P R E F A C E

Welcome to the world of **CUET (PG) Plant Biotechnology exam preparation!** This preface is designed to provide you with an overview of what to expect in this comprehensive resource for preparing for the CUET (Common University Entrance Test) Plant Biotechnology Postgraduate examination. It is our mission to help you succeed by offering a robust collection of previous year questions and practice questions along with detailed explanations.

Previous Year Questions: We have curated a vast collection of previous year CUET (PG) Plant Biotechnology questions. These questions are organized by topic and difficulty level to help you get a comprehensive understanding of what the examination expects.

Practice Questions: Along with the previous year questions, you'll find additional practice questions designed to strengthen your grasp of various Plant Biotechnology topics. These questions are meant to challenge your knowledge and problem-solving skills.

Detailed Explanations: One of the most crucial aspects of this resource is the detailed explanations provided for each question. We understand that learning from your mistakes is crucial, and our explanations will help you understand not just the right answers but also the logic behind them.

Progress Tracking: We recommend that you keep track of your progress as you work through this resource. This will help you identify your strengths and weaknesses and adjust your study plan accordingly.

We believe that with dedication, practice, and a thorough understanding of the subject, you can excel in the CUET (PG) Plant Biotechnology examination. Use this resource to your advantage, and best of luck in your preparation and the upcoming exam!

A C K N O W L E D G E M E N T

We would like to express our sincere gratitude to everyone who helped make this comprehensive compilation of answers to previous year's & practice questions CUET PG Plant Biotechnology entrance exam questions.

First and foremost, we would like to sincerely thank Mr. Radheshyam Choudhary, the founding CEO of IFAS Edutech Pvt. Ltd., for his unwavering encouragement, support, and insightful advice that have enabled us to turn our vision into a reality.

This book has become an invaluable tool for those aspiring to take the CUET PG Plant Biotechnology exam thanks in large part to your unwavering commitment to empowering students.

We extend our sincere gratitude to the distinguished instructors and subject matter experts, whose insight and understanding have been the foundation of our project. Their knowledge, direction, and unwavering quest of perfection have made this book an invaluable tool for those preparing for the CUET PG Plant Biotechnology. Our sincere appreciation is owed to Mr. Dadasaheb Sondge, Mr. Lalji Kanojiya. Your enthusiasm for teaching has spread to us, inspiring a love of study and a drive to learn more about the areas we value.

Also acknowledged for their extensive reviews and assistance in organizing the book are Mr. Shivang Dubey, Ms. Kranti baraskar, Ms. Nikita Patole. You've always been eager to go above and above, giving us individualised attention and explanations of ideas to make sure we understood. The correctness and rigour of the solutions provided here have been made possible by your extensive knowledge, skill, and dedication to education.

We also thank the editing and support staff at IFAS for their tremendous efforts in ensuring that this book meets the highest standards of quality and clarity. Your painstaking work in material organisation, editing, and review has been really helpful in making this book approachable and user-friendly.

We are incredibly appreciative to the students, whose passion and insatiable curiosity have served as a constant source of motivation. Your curiosity and commitment to study have inspired us to provide the most comprehensive answers to the difficult problems that CUET PG Plant Biotechnology exams present. Your confidence in our knowledge motivates us to keep aiming for educational excellence. We sincerely hope that this book serves as a reliable resource for you while you pursue knowledge and triumph. With sincere appreciation

Kailash Choudhary

Digambar Jagtap

About Common University Entrance Test CUET PG

Common University Entrance Test (CUET) is being introduced for admission into PG programmes in Central and participating Universities for academic sessions. The Common University Entrance Test (CUET) will provide a common platform and equal opportunities to candidates across the country, especially those from North- East and from rural and other remote areas and help to establish better connect with the Universities. A single Examination will enable the Candidates to cover a wide outreach and be part of the admissions process to various Central Universities. The CUET PG will be conducted in CBT mode in 02 shifts for admissions in the next academic session.

