



## BIOLOGY

### BOOKS - FULL MARKS BIOLOGY (TAMIL ENGLISH)

#### PLANT TISSUE CULTURE

#### Textual Questions Solved

1. Totipotency refers to

- A. capacity to generate genetically identical plants
- B. capacity to generate a whole plant from any plant cell / explant
- C. capacity to generate hybrid protoplasts
- D. recovery of healthy plants from diseased plants

**Answer: B**



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2. Micro propagation involves

- A. vegetative multiplication of plants by using micro-organisms
- B. vegetative multiplication of plants by using small explants
- C. vegetative multiplication of plants by using microspores
- D. Non-vegetative multiplication of plants by using microspores and megaspores

**Answer: B**



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3. Match the following :

Column I

Column II

- |                      |     |   |
|----------------------|-----|---|
| 1. Totipotency       | (A) | Reversion of mature cells into meristem         |
| 2. Dedifferentiation | (B) | Biochemical and structural changes of cell      |
| 3. Explant           | (C) | Properties of living cells develops into entire |
| 4. Differentiation   | (D) | Selected plant tissue transferred to culture m  |

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

**Answer: A**

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4. The time duration for sterilization process by using autoclave is \_\_\_\_\_ minutes and the temperature is \_\_\_\_\_

- A. 10 to 30 minutes and  $125^{\circ}C$
- B. 15 to 30 minutes and  $121^{\circ}C$
- C. 15 to 20 minutes and  $125^{\circ}C$
- D. 10 to 20 minutes and  $121^{\circ}C$

**Answer: B**

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5. Which of the following statement is correct?

- A. Agar is not extracted from marine algae such as seaweeds
- B. Callus undergoes differentiation and produces somatic embryoids
- C. Surface sterilization of explants is done by using mercuric bromide
- D.  $P^H$  of the culture medium is 5.0 to 6.0

**Answer: D**

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6. Select the incorrect statement from given statement.

- A. A tonic used for cardiac arrest is obtained from *Digitalis purpuria*
- B. Medicine used to treat Rheumatic pain is extracted from *Capsicum annum*

C. An anti-malarial drug is isolated from *Cinchona officinalis*

D. Anti-carcinogenic property is not seen in *Catharanthus roseus*

**Answer: A::B::C::D**



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7. Virus free plants are developed from

A. Organ culture

B. Meristem culture

C. Protoplast culture

D. Cell suspension culture

**Answer: B**



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8. The prevention of large scale loss of biological integrity is .....

A. Biopatent

B. Bioethics

C. Biosafety

D. Biofuel

**Answer: C**



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9. Cryopreservation means it is a process to preserve plant cells, tissues or organs

A. at very low temperature by using ether

B. at very high temperature by using liquid nitrogen

C. at very low temperature of -196 by using liquid nitrogen

D. at very low temperature by using liquid nitrogen

**Answer: C**



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**10. Solidifying agent used in plant tissue culture is**

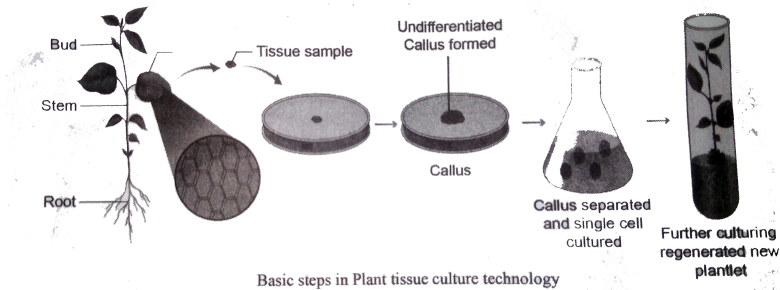
- A. Nicotinic acid
- B. Cobaltous chloride
- C. EDTA
- D. Agar

**Answer: D**



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11. What is the name of the process given below? Write its 4 types.



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12. How will you avoid the growing of microbes in nutrient medium during culture process? What are the techniques used to remove the microbes?

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13. Write the various steps involved in cell suspension culture.

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14. What do you mean by Embryoids? Write its application.



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15. Give the examples for micro propagation performed plants.



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16. Explain the basic concepts involved in plant tissue culture.



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17. Based on the material used, how will you classify the culture technology?



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18. What is Cryopreservation?



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19. What do you mean by Germplasm conservation? Describe it.



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20. Write the protocol for artificial seed preparation.



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## Additional Questions 1 Mark Questions

1. Who proposed the concept of totipotency / Father of Tissue culture

\_\_\_\_\_.



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2. Identify the group of scientists who developed the intergenic hybrid - the pomato.

A. Yamada et al.

B. Horsh et al.

C. Takebe et al.

D. Melchers et al.

**Answer: D**



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3. The production of secondary metabolites require the use of.....

A. Protoplast culture

B. Organ culture

C. Cell suspension culture

D. Virus free germ culture

**Answer: C**



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4. Which of the following condition favours callus induction?

