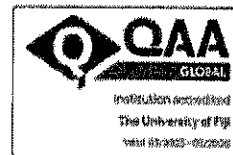


The University of Fiji
(An Entity of Arya Pratinidhi Sabha of Fiji)



School of Science and Technology
Semester 1, 2025

FINAL EXAMINATION PAPER

BIO112: PLANT BIOLOGY

Important Instructions to Students:

1. There are 14 pages. Read the questions, instructions carefully and answer the questions.
2. You are allowed an extra 10 minutes reading time (during this time, you are not allowed to write with pen) and 180 minutes (3 Hours) to complete this paper.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. There are two sections A, and B. **Section A** – Answer all the 40 multiple choice questions. Each question is worth 1 mark. **Section B** – There are 20 questions, and all are compulsory. Answer all the questions in the answer booklet. Write the question number clearly.
6. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
7. This is a **closed book examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders will be penalized.

Examination Paper Content (Format):

<u>Section</u>	<u>Questions</u>	<u>Content</u>	<u>Marks</u>	<u>Suggested Time</u>
A	1-40	Multiple Choice Questions	40	70 minutes
B	1-20	Short Answer Questions	60	110 minutes
		TOTAL	100	180 Minutes

*Registered with the Fiji Higher Education Commission as a University under the Higher Education Act 2008.
Registration Certificate Number (RGN0020/11)*

Circle the correct answer on the grid provided and attach it to your answer booklet.

1. Which organelle is responsible for photosynthesis in plant cells?
 - A. Mitochondria
 - B. Vacuole
 - C. Chloroplast
 - D. Nucleus
2. What is the function of the plant cell wall?
 - A. Protein synthesis
 - B. Structural support
 - C. Energy production
 - D. Transport of water
3. Which plant tissue is responsible for transporting water from roots to leaves?
 - A. Phloem
 - B. Xylem
 - C. Cambium
 - D. Parenchyma
4. Which tissue type carries sugars produced during photosynthesis?
 - A. Xylem
 - B. Phloem
 - C. Collenchyma
 - D. Sclerenchyma
5. What type of plant tissue is responsible for growth in length (primary growth)?
 - A. Xylem
 - B. Phloem
 - C. Meristematic tissue
 - D. Dermal tissue
6. What is the region of active cell division at the tips of roots and shoots?
 - A. Cambium
 - B. Apical meristem
 - C. Lateral meristem
 - D. Epidermis
7. Which type of growth results in increased girth of stems and roots?
 - A. Primary growth
 - B. Secondary growth
 - C. Tertiary growth
 - D. Meristematic growth

8. Which part of the root absorbs water and minerals?
 - A. Root cap
 - B. Cortex
 - C. Root hairs
 - D. Endodermis
9. The main function of the root cap is to:
 - A. Absorb nutrients
 - B. Protect the root tip
 - C. Store food
 - D. Anchor the plant
10. The vascular tissue in a dicot stem is arranged in:
 - A. Rings
 - B. Scattered bundles
 - C. Central cylinders
 - D. Spirals
11. Which stem modification helps in food storage?
 - A. Thorn
 - B. Runner
 - C. Tuber
 - D. Tendril
12. Which part of the leaf contains most of the chloroplasts?
 - A. Upper epidermis
 - B. Spongy mesophyll
 - C. Palisade mesophyll
 - D. Guard cells
13. What is the main function of stomata?
 - A. Water transport
 - B. Food storage
 - C. Gas exchange
 - D. Photosynthesis
14. Transpiration is the process of:
 - A. Food movement
 - B. Water evaporation from leaves
 - C. Sugar production
 - D. Seed dispersal