ELIGIBILITY AND QUALIFICATIONS

AGE LIMIT

As the eligibility criteria for admission may be unique for every University, the candidates are advised to visit the University website to which they are applying for their respective programs. Candidates are advised to satisfy themselves before applying that they possess the eligibility

MARKING SCHEME

- Each question carries 04 (four) marks.
- For each correct response, candidate will get 04 (four) marks.
- For each incorrect response, 01 (one) mark will be deducted from the total score.
- Un-answered/un-attempted response will be given no marks.
- To answer a question, the candidate needs to choose one option as correct option.

However, after the process of Challenges of the Answer Key, in case there are multiple correct options or change in key, only those candidates who have attempted it correctly as per the revised Final Answer Key will be awarded marks.

In case a Question is dropped due to some technical error, full marks shall be given to all the candidates irrespective of the fact who have attempted it or not. *Examination will be conducted on multiple days in two shifts per day schedule and date sheet will be available on the website. Keep viewing it for updates.

EXAMINATION SCHEME

1. MODE OF EXAMINATION CUET (PG) 2025

Will be conducted in **Computer Based Test** mode only.

2. MEDIUM OF QUESTION PAPERS

The medium of Question Paper for CUET (PG) 2025 will be **English and Hindi (Bilingual**).

3. STRUCTURE OF QUESTION PAPERS

Structure of Examination for CUET (PG) - 2025

1. There would be no General Test with each paper.
2. Duration of Exam would be of **105** Minutes.
3. The Question paper will have **75** Questions.

4. MARKING SCHEME

i) For each correct response, candidate will get **04 (four) marks**.
ii) For each incorrect response, **01 (one) mark** will be deducted from the total score.
iii) Un-answered/un-attempted response will be given **no marks.**
iv) To answer a question, the candidate needs to choose one option as correct option.
v) However, after the process of Challenges of the Answer Key, in case there are multiple correct options or change in key, only those candidates who have attempted it correctly as per the revised Final Answer Key will be awarded marks.
vi) In case a Question is dropped due to some technical error, full marks shall be given to all the candidates irrespective of the fact who have attempted it or not.

5. AGE LIMIT

For appearing in the CUET (PG) 2025, there is no age limit for the candidates. The candidates who have passed the bachelor degree/equivalent examination or appearing in 2025 irrespective of their age can appear in CUET (PG) 2025 examination. However, the candidates will be required to fulfill the age criteria of the University in which they are desirous of taking admission.

Syllabus

Plant Biotechnology

UNIT I Introduction :

- Cryo and organ genic differentiation.
- Types of culture: Seed, Embryo, Callus, Organs, Cell and Protoplast culture.
- Micro propagation Axillary bud proliferation, Meristem and shoot tip culture, Bud culture.
- Organogenesis, embryogenesis, advantages and disadvantages of micro propagation.

UNIT- II :

- In vitro haploid production Androgenic methods: Anther culture, Microspore culture Ando genesis Significance and use of haploids.
- Ploidy level and chromosome doubling.
- Diploidization, Gynogenic haploids, factors effecting gynogenesis, chromosome elimination techniques for production of haploids in cereals.

UNIT - III :

- Protoplast Isolation and fusion Methods of protoplast isolation, Protoplast development.
- Somatic hybridization, identification and selection of hybrid cells, Cybrids, Potential of somatic Hybridization limitations.
- Soma clonal variation. Nomenclature, methods, applications basis and disadvantages.

UNIT - IV :

- Plant Growth Promoting bacteria.
- Nitrogen fixation, Nitrogenase, Hydrogenase, Nodulation, Biocontrol of pathogens, Growth promotion by free-living bacteria.