A. Temperature of  $25^{\circ}C \pm 5^{\circ}C$  with 12 hours of photoperiod

B. Temperature of  $25^{\circ}C \pm 2^{\circ}C$  with 18 hours of photoperiod

C. Temperature of  $25^{\circ}C \pm 5^{\circ}C$  with 14 hours of photoperiod

D. Temperature of  $25^{\circ}C \pm 2^{\circ}C$  with 16 hours of photoperiod

**Answer: D**



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5. Protoplast are the cells devoid of .....

- A. Cell wall
- B. Cell membrane
- C. plasma membrane
- D. both A and B

**Answer: A**

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6. A widely used fusogen in protoplast culture is .....

- A. a) Polymethyl glycol
- B. Polyethylene glycol
- C. c) Polyethylene chloride
- D. d) Polyvinyl chloride

**Answer: B**

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7. Source of agar is.....



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8. Synseeds are developed by encapsulating embryoids with.....

- A. Sodium chloride
- B. Potassium iodide
- C. Sodium alginate
- D. Potassium dichromate

**Answer: C**



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9. The optimal pH of culture medium is generally.....

A. a) Acidic

B. b) Basic

C. c) Neutral

D. d) Slightly basic

**Answer: A**



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**10. Identify the correct sequence regarding steps involved in PTC**

A. a) Sterilization → Incubation → Inoculation → Embryogenesis  
→ Hardening

B. b) Inoculation → Induction → Sterilization → Hardening →  
Embryogenesis

C. c) Induction → Incubation → Inoculation → Hardening →  
Sterilization

D. d) Sterilization → Inoculation → Incubation → Embryogenesis

→ Hardening

**Answer: D**



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11. Dimethyl sulphoxide is a.....

A. a) Solidifying agent

B. b) Cryoprotectant

C. c) Fusogenic agent

D. d) Stimulant

**Answer: B**



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**12.** Assertion (A) : Incubation is followed by Inoculation.

Reason (R) : Explant is inoculated to media.

- A. a) Both A and R are correct but R is not a correct explanation to A
- B. b) R explains A
- C. c) A is correct R is incorrect
- D. d) Both A and R are incorrect

**Answer: B**



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**13.** Assertion (A) : Sterilization helps to overcome microbes.

Reason (R) : Explants are autoclaved.

- A. a) Both A and R are correct but R is not a correct explanation to A
- B. b) R explains A
- C. c) A is correct R is incorrect

D. d) Both A and R are incorrect

**Answer: C**

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14. Assertion (A) : Protoplasts are cells devoid of cell wall.

Reason (R ) : Secondary metabolites are synthesized by protoplasmic fusion.

- A. Both A and R are correct but R is not a correct explanation to A
- B. R explains A
- C. A is correct R is incorrect
- D. Both A and R are incorrect

**Answer: C**

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15. Assertion (A) : Development of root from callus is called caulogenesis.

Reason (R) : Caulogenesis is the final step of protoplasmic fusion.

A. Both A and R are correct but R is not a correct explanation to A

B. R explains A

C. A is correct R is incorrect

D. Both A and R are incorrect

**Answer: D**



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16. Assertion (A) : Liquid nitrogen is used in cryopreservation techniques.

Reason (R) : Gene bank DNA bank are the parts of germplasm conservation.

A. a) Both A and R are correct but R is not a correct explanation to A

B. b) R explains A

C. c) A is correct R is incorrect

D. d) Both A and R are incorrect

**Answer: A**



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**17. Identify the cryoprotectant**

A. a) Dimethyl formamide

B. b) Fructose

C. c) Glycerol

D. d) Sodium alginate

**Answer: C**



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18. Identify the wrong statement from the below

- A. Artificial seeds are stored for long time under cryopreservation
- B. Somatic embryos are used for artificial seed production
- C. Period of dormancy of artificial seeds is greatly reduced
- D. Encapsulation of embryoids is done using cryoprotectant

**Answer: D**



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19. Identify the plant tissue used for virus free germplasm

- A. Apical meristem
- B. Intercalary meristem
- C. Lateral meristem
- D. Plate meristem

**Answer: A**



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**20. Match the following :**

- A. Solidifying agent (i) Sucrose  
B. Cryoprotectant (ii) PEG  
C. Growth hormone (iii) Agar  
D. Fusogen (iv) IAA

A. A - iii B - I C - iv D - ii

B. A - ii B - iv C - iii D - I

C. A - iv B - ii C - I D - iii

D. A - I B - iii C - ii D - iv

**Answer: A**



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21. Identify the incorrect statement:

- (a) Explants are surface sterilized
- (b) Nutrient media are autoclaved
- (c) Culture rooms are UV radiated for 15 minutes
- (d) Glasswares and accessories are autoclaved

