

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

總共 100 分

一、選擇題:(30 分, 每題 2 分)

1. When a tissue that has been equilibrated with a 0.4 M mannitol solution (-0.95 MPa) and then are transferred to a 0.6 M (-1.4Mpa) mannitol solution in which most of cells are plasmolyzed, the equilibrated final values of solute potential (Ψ_s) for the tissue will be (a) -0.95 MPa (b) -1.4Mpa (c)-2.35Mpa (d)-0.45Mpa (E) 0.45Mpa
2. When measured the uptake of selected ions by roots of pea, the Nernst equation can be used to predict the internal concentration of cells. If the predicted concentration of the ion is much larger than actual concentration in the cell, that indicates plant cells (a)actively export the ion (b)actively import the ion (c)passively export the ion (d)passively import the ion (e)no transport activity to the ion
3. Which of solute transport mechanisms most probably account for rapidly accumulation of large quantities of potassium ions in a cell? (a)ATP pumps (b)active carrier transporter (c)passive carrier transporter (d)facilitated channel (e)none of the above
4. What is the initial deficiency symptom of inorganic nutrient of low mobility in the plants? (a)all leaves are yellow (b)yellow old leaves (c)yellow new leaves (d)no symptom (e)no flower formation
5. What is NOT the major function of phosphorous nutrient in plant? (a)to make up DNA (b)to produce ATP (c)to regulate osmotic pressure (d)to form cell membrane (e) all of the above
6. During photosynthesis, oxygen is evolved from (a)carbohydrate (b)carbon dioxide (c)sunlight (d)protein (e)water
7. Which of the following statements about phytochrome is wrong? (a)chromophore is synthesized in the plastid (b)Pfr functions as a transcription factor (c)is a phycobiliprotein (d)under far-red light, all the phytochromes will convert to Pr (e)involved in seed germination
8. Which one of the metabolites is considered as a regulator for sucrose synthesis in the cytosol? (a)triose phosphate (b)glucose-1-phosphate (c)fructose-2,6-bisphosphate (d) ribulose-1,5-bisphosphate (e)sucrose
9. In photosynthesis, photosystem II (PSII) absorb light energy at or just below (a) 600nm (b)680 nm (c)700 nm (d)750 nm (e)780 nm
10. How many molecule of ATP is required for the synthesis of one molecule of glucose in C4 pathway? (a) 30 (b)28 (c)24 (d)18 (e)12
11. Which of these statements about cholesterol synthesis is true?
(a)Cholesterol is the only known natural product whose biosynthesis involves isoprene units.
(b)Only half of the carbon atoms of cholesterol are derived from acetate.
(c)Squalene synthesis from farnesyl pyrophosphate results in the release of two moles of PP_i for each mole of squalene formed.
(d)The activated intermediates in the pathway are CDP-derivatives.
(e)The condensation of two five-carbon units to yield geranyl pyrophosphate occurs in a "head-to-head" fashion.
12. Which of the following statements about secondary metabolites is FALSE?
(a)They are found in all cells of a plant.
(b)Some function as chemical signals or in the defense of the plant against herbivores.
(c)They frequently are synthesized in one part of the plant and stored in another.
(d)Some are produced only after the plant has been damaged.
(e)Their concentration in a plant can vary greatly over a 24-hour period.

13. _____ is a secondary metabolite responsible for adding compressive strength, stiffness, and waterproofing to the plant cell wall. (a) Tannin (b) Lignin (c) Cellulose (d) Flavone (e) Flavonol
14. Plant essential oils are types of (a) tannins (b) flavonoids (c) alkaloids (d) terpenoids (e) anthocyanins.
15. The major classes of secondary plant metabolites are: (a) sugars and proteins (b) alkaloids and sugars (c) nucleic acids, alkaloids, and phenolics (d) terpenoids, phenolics, and proteins (e) alkaloids, phenolics, and terpenoids.

二、複選配合題：(20 分，每題 2 分)

1. Select the following hormone(s) that match to the question:

- (a) Auxins (b) Ethylene (c) Cytokinin (d) Gibberellic acid (e) Abscisic acid (f) Brassinosteroids (g) Salicylic acid (h) Jasmonic acid (i) Peptide hormones (j) Polyamines (k) Nitric acid (l) Strigolactone (m) Flavonoids

- (1) *Striga* is a parasitic weed that produces a kind of hormone that induce shoot branching in the host plant.
- (2) Two most common used hormones in manipulating shoot and root morphogenesis under plant tissue culture condition.
- (3) Two hormones have antagonistic effects on seed development and germination
- (4) Gaseous hormones in plant
- (5) Hormones that are commonly involved in abiotic stress responses.

2. Select the most likely phenomenon or physiological effect according to questions:

- (a) Thigmotropism (b) Apical dominance (c) Totipotency (d) Habituation (e) Apical dominance (f) Phototropism (g) Triple response (h) Polar growth (i) Gravitropic bending (j) de-foliate (k) Parthenocarpy (l) Phase change (m) Vivipary (n) Crown gall disease

- (1) When cultured normal callus tissues of many species are subcultured repeatedly over a long period, they can grow on culture medium without hormones (such as auxin or cytokinin).
- (2) Spray "orange agent" containing a mixture of two synthetic auxins, 2,4-Dichlorophenoxyacetic acid (2,4-D) and 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), on plants will lead to what plant response.
- (3) Growth response to light mainly in all shoots and some roots to ensure leaves can receive optimal sunlight.
- (4) Spray auxin on the terminal bud of a plant.
- (5) Expose pea-seedlings to ethylene leads to swelling of hypocotyl, exaggeration of the curvature of the apical hook and inhibition of root elongation.

三、解釋名詞：(24 分，每題 3 分)

1. cryptochrome
2. proton motive force
3. vernalization
4. totipotency
5. abiotic stress
6. plastids
7. membrane potential
8. osmosis

四、問答題：(26 分)

1. What are the strategies for nitrogen fixers to reconcile the demands of oxygen for respiration and sensitivity of nitrogenase to oxygen? (5 分)
2. (1) Please explain the ABC model for flower development? (2) According to the model, how to create a flower with stamen-stamen-stamen-carpel? (5 分)
3. How does ABA regulate stomatal closure in water-stressed whole plants? (5 分)
4. In what general ways are plant and animal hormones similar and different? (5 分)
5. Describe the forces or mechanisms of water movement from the soil, through the root, stem, and leaf of a plant, and into the atmosphere? (6 分)