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UNIT 1 : NUMBER OF QUESTIONS ASKED IN CUET PG EXAM (2022 to 2024)

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UNIT - 1

SECTION-1.1: CRYO AND ORGAN GENIC DIFFERENTIATION

PREVIOUS YEAR EXAM QUESTIONS

(CUET-PG 2022)

1. The liquid plant tissue culture media that contain labile organic ingredients, are sterilized by filter sterilization. The most commonly used cellulose acetate membrane filters used for filter sterilization has a pore size of
   (1) 1 (2) 0.45 µ
   (3) 0.22 M (4) 0.11 µ

(CUET-PG 2022)

2. The salts used as macronutrient in MS medium supply:
   A. H. O, Cl, S, Mg
   B. N, H, S, Cl, Mg
   C. N, P, K, Ca, Mg
   D. Cl, P, S, Mg, H
   E. O, N, Mg, S, Cl
   Choose the correct answer from the options given below:
   (1) A only (2) B only
   (3) C only (4) D only

(CUET-PG 2022)

3. Binding of plant hormones to the membrane receptors of plant tissues cultured in-vitro induces a cascade of events leading to biological response by the cultured tissue. The phenomenon is known as:
   (1) Transcription (2) Signal transduction
   (3) Transgenesis (4) Replication

(CUET-PG 2022)

4. Which of the following is NOT the basic component of plant tissue culture media?
   (1) Essential elements in form of complex mixture of salts.
   (2) Organic chemicals as a source of vitamins
   (3) A source of carbon
   (4) Bactericides to control contamination

(CUET-PG 2022)

5. Given below are two statements:
   Statement I: Auxin promotes cell division and root differentiation while cytokinins promote growth through regulation of cell division and shoot differentiation.
   Statement II: Auxin does not antogonise cytokinin action.
   In the light of the above statements, choose the most appropriate answer from the options given below:
   (1) Both Statement I and Statement II are correct.
   (2) Both Statement I and Statement II are incorrect.
   (3) Statement I is correct but Statement II is incorrect.
   (4) Statement I is incorrect but Statement II is correct.

(CUET-PG 2022)

6. What influences the development of plant in tissue culture?
   (1) Wavelength flux density and photoperiod of light.
   (2) Wavelength and density of light
   (3) Exposure to the light.
   (4) Short photoperiod

(CUET-PG 2023)

7. Contribution of Edward C. Cocking in the field of Tissue culture is –
   (1) Demonstrated somatic embryogenesis for the first time
   (2) Protoplast isolation in large scale.
   (3) Somatic cell hybridization in plants.
   (4) Father of plant tissue culture.

(CUET-PG 2023)

8. Upon performing micro-propagation in Jatropha curcas, it was observed that the callus would repeatedly become brown and die. What could be the most probable reasons:
   (1) Repeated sub-culturing
   (2) The MS. medium was supplemented with sucrose which led to browning.
   (3) Explant secreted phenolic compounds and there was oxidation in explant tissues.
   (4) The nature of callus was brown and friable.

(CUET-PG 2023)

9. Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R:
   Assertion A: Ideal tissue for the plant tissue culture is apical meristem.

Reason R: The viruses are unable to take over control of the host biosynthetic machinery. Auxins in meristems inhibit viruses.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both A and R are correct and R is the correct explanation of A.
(2) Both A and R are correct but R is NOT the correct explanation of A.
(3) A is correct but R is not correct.
(4) A is not correct but R is correct.

(CUET-PG 2023)

10. Objective of plant transformation relies on the following except:
(1) DNA modifying enzymes
(2) Totipotency of plant cells used for transformation
(3) Plant tissue culture
(4) Plasticity in the experimental plants

(CUET-PG 2023)

11. Advances in plant biotechnology is assured through fundamental discoveries. These include:
A. Plant gene isolation
B. Plant gene analyses
C. Plant transformation
D. Plant nutritional deficiency
E. Plant environmental studies
Choose the correct answer from the option given below:
(1) A, B and C only (2) A, C and D only
(3) A, C and E only (4) B, C and E only

(CUET-PG-2 2024)

12. Cytokines
(A) Are derivatives of adenines
(B) Are important for shoot induction
(C) Have property of cell elongation
(D) Usually promotes cell division if added together with auxin in culture
Choose the correct answer from the options given below:
(1) (A), (B) and (C) only (2) (A), (B) and (D) only
(3) (A), (C) and (D) only (4) (B), (C) and (D) only

(CUET-PG-2 2024)

13. Different steps for regeneration via organogenesis
(A) Shoot formation
(B) callus formation
(C) Initial explant
(D) Plantlet
Choose the correct answer from the options given below:
(1) (A), (D), (C), (B). (2) (D), (B), (A), (C).
(3) (B). (C), (A), (D). (4) (C), (B), (A), (D).

