



**PUNJAB PUBLIC SERVICE COMMISSION**  
**COMBINED COMPETITIVE EXAMINATION**  
**FOR RECRUITMENT TO THE POSTS OF**  
**PROVINCIAL MANAGEMENT SERVICE, ETC -2021**  
**CASE NO. 3C2022**

**SUBJECT: BOTANY (PAPER-II)**

**TIME ALLOWED: THREE HOURS**

**MAXIMUM MARKS: 100**

**NOTE:**

- i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
- ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
- iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
- iv. Extra attempt of any question or any part of the question will not be considered.

**NOTE:** Attempt FIVE Questions. Minimum ONE Question from each Section.  
Attempt in Urdu or English.

**SECTION-I**

- Q. No. 1:** a) How do the roots of vascular plants absorb water from the soil?  
b) Discuss energy balance of respiration (ATP yield per molecule of glucose).  
c) What are the physiological effects of ethylene on different plant species and plant organs.  
d) Write a note on nature of enzymes. **(5X4=20 Marks)**
- Q. No. 2:** a) Define Vernalization. Discuss the mechanism and factors necessary for vernalizations.  
b) What is seed dormancy? How can seed dormancy be broken? Describe the practical significance of seed dormancy. **(10+10=20 Marks)**

**SECTION-II**

- Q. No. 3:** a) Discuss various types of erosion of soil by water. Describe the ways and means adopted by farmers to check water erosion.  
b) Define water logging. How does it affect the plant growth? Discuss its causes and suggest also the measures for reclamation of water logged soils. **(10+10=20 Marks)**
- Q. No. 4:** a) Give detailed account of grassland ecosystem and its productivity.  
b) Write note on any two of the following.  
A) Acid rain B) Global Warming  
C) Photochemical smog D) Eutrophication of aquatic eco-system. **(10+(5X2)=20 Marks)**

**SECTION-III**

- Q. No. 5:** a) How does mitosis occur in plant cells. Explore the process in detail with diagrams.  
b) Differentiate between the followings:  
i) mitosis and meiosis ii) Cytokinesis and karyokinesis **(10+(5X2)=20 Marks)**

- Q. No. 6:**
- a) Describe the structure of plasma membrane in detail with diagrams.
  - b) Differentiate between followings
    - i) hypertonic and hypotonic solution
    - ii) Pinocytosis and phagocytosis
    - iii) exocytosis and endocytosis
    - iv) active transport and simple diffusion
    - v) primary and secondary lysosomes.
- (10+(5X 2)=20 Marks)**

**SECTION-IV**

- Q. No. 7:**
- a) What are different types of RNA's? Discuss their structure and role in the process of translation.
  - b) Define mutation. Write a detailed note on the kinds of point mutation and also discuss causes of mutation.
- (10+10=20 Marks)**
- Q. No. 8:**
- a) What is meant by sex-linkage? Discuss the pattern of inheritance of X linked traits with some suitable examples.
  - b) Write short notes on the following:
    - i) Barr bodies
    - ii) Post transcriptional changes in MRNA of eukaryotes:

**(10+10=20 Marks)**

**SECTION-V**

- Q. No. 9:**
- a) What is Organic Evolution? How did the following contribute to Charles Darwin's formulation of the theory of natural selection? i) Uniformitarianism ii) Malthus essay on "Principles of population"
  - b) Write note on the followings:
    - i) Neo-Darwinism
    - ii) Adaptive radiation
- (10+(5x2)=20 Marks)**
- Q. No. 10:**
- a) What is the theory of inheritance of acquired characteristics and how did Lamarck use it to explain the phenomenon of evolution?
  - b) What are the four assumptions of Hardy- weinberg law? How do the allelic frequency of population is changed? Explain with some suitable examples.

**(10+10=20 Marks)**