15. Which part of the flower develops into a fruit?
- A. Stigma
 - B. Ovary
 - C. Anther
 - D. Style
16. Which floral part is responsible for producing pollen?
- A. Filament
 - B. Stigma
 - C. Anther
 - D. Ovule
17. Pollination is the transfer of pollen from:
- A. Ovary to anther
 - B. Anther to ovary
 - C. Anther to stigma
 - D. Stigma to style
18. A fruit that develops without fertilization is called a:
- A. Simple fruit
 - B. Aggregate fruit
 - C. Parthenocarpic fruit
 - D. Multiple fruit
19. A prothallus in a fern is best identified as a:
- A. Young sporophyte
 - B. Zygote
 - C. Gametophyte
 - D. Sporangium
20. Pines contain resin cells in their leaves and stems. The primary function of resin is to:
- A. Provide a soft texture
 - B. Store nutrients
 - C. Prevent fungal growth
 - D. Add aroma to the plant
21. Which group of algae has members with silica-based cell walls?
- A. Diatoms
 - B. Brown algae
 - C. Red algae
 - D. Dinoflagellates

22. The brownish pigment found in both brown algae and diatoms is:
A. Chrysolaminarin
B. Fucoxanthin
C. Paramylon
D. Bryopsidin
23. Mushrooms and toadstools are the reproductive structures of which fungal phylum?
A. Zygomycota
B. Basidiomycota
C. Deuteromycota
D. Chytridiomycota
24. Specialized aerial roots in aquatic plants that facilitate gas exchange are called:
A. Velamen roots
B. Water-storage roots
C. Buttress roots
D. Pneumatophores
25. Mycorrhizae are roots associated symbiotically with:
A. Bacteria
B. Algae
C. Fungi
D. Mycorrhizobium
26. Cork cells reduce water loss by producing:
A. Suberin and waxes
B. Lignin
C. Compressed cell layers
D. Guard cells
27. Pigments that pass absorbed light energy to reaction centers are called:
A. Reaction-center pigments
B. Phosphorescent pigments
C. Antenna pigments
D. Carotene pigments
28. Bryophytes, ferns, and their allies require _____ for sexual reproduction because sperm cells _____.
A. Pollinators; rely on animals
B. Wind; are wind-dispersed
C. Surface water; swim to the egg
D. Dry conditions; dry before fertilization

29. A flower with dull green petals, abundant pollen, and feathery stigmas is most likely pollinated by:
- A. Bees
 - B. Wind
 - C. Beetles
 - D. Bats
30. Which of the following pollinators relies more on vision than scent?
- A. Beetles
 - B. Bees
 - C. Flies
 - D. Hummingbirds
31. In the alternation of generations in plants, the gametophyte generation is:
- A. Diploid and produces gametes
 - B. Haploid and produces gametes
 - C. Diploid and produces spores
 - D. Haploid and produces spores
32. The process by which light energy is converted into chemical energy during photosynthesis takes place mainly in the:
- A. Mitochondria
 - B. Nucleus
 - C. Chloroplasts
 - D. Endoplasmic reticulum
33. Which of the following is a product of the light-dependent reactions of photosynthesis?
- A. Glucose
 - B. Oxygen
 - C. Carbon dioxide
 - D. NADP^+
34. During the sporophyte phase in the plant life cycle:
- A. Gametes are produced
 - B. Meiosis occurs to form gametes
 - C. Spores are formed by meiosis
 - D. Fertilization occurs
35. Which pigment is directly involved in the light reactions of photosynthesis?
- A. Xanthophyll
 - B. Carotene
 - C. Chlorophyll a
 - D. Chlorophyll b