(CUET-PG-2 2024)

14. Which of the following molecule DOES NOT have an auxin-like activity?
(1) 1-Naphthalene Acetic Acid
(2) Benzyladenine
(3) 2-methoxy-3, 6-dichlorobenzoic acid
(4) 2, 4-Dichlorophenoxy Acetic Acid

(CUET-PG-2 2024)

15. Which of the following is a carbohydrate, but CANNOT be used as carbon source for in vitro plant tissue culture?
(1) Sucrose (2) Maltose
(3) Myo-inositol (4) Cellobiose

(CUET-PG-2 2024)

16. Match the following plant tissue culture media components in list I with their functions

LIST I		**LIST II**	
A	Gelrite	I	Prevent oxidation of phenols
B	2,4-Dichlorophenoxyacetic acid	II	Media solidification agent
C	Polyvinylpyrrolidone	III	Stress hormone
D	Abscisic acid	IV	Callus induction

Choose the correct answer from the options given below:
(1) (A)-(IV), (B) (I), (C) - (II), (D)-(III)
(2) (A)-(III), (B)-(I), (C) - (II), (D)- (IV)
(3) (A)-(III), (B)-(IV), (C) - (II), (D)- (I)
(4) (A)-(II), (B)-(IV), (C) - (I), (D)-(III)

ANSWER KEY									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
(3)	(3)	(2)	(4)	(3)	(1)	(2)	(3)	(1)	(1)
11	**12**	**13**	**14**	**15**	**16**				
(1)	(2)	(4)	(2)	(3)	(4)				

PRACTICE QUESTIONS

1. In plant tissue culture, keeping auxin amount constant and increase in cytokinine leads to:
(1) root differentiation
(2) shoot differentiation
(3) callus formation
(4) somatic embryogenesis.

2. Hormone pair required for a callus differentiation is:
   (1) Auxin and cytokinin
   (2) Auxin and ethylene
   (3) Auxin and absiccic acid
   (4) Cytokinins and gibberellins

3. What is the first step in the process of regenerating a whole plant from a mature tissue explant in tissue culture?
   (1) Dedifferentiation (2) Redifferentiation
   (3) Photosynthesis (4) Pollination

4. Which of the following statements correctly defines totipotent cells?
   (1) They can differentiate into a limited number of cell types
   (2) They can differentiate into only one specific cell type
   (3) They can differentiate into any cell type in an organism
   (4) They lose the ability to differentiate early in development

5. Meristemoid cells are best described as:
   (1) Differentiated and non-dividing
   (2) Dedifferentiated and dividing
   (3) Differentiated and dividing
   (4) Dedifferentiated and non-dividing

6. What is the process called where an undifferentiated plant cell differentiates into a specific organ or structure?
   (1) Morphogenesis (2) Androgenesis
   (3) Totipotency (4) Organogenesis

7. When a part of plant organ or tissue is put on a culture medium and maintained under optimum growth conditions, the meristematic cells de-differentiate and proliferate to form a mass of cells called
   (1) Callus (2) Embryoids
   (3) Both (4) None of the above

8. The development of the plant organ from the explant used for tissue culture
   (1) Dedifferentiation
   (2) Differentiation
   (3) Redifferentiation
   (4) Totipotency

9. Which of the following plant hormones is primarily responsible for promoting shoot differentiation in plant tissue culture?
   (1) Abscisic acid (2) Gibberellin
   (3) Cytokinin (4) Ethylene

10. In plant tissue culture, what is the significance of callus formation?
    (1) It indicates that the plant tissue is dying.
    (2) It represents the undifferentiated mass of cells from which organs can differentiate.
    (3) It is a sign of infection in the culture.
    (4) It is used exclusively for genetic modification purposes.

