Index Number:_____ SEC35/s2.18s

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2017

SUBJECT:	**Agribusiness**
PAPER NUMBER:	Synoptic – Unit 2
DATE:	1st November 2017
TIME:	10:00 a.m. to 12:05 p.m.

THIS PAPER SHOULD BE RETURNED TO THE INVIGILATOR AFTER THE EXAMINATION.

Scenario:

Your school is working on an ambitious project in which fish and plants will be grown together, so that the dirty water from the fish tanks is used to provide nutrients that are essential for plant growth. This is the basis for hydroponics, the process of growing plants in sand, gravel, or liquid, with added nutrients but without soil.

Before you start working on this project, you have been requested to draft a number of fact sheets which assess your knowledge about aquatic and land-based production.

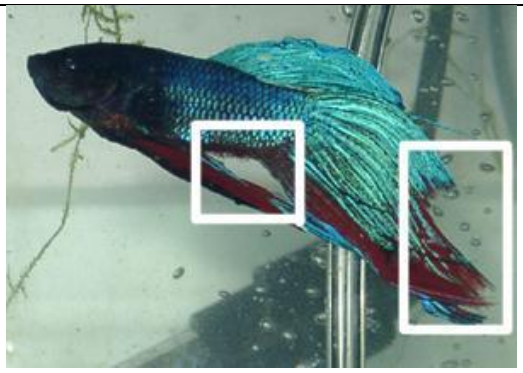
Question 1 **K3 (4 marks)**

Identify the fish diseases and disorders by observing the image and the brief description below.

Fin rot	Nodavirus	Pop eye	Bloat
Fish lice	Whitespot (Ich)	In-breeding	Lateral line disease

	Image	**Description**
a.		Markedly swollen belly, swollen scales, reddening at vent or base of fins, ulcers on body, and long, pale faecal cast. *Taken from: https://www.gardenpondforum.com/*
Answer		

(0.5)

	Image	**Description**
b.		Caused by various bacteria, such as *Aeromonas*, *Pseudomonas* and myxobacteria. Symptoms include split, scruffy fins, often with a white edge to them. *Taken from: http://www.bettafishcenter.com/*
Answer		

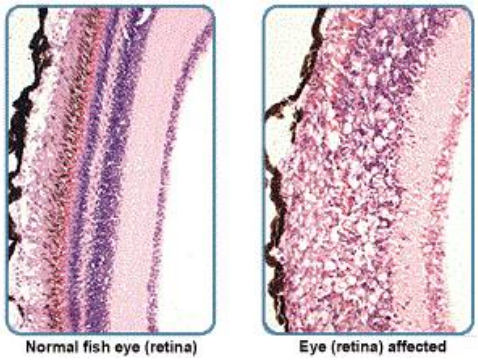
(0.5)

	Image	Description
c.		Symptoms vary tremendously, from abnormalities in colouration and unusual fins to missing eyes, deformed jaws and loss of swim bladder. Siamese twins is another manifestation of this sort of problem. *Taken from: https://i.ytimg.com/*
Answer		

(0.5)

	Image	Description
d.		Caused by small ciliate protozoans. Symptoms include small, white cysts on the skin, fins and gills. *Taken from: http://3.bp.blogspot.com/*
Answer		

(0.5)

	Image	Description
e.		A viral infection which typically affects new-born baby fish. Fish are often observed to swim around disoriented, swimming in spirals, chasing their tails or belly up. *Taken from: http://www.agriculture.gov.au/*
Answer		

(0.5)

This question continues on the next page.

	Image	Description
f.		Can be caused by a variety of factors, including bacterial infection, parasite infestation, etc. One or both eyes protrude from the head in an unusual fashion. *Taken from: http://www.tropicalfishsite.com/*
Answer		

(0.5)

	Image	Description
g.		Caused by various crustaceans which attach to the skin and fins. The intense irritation that results may cause heavily infested fish to scratch against rocks. *Taken from: http://cdn.spectrumbrands.com/*
Answer		

(0.5)

	Image	Description
h.		Caused by the flagellate protozoan, *Hexamita*. Small holes appear in the body especially the head region, which gradually develop into tubular eruptions. *Taken from: http://reefkeeping.com/*
Answer		

(0.5)

Question 2 **K4 (3 marks)**

Describe the correct treatment procedure for the fish diseases and/or disorders below.

a. Fish lice

_____

_____

_____ (1)

b. Fin rot

_____

_____

_____ (1)

c. White spot (Ich)

_____

_____

_____ (1)

Please turn the page.

Question 3 **C2 (5 marks)**

Fill in the blanks by choosing **ONE** from the below to explain tank and cage requirements of rearing seabream. Each word should be used ONLY ONCE.

