To study disease processes and malignancy
7. for isolation of viruses
8. Vaccine production
9. Production of biologically important molecules (IF, IL, Urokinase etc.)
10. Cell fusion techniques
11. Mapping genes on chromosomes
12. Development of monoclonal antibody
13. Gene transfer studies
14. Regenerative medicines
15. Pre-post natal diagnosis for chromosomal mutation.

**Q3D. Draw a neat labeled diagram of carbon dioxide incubator (4M) and explain its use in animal cell culturing (3M)** (07)

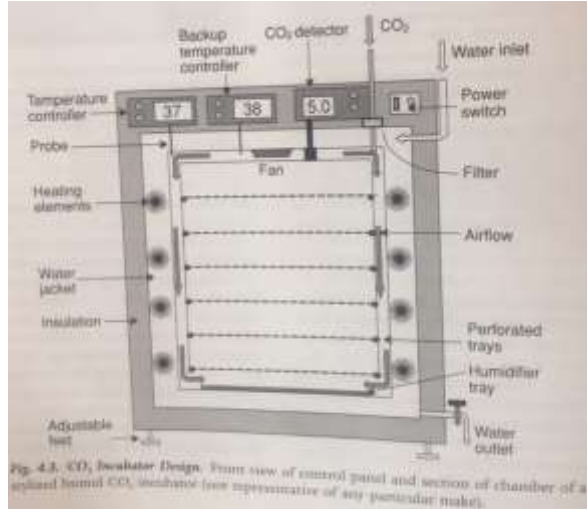


Fig. 4.3. CO<sub>2</sub> Incubator Design. Front view of control panel and section of chamber of a typical humid CO<sub>2</sub> incubator (not representative of any particular make).

Carbon dioxide incubators maintain optimum temperature, humidity, carbon dioxide and oxygen concentration in the atmosphere inside the chamber for the growth of the culture animal cells. All the above conditions can be adjusted as per the required or need of the cells to be maintained or cultured etc.

Q.4. A. Communication Process

(08)

Explanation of communication 1 Mark

Basic model of communication with five elements: the sender, the receiver, the message, the channel and feedback :explain each element 7 Mark

Q.4. B. Listing the component of research paper 2 Marks

(07)

Any two components like Introduction...Review of literature, methods, results discussion...etc. 5 Marks

OR

Q.4.C

(08)

1.any appropriate title suitable 2 Marks

2.Determination and compare, phytochemical screening, antioxidant and antimicrobial activities of the essential oil..... 2Marks

3.Azadirachta indica...2 Marks

4.Any appropriate 4 key words ...2Marks

Q.4.D, Differentiating Points of verbal and nonverbal communication

Verbal communication involves using speech to exchange information with others. We usually communicate verbally in face-to-face conversations such as; meetings, interviews, conferences, speeches, phone calls e.t.c. Much of the communication that takes place between people is both verbal and non-verbal; that is, it is based on language and gestures. Verbal communication of the vocal category includes spoken language. Written communication (may be included by some students) While it may seem counter-intuitive, written communication is considered a form of verbal communication under most commonly accepted definitions of the term. For this reason, a plethora of seemingly nonverbal communication forms can be used as examples of verbal communication, including written letters, memos, newsletters, newspapers, journals and even personal notes. Textbooks, novels and other literature also serve as examples of verbal communication, because they use words as the medium through which a message is conveyed.

Non-verbal communication is a type of communication that employs gestures and body language. The term "body language" is sometimes used to denote non-verbal communications. "Body Language" is the communication of personal feelings, emotions, attitudes, and thoughts through body-movements such as gestures, postures, facial expressions, touch, smell, walking styles and positions among others. These movements can be done either consciously or involuntarily; more often they 'happen' subconsciously, and are accompanied, or not accompanied, by words. Examples can be given by the student.

#### Q.5.Short Notes

15

##### 1. Use of rotary shakers in PTC lab.

###### Callus culture

- Friable callus
- Suspension culture
- Secondary metabolite production
- Providing medium and oxygen to explants

##### 2. Importance of callus culture

###### Regeneration of whole plant

- Good source of genetic variations
- Friable callus-secondary metabolite production
- Several biochemical assays.

##### 3. Inverted Microscope

- An inverted microscope is a microscope with its light source and condenser on the top, above the stage pointing down, while the objectives and turret are below the stage pointing up. It was invented in 1850 by J. Lawrence Smith, a faculty member of Tulane University (then named the Medical College of Louisiana).
- It is basically used to observe animal cells cultured on plates and flasks directly. Etc.

**(Diagram not required but if its various parts are mentioned then marks to be given.)**

4.

be verbal/ non-verbal or visual. Communication can be accidental especially in non-verbal. 1. To change in behavior 2. To influence others 3. To express our thoughts and emotions through words & actions. 4. It is a tool for controlling and motivating people. 5. It is a social and emotional process. 6. Communication for improving self-confidence 7. Entertain 8. Educate 9. Establish relationships 10. Inform 11. Solve problems 12. Make orders 13. Give directions (Open ended question- can be discussed by the student as taught)

**5. Growth factors (GF)**

Ans- The family of polypeptides with specific mitogenic activity (FGF, EGF, PDGF, HBGF, IGF etc.)

They are required for the growth of specialized tissue types.

Serum contains GF like platelet derived GF, which promotes proliferation of fibroblasts and glial cells.

GF can be produced commercially using recombinant technology

GF may act synergistically or additively with each other or with other hormones and paracrine factors such as prostaglandin and hydrocortisone.