36. In which part of the chloroplast do the Calvin cycle occur?
- A. Thylakoid membrane
 - B. Outer membrane
 - C. Inner membrane
 - D. Stroma
37. In mosses, which generation is dominant and photosynthetic?
- A. Sporophyte
 - B. Gametophyte
 - C. Embryo
 - D. Zygote
38. The main purpose of the Calvin cycle in photosynthesis is to:
- A. Split water molecules
 - B. Produce ATP and NADPH
 - C. Fix carbon dioxide into sugars
 - D. Release oxygen
39. Which of the following features is unique to angiosperms?
- A. Production of spores
 - B. Presence of vascular tissue
 - C. Seeds enclosed within a fruit
 - D. Alternation of generations
40. Which of the following correctly ranks the major plant groups in evolutionary order from earliest to most recently evolved, and identifies a key distinguishing feature of the most advanced group?
- A. Bryophytes → Pteridophytes → Gymnosperms → Angiosperms; Angiosperms have vascular tissue
 - B. Pteridophytes → Bryophytes → Angiosperms → Gymnosperms; Gymnosperms produce flowers
 - C. Bryophytes → Pteridophytes → Gymnosperms → Angiosperms; Angiosperms produce seeds enclosed within fruits
 - D. Algae → Gymnosperms → Bryophytes → Angiosperms; Angiosperms lack motile sperm

Section B**Short Answer Questions**

[60 marks]

There are 20 questions in this section. Answer all the questions. Answer the questions in the answer booklet. Label all the questions properly.

1.
 - (a) Explain the role of algae in an ocean ecosystem.
 - (b) Describe a dinoflagellate algal bloom.

[2 marks]

2. Differentiate between lichen and mycorrhizae. Explain the role of fungi in both cases.

[2 marks]

3. Match the plant cell components on the left with their correct function on the right.

[3 marks]

a. Plasmodesmata	1. Contains dissolved substances, such as salts, sugars, organic acids, and small proteins
b. Dictyosomes	2. Allows transfer of materials between cells
c. Chloroplasts	3. Serves in photorespiration
d. Amyloplasts	4. Modify carbohydrates attached to proteins that are synthesized and packaged in ER
e. Vacuoles	5. Site for photosynthesis
f. Peroxisomes	6. Synthesize starch

4. A newly discovered plant has vascular tissue, produces spores, and does not produce seeds. To which plant group does it most likely belong? Justify your answer.

[1 mark]

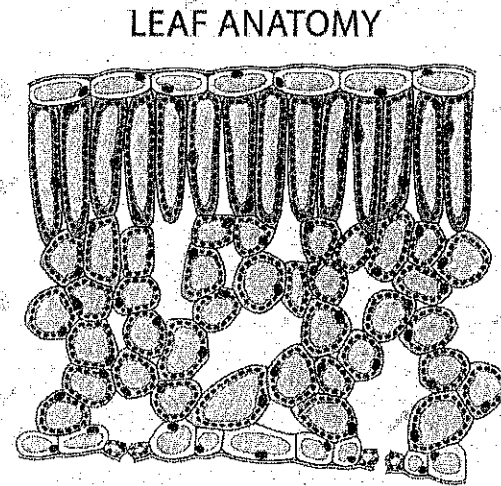
5. Differentiate between apical and lateral meristems in plants.

[1 mark]

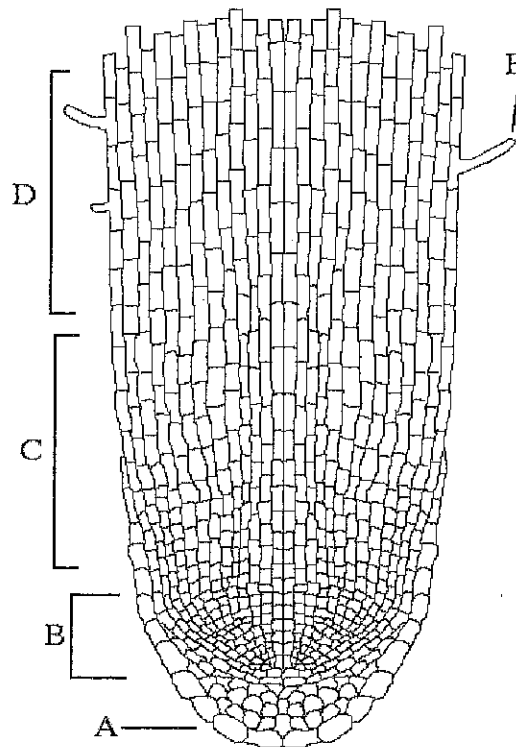
6. Explain why Bryophytes are commonly found in moist environments. How does their reproductive strategy influence this distribution?

