

UNIVERSITY OF RUHUNA
BACHELOR OF SCIENCE (GENERAL DEGREE) LEVEL III (SEMESTER II)
EXAMINATION – January, 2018

SUBJECT: BOTANY

COURSE UNIT: BOT3222 (Tissue Culture)

Time: 1 1/2 hours

Answer **three (03)** questions only, including the question I.

Ia)

(20 marks)

i) Organogenesis is

- a) formation of callus tissue
- b) formation of root and shoots on callus tissue
- c) both (a) and (b)
- d) genesis of organs

ii) In a callus culture

- a) increasing level of cytokinin to a callus induces shoot formation and increasing level of auxin
- b) promote root formation
- c) increasing level of auxin to a callus induces shoot formation and increasing level of cytokinin promote root formation
- d) auxins and cytokinins are not required
- e) only auxin is required for root and shoot formation

iii) Protoplasts can be produced from suspension cultures, callus tissues or intact tissues by enzymatic treatment with

- a) cellulolytic enzymes
- b) pectolytic enzymes
- c) both cellulolytic and pectolytic enzymes
- d) proteolytic enzymes

iv) Protoplasts are the cells devoid of

- a) cell membrane
- b) cell wall
- c) both cell wall and cell membrane
- d) none of these

- v) The phenomenon of the reversion of mature cells to the meristematic state leading to the formation of callus is known as
- redifferentiation
 - dedifferentiation
 - either (a) or (b)
 - none of these
- vi) Subculturing is similar to propagation by cuttings because
- it separates multiple microshoots and places them in a medium
 - it uses scions to produce new microshoots
 - they both use in vitro growing conditions
 - all of the above
- vii) What is/are the benefit(s) of micropropagation or clonal propagation?
- Rapid multiplication of superior clones
 - Multiplication of disease free plants
 - Multiplication of sexually derived sterile hybrids
 - All of the above
- viii) What is meant by 'Organ culture'?
- Maintenance alive of a whole organ, after removal from the organism by partial immersion in a nutrient fluid
 - Introduction of a new organ in an animal body with a view to create genetic mutation in the progenies of that animal
 - Cultivation of organs in a laboratory through the synthesis of tissues
 - The aspects of culture in community which are mainly dedicated by the need of a specified organ of the human body
- ix) If you want to use a plant tissue culture as a chemical factory for vitamins, choose
- suspension cultures
 - callus cultures
 - organ cultures
 - protoplast cultures
- x) Cell suspension cultures require
- organogenesis
 - differentiation
 - aggregation
 - disaggregation

b) List the different categories of microorganisms found in explants? Give two examples for each.

(10 marks)

c) Name three types of heat labile chemicals used in tissue culture. Mention how these chemicals are sterilized.

(10 marks)

d) Fill in the table in order to describe the different sterilization methods used in *in vitro* plant propagations. (50 marks)

Sterilization method	Conditions used
1.	
2.	
3.	

4.

5.

2.

- a) List the factors to be considered in selecting a mother plant for *in-vitro* culture? **(10 marks)**
- b) Mention five complex natural ingredients that could be added to a tissue culture medium. **(10 marks)**
- c) Compare the traditional and *in vitro* propagation of plants **(20marks)**
- d) Somaclonal variation has advantages as well as disadvantages' Discuss the statement. **(30 marks)**
- e) Briefly explain the procedure to obtain virus free plants. **(30 marks)**

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3.

- a) Briefly explain the potential health hazards associated with plant tissue culture procedures? **(20 marks)**
- b) What are the advantages of using an aqueous medium in comparison with an agar-solidified medium? **(10 marks)**
- c) What are haploid plants? Explain the importance of having haploid plants in different field in biology? **(30 marks)**
- d) What are secondary metabolites? How plant tissue culture has helped to obtain secondary metabolites? **(40 marks)**

4.

- a) Describe the remedial measures to overcome the five problems encountered in plant tissue culture. **(20 marks)**
- b) List the factors affecting embryogenesis. **(20 marks)**
- c) Why do callus cultures become brown and necrotic if they are left too long on the same medium? **(5 marks)**
- d) Write a brief account on hardening or acclimatization process **(30 marks)**
- e) What is a protoplast and how it is important in crop improvement? **(25 marks)**