11. What is Dimethyl sulfoxide used for?
    (1) A gelling agent (2) Cryoprotectant
    (3) Chelating agent (4) An Alkylating agent

ANSWER KEY									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
(2)	(1)	(1)	(3)	(2)	(4)	(1)	(3)	(2)	(2)
11									
(2)									

EXPLANATIONS

PREVIOUS YEAR EXAM QUESTIONS

1. Correct Answer is (3): Fluids that would be damaged by heat, irradiation etc. can be sterilized by microfiltration using membrane filters. A microfilter with pore size 0.22 µm will usually effectively remove microorganisms. The membrane filtration technique basically involves the use of a semipermeable membrane that selectively retains the particles/molecules that are bigger than the pore size while the smaller molecules pass through the membrane pores.

2. Correct Answer is (3): The macronutrients in MS medium are the primary elements that plants need in large amounts for their growth and development. They include nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S). These macronutrients are provided in the form of inorganic salts, such as ammonium nitrate (NH4NO3), potassium phosphate (KH2PO4), calcium chloride (CaCl2), magnesium sulfate (MgSO4), and potassium sulfate (K2SO4).

3. **Correct Answer is (2):** Signal transduction refers to the complex process by which a signal molecule, such as a plant hormone, interacts with a receptor and triggers a cascade of cellular events leading to a specific biological response. The binding of plant hormones to receptors on cultured plant tissues initiates a signal transduction pathway, ultimately leading to a biological response. Therefore, signal transduction accurately describes the phenomenon of plant tissues responding to hormones in-vitro.

4. **Correct Answer is (4):-** Bactericides to control contamination is NOT a basic component of plant tissue culture media. While controlling contamination is essential in tissue culture, bactericides are not typically included as a basic component of the culture media. Instead, sterile techniques, laminar flow hoods, and antibiotics are often used to control contamination.

5. **Correct Answer is (3):-** Statement I: Auxin is indeed known for promoting cell elongation, and it plays a crucial role in root formation and differentiation. Statement II suggests that auxin does not antagonize cytokinin action. This statement is not entirely accurate. Auxin and cytokinins can have antagonistic effects in certain processes, such as in the control of apical dominance and in the balance between root and shoot development. Therefore Statement I is correct but Statement II is incorrect.

6. **Correct Answer is (1):-** Wavelength flux density and photoperiod of light: Different wavelengths and intensities of light, as well as the duration of light exposure (photoperiod), can affect plant growth and development. Plants respond differently to varying light conditions, and optimizing these factors is crucial for successful tissue culture.

7. **Correct Answer is (2):** Edward C. Cocking's breakthrough in protoplast isolation allowed for the efficient removal of cell walls from plant cells, facilitating easier manipulation and study in vitro. This technique revolutionized plant biotechnology, enabling advancements in genetic engineering and somatic hybridization.

8. **Correct Answer is (3):** Explant secretion of phenolic compounds and subsequent oxidation in the tissues often lead to browning and deterioration of callus tissue in micropropagation processes**.**

9. **Correct Answer is (1):** Assertion A: The apical meristem is considered the ideal tissue for plant tissue culture due to its high growth potential and undifferentiated nature.
   Reason R: Viruses are unable to manipulate the host biosynthetic machinery in meristems because auxins present in meristems inhibit viral activity. Reason R logically explains why apical meristems are preferred for tissue culture.

10. **Correct Answer is (1):** The objective of plant transformation has nothing to do with the DNA modifying enzymes, these enzymes can be utilized in genetic engineering to insert or modify genes within the plant cells. The main focus of plant transformics lies in utilization of techniques that exploit the totipotency of plant cells, like tissue culture methods.

11. **Correct Answer is (1):**
    Plant nutritional deficiency - not directly related to biotechnology, understanding plant nutritional deficiencies is fundamental to improving crop yield and quality.
    Plant environmental studies – here, plant & its surrounding environmental interaction are studied, not usually related to biotechnological studies.