[2 marks]

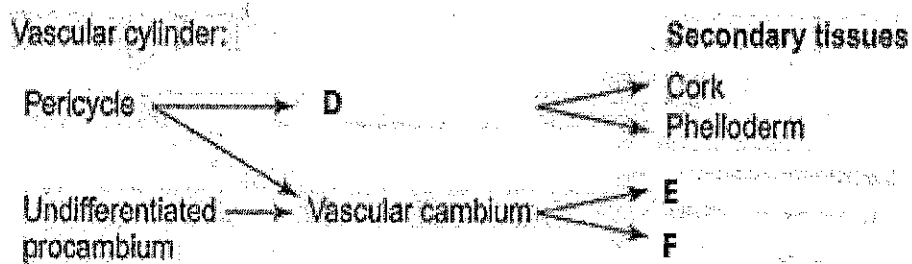
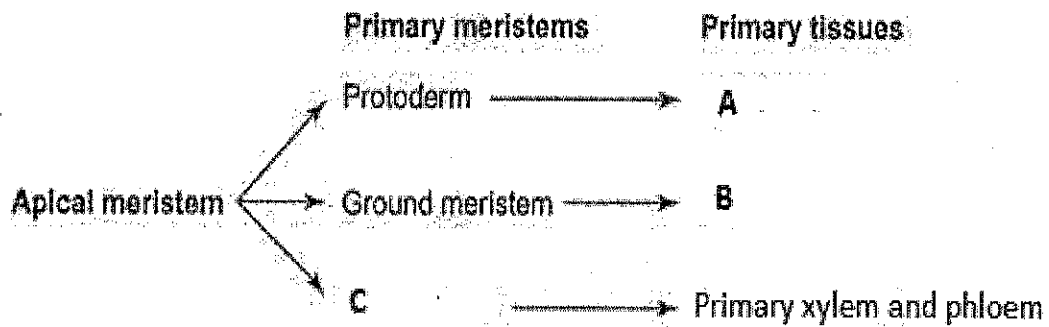
7. Copy the diagram of the leaf cross-section in your answer booklet and label the following parts: upper epidermis, palisade mesophyll, spongy mesophyll, stomata, guard cells, cuticle [3 marks]



8. Study the diagram of the onion root tip below and identify the activity at each labeled area of the root tip. [2.5 marks]



