

Duration: **3:00 Hours**. Total Marks: **50**

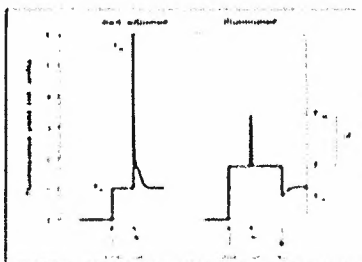
Date: December 3, 2018

There are two sections **A** and **B**. Read instructions at the head of each section carefully.

Section A. Answer all questions

Section Total = 42

1. What is the *isotope effect* with respect to carbon assimilation in C3 and C4 plants and how it is measured and expressed? Do C3 and C4 plants differ in this, and do all C4 species show the same effect? Explain. (4)
2. In what way is CAM photosynthesis different from C4 Photosynthesis? Explain the mechanism of CAM in detail and simply indicate the differences with C4. (4)
3. What are *artificial* and *natural* systems of plant classification, and why is *monophyly* emphasized? What kind of system do Indian plant taxonomists use? (4)
4. In the context of plant responses (say photosynthetic) to environmental stressors, what do the terms *acclimation*, *adaptation*, and *homeostatic compensation* mean? Explain with example experiments or observations on how you can demonstrate these phenomena. (6)
5. The phenomenon of chlorophyll fluorescence is illustrated in the following figure: (6)



Show how you can estimate photosynthetic quantum yield (Φ_F) using these measurements.

6. A well-watered plant is suddenly denied water for a period a few days. And you have the instruments to measure Ψ_{soil} , Ψ_{root} , and Ψ_{leaf} . Plot how these three parameters change with time on a single graph. What does teach you about movement of water through plants? Can suction alone explain this movement? (6)
7. Declining soil water potential is a considerable stress for plants. What options do plants have in maintaining a favorable water potential gradient from soil to roots? Do you expect to see any tradeoffs in the ways that plant roots/root cells deal with water stress? (6)
8. Suggest experiments to (a) measure *mycorrhizal dependency* and (b) the *benefits* and *costs* of mycorrhizal associations. (6)

Section B. Answer all questions (on a separate additional sheet please)

Section Total = 8

1. Expand and write the key functions of the following proteins: (1)
 - a. HY5:
 - b. COP1:
2. Define secondary metabolites? Write the two major differences between primary and secondary metabolites? (2)
3. Define the terms Skotomorphogenesis and Photomorphogenesis, and write three key differences between them? (2)
4. Write three major classes of secondary metabolites, and name at least two chemical compounds and the corresponding plant source under each category. (3)