Heating	Capacity	Coast	PVC	Aeration
Salt	pH	Biofilter	Cages	Light

The first four to six weeks of the life of gilthead seabream are spent in a specific larval rearing unit of the hatchery. The most common equipment consists in a number of round fibreglass tanks of an individual _____ of 6-10m^3. Seawater is normally recirculated through a _____ so as to filter off any harmful substances. Depending on the system, the water source can be seawater, however, _____ concentration and the level of _____ need to be monitored.

As gilthead seabream reproduction takes place during the winter season, _____ the water in the larval rearing tanks accelerates the growth rate. A _____ hanged over each tank provides the necessary illumination to allow visual predation. For gilthead seabream in their early post-larval development stage, light intensity is critical to start a proper predatory activity.

_____ should be adjusted to avoid a stressful turbulence to which post-larvae are most sensitive in particular at two critical stages: during the first feeding, and during the formation of the swim bladder.

The Gilthead seabream can then be farmed in _____, generally made out of _____. The cages are normally off the _____. Although densities (10-15 kg/m^3) are lower than in tanks, there are great advantages that make cages farming more profitable. For example, there are no energy costs for pumping, aeration, or post-rearing water treatment. However, it is not possible to control temperature in cage rearing, resulting in a longer rearing period to market size.

(0.5 each)

Question 4 **C1 (6 marks)**

Answer the following questions.

a. Why do goldfish larvae require more proteins than the adult stage?

_____

_____ (2)

b. Why do juvenile tuna require carbohydrates?

_____

_____ (2)

c. Why do adult goldfish require fats?

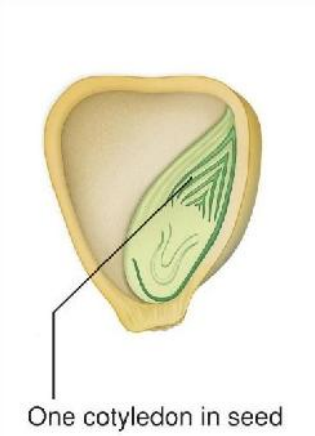
_____

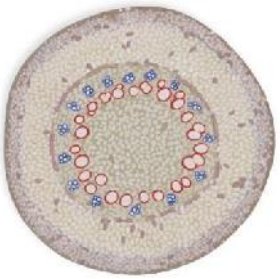
_____ (2)

Please turn the page.

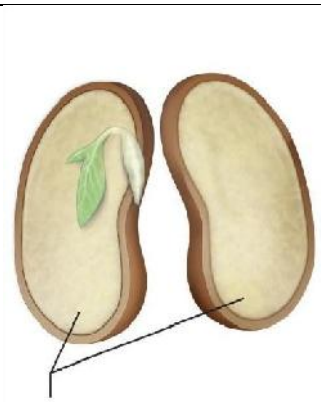
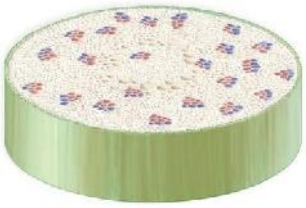
Question 5 **K5 (11 marks)**

a. Tick whether the following structures belong to monocots or dicots.

	Structures	Monocots	Dicots
i.	 One cotyledon in seed		
ii.	 Root phloem between arms of xylem		
iii.	 Leaf veins form a net pattern		

	Structures	Monocots	Dicots
iv.	 Root xylem and phloem in a ring		
v.	 Flower parts in threes and multiples of three		
vi.	 Flower parts in fours or fives and their multiples		

This question continues on the next page.

	Structures	Monocots	Dicots
vii.	 Two cotyledons in seed		
viii.	 Vascular bundles scattered in stem		
ix.	 Leaf veins form a parallel pattern		

	Structures	Monocots	Dicots
x.	 Vascular bundles in a distinct ring		

(0.5 each)

Above images taken from: https://media.licdn.com/

b. Describe the function of each of the following organs within a plant.

i. Xylem

_____ (2)

ii. Phloem

_____ (2)

iii. Leaf

_____ (2)

Please turn the page.

Question 6 **K6 (7 marks)**

Identify the following physiological processes with the correct description.

Phototropism	Transpiration	Translocation
Geotropism	Respiration	Photosynthesis
	Germination	

a. The process by which plants use the energy from sunlight to produce glucose from carbon dioxide and water.

_____ (1)

b. The process by which moisture is carried through plants from roots towards the leaves and eventually released to the atmosphere.

_____ (1)

c. The growth of the parts of plants in response to the force of gravity.

_____ (1)

d. The orientation of a plant or other organism in response to light.

_____ (1)

e. The movement of materials from leaves to other tissues throughout the plant.