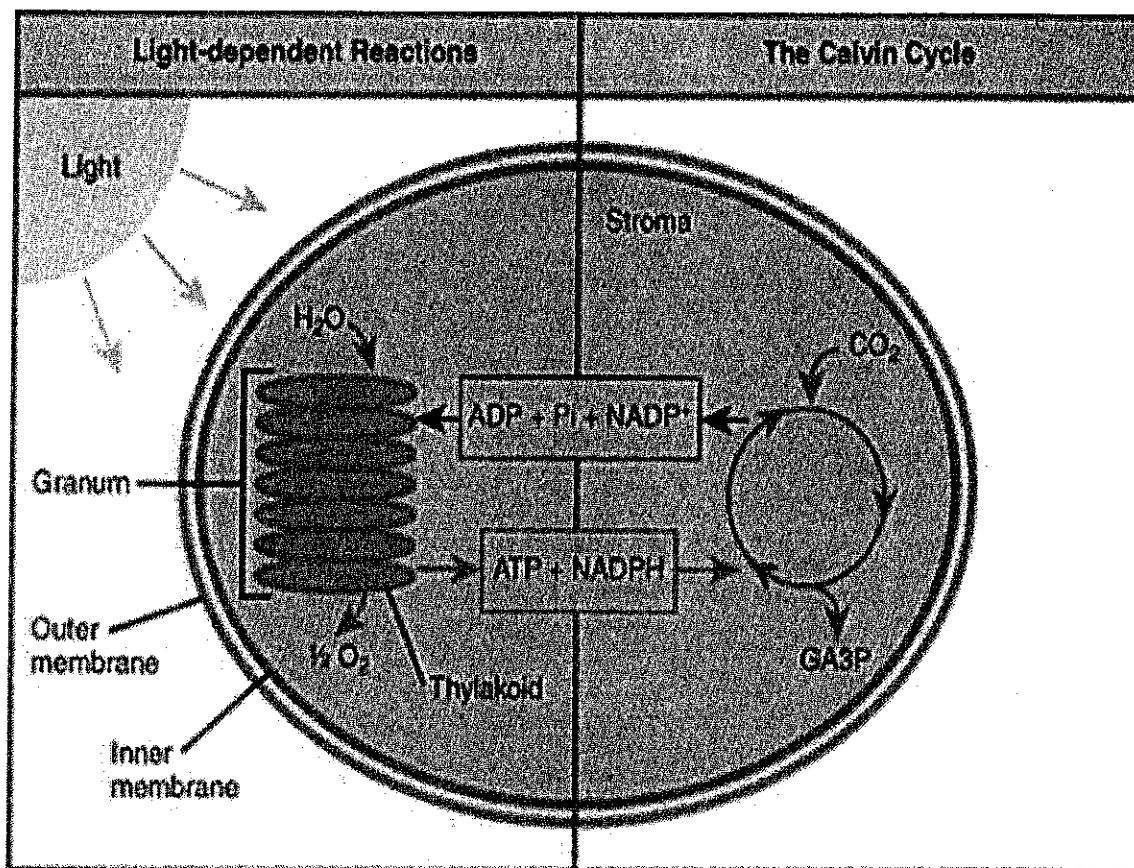
9. Study the flow chart given below on primary and secondary growth in plants and identify parts labeled A, B, C, D, E, and F. [3 marks]



10. Provide one similarity between Bryophytes and Ferns. [2 marks]

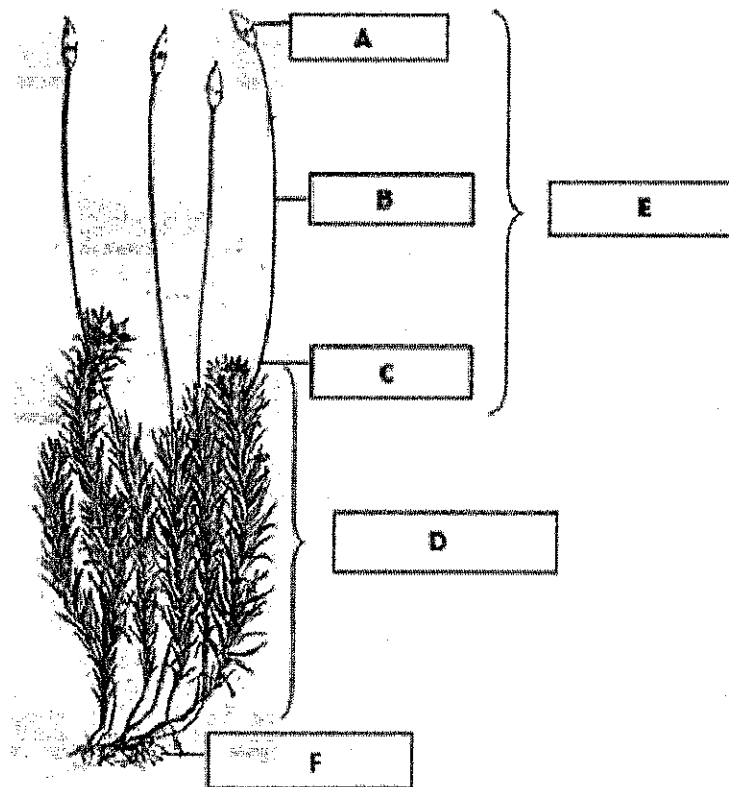
11. Study the diagram below and answer the questions that follow.