12. **Correct Answer is (2):-**

(A) Are derivatives of adenines - True. Cytokinins are indeed derivatives of adenine, which is a type of purine base found in DNA and RNA.
(B) Are important for shoot induction - True. Cytokinins promote shoot initiation and growth, and they are used in plant tissue culture for this purpose.
(C) Have property of cell elongation - False. This property is generally associated with gibberellins, not cytokinins. Cytokinins are more involved in cell division and the growth of shoots.
(D) Usually promotes cell division if added together with auxin in culture - True. Cytokinins, when combined with auxins, can effectively promote cell division, a synergy often utilized in plant tissue cultures.

13. **Correct Answer is (4):-**

(C) Initial explant: This is the first step where a specific part of the plant, such as a leaf, stem, or even root cells, is selected and prepared for culture.

(B) Callus formation: After the explant is cultured, the cells often proliferate into an undifferentiated mass known as callus under the influence of specific hormones in the culture medium.

(A) Shoot formation: From the callus, shoot formation is induced again by adjusting the hormonal composition of the medium, particularly increasing the ratio of cytokinins to auxins.

(D) Plantlet: Once shoots have formed, they can be induced to form roots and develop into complete plantlets that can eventually be acclimatized and transferred to soil or another growing medium.

14. Correct Answer is (2):- Benzyladenine - This is not an auxin but a cytokinin, another class of plant hormone that promotes cell division, shoot formation, and delays senescence, among other effects. It does not have auxin-like activity.

15. Correct Answer is (3):- Myo-inositol: Although technically a carbohydrate, myo-inositol serves primarily as a growth factor in plant tissue culture and is not used as a primary carbon source. It is involved in cell membrane structure and is important for cell division and growth but does not function in the capacity of energy provision.

16. Correct Answer is (4):- Matching these descriptions with the provided functions:

(A) - Gelrite: Media solidification agent (II)

(B) - 2,4-D: Callus induction (IV)

(C) - Polyvinylpyrrolidone: Prevent oxidation of phenols (I)

(D) - Abscisic acid: Stress hormone (III)

PRACTICE QUESTIONS

1. Correct Answer is (2):- In plant tissue culture, the ratio of auxin to cytokinin plays a crucial role in determining the type of growth and differentiation that occurs. When the concentration of cytokinin is increased while keeping the auxin concentration constant, it typically leads to ((2) shoot differentiation.

2. Correct Answer is (1):- The combination of auxin and cytokinin hormones is commonly used in plant tissue culture to induce callus formation and subsequent differentiation into roots, shoots, or other plant structures, depending on the specific culture conditions.

3. Correct Answer is (1):- Dedifferentiation is the first step where mature cells lose their specialized characteristics to revert to a more embryonic, pluripotent state, allowing for the formation of callus tissue, which is a mass of undifferentiated cells.

4. Correct Answer is (3):- Totipotent cells have the capacity to differentiate into any cell type in an organism, including both the cells of the embryo and the extraembryonic tissues. This is the most versatile state of cellular potential, seen in the zygote and its immediate descendant cells.

5. Correct Answer is (2):- Meristemoid cells are dedifferentiated (i.e., they revert to a less specialized state) and are capable of dividing, which allows for the formation of new tissues.

6. Correct Answer is (4):- Organogenesis refers to the process by which an undifferentiated cell develops into a specific organ or structure. In plant tissue culture, this is a crucial step following the formation of callus tissue.

7. Correct Answer is (1):- When a part of a plant organ or tissue is placed on a culture medium and provided with appropriate nutrients and growth conditions, the meristematic cells in the tissue can undergo de-differentiation and rapid proliferation, forming a mass of undifferentiated cells called callus. Callus is a crucial stage in plant tissue culture and can be induced to differentiate into various plant tissues and organs under specific conditions.

8. Correct Answer is (3):- Re-differentiation refers to the process in plant tissue culture where cells derived from explants undergo a transformation or reorganization to form specialized tissues or organs. In tissue culture, explants are typically taken from plants, and the process of re-differentiation involves the cells regaining specific functions and structures, leading to the development of new organs. This phenomenon is crucial for the successful regeneration of complete and functional plants from cultured cells or tissues. Re-differentiation is a key aspect of the plant's ability to express its genetic potential and form distinct cell types during tissue culture.