_____ (1)

f. The processes by which plants take in oxygen to produce water, carbon dioxide and energy which helps the plant grow.

_____ (1)

g. The process by which an organism grows from a seed.

_____ (1)

Question 7 **C3 (5 marks)**

Continue the following phrases:

a. Photoperiodism is the:

_____ (1)

b. Vernalisation is the:

_____ (1)

c. Black out (in horticulture) might be needed:

_____ (1)

d. In horticulture heating may need to be provided to:

_____ (1)

e. In horticulture cooling may need to be provided to:

_____ (1)

Please turn the page.

Question 8 **K7 (8 marks)**

a. Choose the records which are best to keep when applying pest control and fertilizer products on a farm. Circle only the correct answers.

i. Date of application

ii. Colour of fertilizer

iii. Type of pathogens targeted

iv. Soil type

v. Name of neighbouring farmer

vi. Chemical dosage

vii. Method of application

viii. Weight of sprayer

ix. Type of crop

b. Describe the importance of recording the following information for proper pest control and fertiliser application.

i. Weather conditions.

_____(1)

ii. Pesticide name and active ingredient.

_____(1)

iii. Nutrient content of fertiliser.

_____(1)

Question 9 **K8 (4 marks)**

a. The onion may be susceptible to a number of diseases, such as the downy mildew, which is a disease of the foliage caused by a fungus-like (Oomycete) organism. Another fungal disease of plants in the Allium family, which include leeks, garlic and onions, among others, is rust.

Consider the following symptoms and identify whether they are associated with downy mildew or rust. The first one has been done for you as an example.

Symptoms	
~~i.~~	~~The first evidence of disease is a fine, furry, greyish white to purple growth on the surface of older leaves.~~
ii.	Leaf tissue under the growth becomes pale green, then yellow, and finally it collapses.
iii.	Small reddish to dull orange oval-shaped pustules develop on leaf blades.
iv.	Bulbs can also be infected and often sprout prematurely or shrivel in store.
v.	From orange, the spots may develop into black lesions over time.

Downy Mildew	Rust
i.	

(0.5 each)

This question continues on the next page.

b. Plant nutrition is the practice of providing to the plant the right nutrient, in the right amount, in the right place, at the right time.

Consider the following symptoms and identify whether they are associated with a deficiency in nitrogen or phosphorus. The first one has been done for you as an example.

	Symptoms
~~i.~~	~~Stunted growth may occur because of reduction in cell division.~~
ii.	Chlorosis could result in the dropping of older leaves.
iii.	Younger leaves turn darker green, older leaves remain yellow.
iv.	Dark to blue-green colouration appears on older leaves.
v	Under severe deficiency, purpling of leaf stems may appear.

Nitrogen Deficiency	**Phosphorus Deficiency**
i.	

(0.5 each)

Question 10 **C4 (6 marks)**

Select the correct measure to control the spreading of disease and prevent nutritional deficiencies. Only **ONE** answer is correct.

a. May be filled with pheromones to catch pests such as the Mediterranean fruit fly.
   i. Traps
   ii. Tolerant/resistant
   iii. Inter-cropping (0.5)

b. Rather than using a chemical, a pest may be controlled by the introduction of a natural enemy or predator.
   i. Pesticide
   ii. Biological control
   iii. Traps (0.5)

c. A process by which chemicals are used to render or arrest soil living organism that are capable of destroying plants and cause diseases in the soil to be inactive, impotent or unproductive.
   i. Solarisation
   ii. Sterilisation
   iii. Tillage (0.5)

d. Growing of two or more crops together in proximity on the same land so that one or both can benefit from the other.
   i. Inter-cropping
   ii. Crop rotation
   iii. Tillage (0.5)

e. Crop varieties that have genetic characteristics that make them less susceptible to particular pests and/or diseases.
   i. Tolerant/resistant
   ii. Pesticides
   iii. Biological control (0.5)

f. Agitating the soil in preparation for growing crops. This can be digging, stirring and overturning the soil.
   i. Artificial fertiliser
   ii. Field burning
   iii. Tillage (0.5)

This question continues on the next page.

g. Even though this method removes plants that are already growing and to help the plants that are about to come up, care must be taken, because if it is too windy, the fire can easily escape.
   i. Solarisation
   ii. Field burning
   iii. Sterilisation (0.5)

h. An organic source of nutrients to the crops from animal origin.
   i. Manure
   ii. Artificial fertiliser
   iii. Biological control (0.5)

i. Applying a chemical on plants that can eradicate the spread of pests.
   i. Pesticides
   ii. Biological control
   iii. Artificial fertiliser (0.5)

j. Sterilisation of the soil using the heat from the sun.
   i. Tolerance
   ii. Solarisation
   iii. Biological control (0.5)

k. Even though it is not an organic source of nutrients, it allows the farmer to apply a more accurate amount of different nutrients.
   i. Manure
   ii. Artificial fertiliser
   iii. Pesticides (0.5)

l. Growing of different crops in succession on a piece of land to avoid exhausting the soil and to control weeds, pests and diseases.
   i. Tillage
   ii. Traps
   iii. Crop rotation (0.5)

Question 11 **C5 (6 marks)**

Explain how the following factors influence proper harvesting of different vegetables in Malta. In each explanation provide **THREE** examples.

a. Fertility

_____

_____

_____(3)

b. Overall care

_____

_____

_____(3)

Please turn the page.