[1 mark per question = 9 marks]



- What are the two main stages of photosynthesis shown in the diagram?
- What is the primary source of energy that drives the light-dependent reactions?
- Which organelle is depicted in the diagram, and where do the light-dependent reactions occur within it?
- What molecules are produced during the light-dependent reactions and used in the Calvin Cycle?
- What are the inputs for the Calvin Cycle as shown in the diagram?
- What is the name of the molecule (three-carbon sugar) produced during the Calvin Cycle?
- What by-product is released from the splitting of water in the light-dependent reactions?
- Where in the chloroplast does the Calvin Cycle take place?
- What are the raw materials required for the light-dependent reactions?

12. Study the diagram given below and answer the questions that follow.



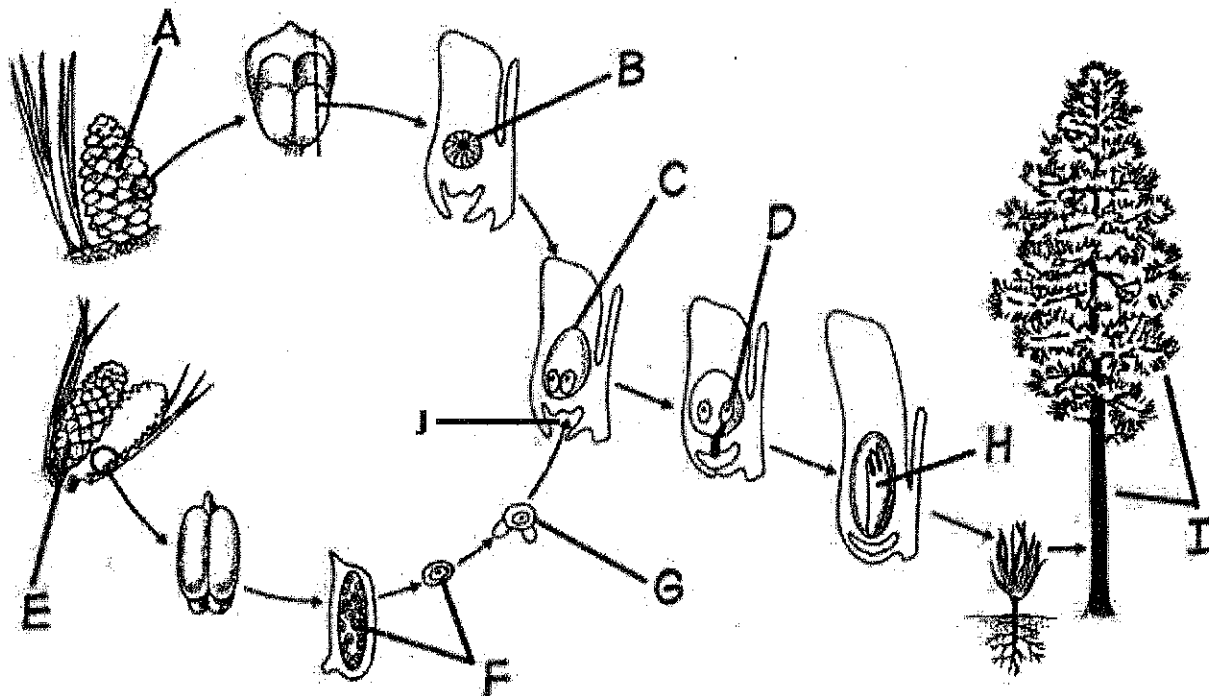
- a) Describe the plant shown above. [1mark]
- b) Label parts A-F [3 marks]
13. Read the following statements regarding different plant groups and specify whether they are true or false. [15 marks]
- Ferns reproduce using seeds.
 - Ferns have vascular tissues (xylem and phloem).
 - The dominant generation in ferns is the gametophyte.
 - Ferns require water for fertilization.
 - Mosses are non-vascular plants.
 - Mosses have true roots, stems, and leaves.
 - The sporophyte is the dominant stage in the moss life cycle.
 - Mosses reproduce using spores instead of seeds.
 - Gymnosperms produce flowers to attract pollinators.