A. a) a only

B. b) b and c

C. c) d only

D. d) none of the above

**Answer: D**



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22. The enzymatic mixture for chemical isolation of protoplast is

A. a) 0.5% macrozyme, 2% onozuka cellulase, 13% manitol

B. b) 1.5% macrozyme, 0.5% onozuka cellulase, 12% sorbitol

C. c) 2% macrozyme, 0.5% onozuka cellulase, 13% sorbitol

D. d) 0.1% macrozyme, 2% onozuka cellulase, 15% sorbitol

**Answer: A**



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**23.** The term used to define the ability of a cell to generate entire individual is

A. a) Pleuripotent

B. b) Totipotent

C. c) Multipotent

D. d) Unipotent

**Answer: B**



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24. The phenomenon of reversion of mature cells to meristematic state leading to callus formation is.....

- A. a) Redifferentiation
- B. b) Dedifferentiation
- C. c) either (a) or (b)
- D. d) none of these

**Answer:**



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25. Somatic hybridization is achieved through.....

- A. Protoplast fusion
- B. r-DNA technology
- C. Transformation

D. Grafting

**Answer: A**



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**26. Identify the mismatched pair:**

A. Digoxin - Digitalis purpuria

B. Codeine - Capsicum annum

C. Vincristine - Catharanthus roseus

D. Quinine - Cinchona officinalis

**Answer: B**



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**Additional Questions 2 Mark Questions**

1. Define tissue culture.



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2. Explain the basic concepts involved in plant tissue culture.



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3. Totipotency refers to



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4. Define sterilization.



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5. Mention the way by which culture media and explants are sterilized.



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6. Name any four culture media used in plant tissue culture.

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7. What is Agar? Mention its role in plant tissue culture.

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8. Write the composition of vitamins used in MS medium.

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9. Define (a) Callus (b) Embryoids

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10. What do you mean by "Hardening" in plant tissue culture technique?

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11. Classify plant tissue culture based on the explants used.

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12. Write the various steps involved in cell suspension culture.

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13. What is a protoplast? Which chemical stain is used to test its viability?

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14. What is a cybrid?



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15. Given below are the secondary metabolites. Mention their plant source.

(a) Digoxin (b) Vincristine.

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16. What is Organogenesis?

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17. How virus free plants are developed?

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18. State the role of cryoprotectants in conservation of plant resources.

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19. Name any two widely used cryoprotectants.

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20. Expand and define IPR.

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21. Define the patent type - Grant.

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22. Point any four ways by which IPR is protected in India.

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**23.** What does ELSI represents to?

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**24.** Mention any two competent national authorities that implement Biosafety guidelines.

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**25.** What does the term 'Bioethics' refers to?

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**26.** State the mission of ELSI program.

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**27.** Name the two inherent capacity responsible for cellular totipotency.





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## Additional Questions 3 Mark Questions

1. Compare Redifferentiation with Dedifferentiation.



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2. How the autoclaving is done for culture media?



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3. Briefly explain the surface sterilization of explants.



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4. Point out the factors that determine success rate of tissue culturing.



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5. Mention any three macronutrients and micronutrients used in MS medium.



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6. What are the optimal conditions that favours the induction of callus from nutrient medium?



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7. Write the various steps involved in cell suspension culture.



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8. What are Secondary metabolites? Give example.



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9. Name any three secondary metabolites obtained from plants and mention their medicinal aspects.



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10. What is somatic embryogenesis? Give any two of its applications.



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11. Differentiate between Somaclonal variations and Gametoclinal variation.



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12. How synthetic seeds are developed?



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13. Give an account on germplasm conservation.

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14. How cryopreservation works?

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15. What does the terms specification and claim refers with respect to patents?

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16. Comment on Biosafety.

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17. Write any three points that you know about Genetic Engineering Appraisal Committee (GEAC).

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18. What is cybrid?

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### Additional Questions 5 Mark Questions

1. (a) Explain the steps involved in protoplast culture.

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2. Point out the applications of plant tissue culture.

Plant tissue culture techniques have several applications such as:



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3. Derive the protocol for micropropagation of bananas.



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4. (a) Enumerate the advantages of Artificial seeds.

(b) Write in detail about Autogenic succession and Allogenic succession.



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5. Highlight the protocol for production of virus free meristem tip culture.



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Hots

1. Study the process given below and mention the phenomena A and B

(a) Meristematic tissue  $\xrightarrow{A}$  Permanent tissue

(b) Callus  $\xrightarrow{B}$  Embryoid



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2. Given below are the list of components and accessories used in PTC technique. Sort them out according to their mode of sterilization.

(a) Glass wares (b) Laminar air flow chamber

(c) Nutrient medium (d) Explant



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3. Name the explant through which virus free plantlets can be generated using tissue culturing technique.



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4. Geographical Indication refers to the products confined to a specific geographical origin.

Name any three Tamil Nadu products of your knowledge that hold GI tag.



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