Question 12 **A2 (10 marks)**

Are the following statements true or false? Circle the correct answer.

a. Tilling of the soil is required in most cases before the sowing/transplanting of the crop to aerate the soil and remove weeds.

True or False

b. When sowing directly in the ground the depth of sowing should be proportional to the size of the seed.

True or False

c. When transplanting cabbages into the ground, the seedlings should have a tall, slim stem and around eight leaves.

True or False

d. When irrigating the crop one must make sure that excess water is avoided to prevent depleting the soil of its oxygen.

True or False

e. A leafy crop should be given more nitrogen than potassium fertilization.

True or False

f. A fruit crop should be given more nitrogen when the fruit starts forming.

True or False

g. A fungicide is a plant protection product that kills fungi whereas a herbicide is a plant protection product that kills weeds.

True or False

h. Gloves are not needed when applying plant protection products.

True or False

i. It would **not** make a difference for the quality of the final product if the crop is bruised during harvesting.

True or False

j. Packaging might help in the presentation of the product on the market and might thus lead to better sales.

True or False

Question 13 **K9 (4 marks)**

Identify the following propagation techniques with the correct explanation. Each term can be used only ONCE.

Grafting	Division	Seeding	Rhizome
Bulb	Layering	Cuttings	Runner

a. Tissues of different types of trees are joined to continue their growth together. The success of this joining requires that the vascular tissue grow together and such joining is called inosculation.

_____ (0.5)

b. Onions can be propagated by planting its short stem with fleshy leaves or leaf bases that function as food storage organs during dormancy.

_____ (0.5)

c. If this modified subterranean stem is separated into pieces, each piece may be able to give rise to a new plant.

_____ (0.5)

d. A slender stem that originates in a leaf axil and grows along the ground or downwards from a hanging basket, producing a new plant at its tip.

_____ (0.5)

e. Stems of different plants that are still attached to their parent plant may form roots when they come in contact with a rooting system.

_____ (0.5)

f. Some plants may be broken up into two or more parts and develop independently in a suitable medium.

_____ (0.5)

g. A piece of stem or root of the potato is placed in a suitable medium such as moist soil. Eventually the potato will begin to grow as a new plant, independent of the parent.

_____ (0.5)

h. Wheat is usually propagated using this method.

_____ (0.5)

Question 14 **K10 (5 marks)**

A growing medium is designed to support the growth of different produce based on the different characteristics that the growing medium has and what one is trying to grow, hence the growing objective.

Circle the correct growing media from the following growing objectives.

a. Improves water drainage (only **ONE** answer is correct).

i. compost ii. perlite (1)

b. Improves aeration (only **ONE** answer is correct).

i. coconut fibre ii. peat (1)

c. Can be considered to be pathogen and/or pest free (only **ONE** answer is correct).

i. soil ii. Vermiculate (1)

d. Allows for adequate nutrient control in hydroponics (**TWO** answers are correct).

i. rockwool
ii. compost
iii. expanded clay
iv. soil (2)

Question 15 **A3 (16 marks)**

Choose the correct word to fill in the blank in each sentence. Only **ONE** word is correct.

a. Propagating plants with _____ is an example of sexual reproduction.

i. cuttings ii. stems iii. seeds (2)

b. Propagating plants with cuttings is an example of _____ reproduction.

i. asexual ii. neutral iii. sexual (2)

c. Scattering seeds directly in the field is called _____.

i. throwing ii. broadcasting iii. transplanting (2)

d. One of the advantages of asexual reproduction is that the daughter plant will have _____ characteristics as the parent.

i. similar ii. the same iii. different (2)

e. _____ cutting is **not** an example of a type of cutting.

i. petal ii. leaf iii. root (2)

f. A _____ is usually used to take cuttings.

i. chainsaw ii. sprayer iii. secateurs (2)

g. Two of the major needs for correct germination are _____ and air.

i. water ii. light iii. fertilizers (2)

h. _____ can be used to help a cutting develop roots better.

i. fertilizers ii. herbicides iii. rooting powder (2)

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