- j. Seeds of gymnosperms are exposed and not enclosed in fruits.
- k. Gymnosperms include conifers like pine and fir trees.
- l. Pollination in gymnosperms is usually carried out by wind.
- m. Angiosperms are the only plant group that produces flowers.
- n. Angiosperms can be monocots or dicots.
- o. Angiosperms rely exclusively on animals for pollination.

14. Study the Pine life cycle shown below and match the structure with the correct letter.

[2.5 marks]

- a. Egg cell _____
- b. Embryo _____
- c. Female gametophyte _____
- d. Pollen Chamber _____
- e. Megasporangium _____
- f. Microspores _____
- g. Ovulate cone _____
- h. Pollen cones _____
- i. Pollen grain _____
- j. Sporophyte _____

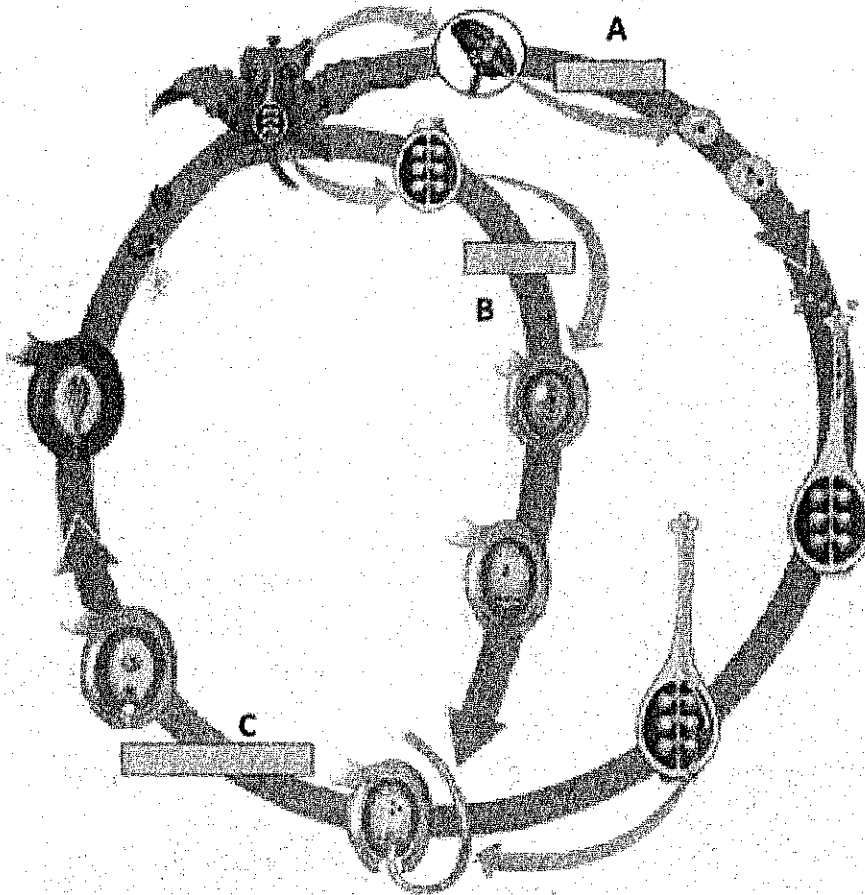


15. Explain the concept of coevolution in an insect and a flower. Provide an example.

[1 mark]

16. Study the diagram of an Angiosperm life cycle given below and describe what is happening at A, B, and C.

[3 marks]



17. What is double fertilization in Angiosperms? [1 mark]

18. Why are Angiosperms the most successful group of plants? [1 mark]

19. What is the role of endosperms in an Angiosperm plant? [1 mark]

20. What is the purpose of the ovaries in an Angiosperm plant? [1 mark]

The End