9. **Correct Answer is (2):-** Cytokinins are a class of plant growth substances (phytohormones) that promote cell division, or cytokinesis, in plant roots and shoots. In the context of plant tissue culture, cytokinins are particularly important for promoting shoot differentiation and development.

10. **Correct Answer is (2):-** A callus is an undifferentiated mass of plant cells that forms when explants (pieces of plant tissue) are cultured on a suitable medium. The formation of a callus is a critical step in many plant tissue culture protocols because it represents a pool of cells that can be induced to differentiate into various types of plant tissues or organs.

11. **Correct Answer is (2):-** Dimethyl sulfoxide (DMSO) is commonly used as a cryoprotectant in various biological applications, including tissue culture and cryopreservation. It helps to protect biological materials, such as cells and tissues, from damage caused by freezing and thawing processes.

SECTION – 1.2: TYPES OF CULTURE: SEED, EMBRYO, CALLUS, ORGANS, CELL AND PROTOPLAST CULTURE.

PREVIOUS YEAR EXAM QUESTIONS

(CUET-PG 2022)

1. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
   Assertion A: Maintenance of slightly hypertonic osmolality is significant during protoplast culture procedure.
   Reason R: The isolated protoplasts are osmotically fragile because they lack cell-wall.
   In the light of the above statements, choose the most appropriate answer from the options given below:
   (1) Both A and R are correct and R is the correct explanation of A.
   (2) Both A and R are correct but R is not the correct explanation of A.
   (3) A is correct but R is not correct.
   (4) A is not correct but R is correct.

(CUET-PG 2022)

2. Match List I with List II

List - I	List-II
A. Haberilandt, G	I. First time somatic embryogenesis demonstrated
B. Steward FC and Reinert. J	II. Protoplast isolation in large scale
C. Edward C. Cocking	III. Somatic cell hybridization in plants
D. Carlson, P.S. Smith, H.H and Dearing, R.D.	IV. Father of plant tissue culture

Choose the correct answer from the options given below:
(1) A-II, B-III, C-I, D-IV (2) A-I, B-IV, C-III, D-II
(3) A-IV, B-I, C-II, D-III (4) A-III, B-II, C-IV, D-I

(CUET-PG 2022)

3. Tissue culture or protoplasts requires a high skill. Assume you have been given necessary facility for protoplast culture. Arrange the following steps in sequence to achieve the goal of culturing the protoplasts.
   A. Count the protoplasts and plate
   B. Sterile leaf tissue
   C. Isolate and purify protoplasts
   D. Chop the tissue into fine pieces in neutral buffer or sterile water
   E. Incubate in cellulose and pectinase enzyme mixture for 2-3 h
   Choose the correct answer from the options given below:
   (1) B, C, D, E, A
   (2) B, D, E, C,A
   (3) A, B, C, D, E
   (4) D, B, C, E, A

(CUET-PG 2023)

4. Virus free plants propagated via tissue culture can easily be tested by
   (1) Microscopy
   (2) Fluorescence microscopy
   (3) ELISA
   (4) Confocal Microscopy

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5. Essential step for protoplast development is removal of cell wall without damaging the cell constituents. These the cells show following features:
   (1) Irresistable expansion of protoplasts.
   (2) The isolated protoplast are osmotically sturdy/strong.
   (3) Large populations of variable protoplast amounts are required.
   (4) Generalized guidelines for cell wall removal for all plant cells are applied.

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6. Give below are two statements: One is labelled as Assertion A and the other is labelled as Reason R:
   Assertion A: Callus culture obtained from the infected viral plants cannot be raised as free from virus.
   Reason R: The virus requires plant cells for replication. It is not able to divide and as the cells continue to divide and increase in number the titre of the virus comes down. The reduction is dependent on the rate of calli division and the time of subculture. In the light of the above statements, choose the most appropriate answer from the options given below:
   (1) Both A and R are correct and R is the correct explanation of A.
   (2) Both A and R are correct but R is NOT the correct explanation of A.
   (3) A is correct but R is not correct.
   (4) A is not correct but R is correct.