Mansoura University
Faculty of Science
Botany Department
El-Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة - مصر

Final Examination in Botany
Second Term: May 2015

Students: 4th Level Microbiology | **Course**: Cell physiology & Genetic control
Time: 2 hours. | **Date: 16/5/2015**
Full mark: 60 | **Question mark:** 20

Answer The Following Questions:

Q1: Answer the following using instructions between brackets (20 marks , 5 marks / each)

1. The operon structure in bacteria. **(Draw)**
2. Gene control through messenger RNA processing. **(Discuss &Draw)**
3. Superrepressors in *Lac* mutations. **(Discuss &Draw)**
4. DNase I hypersensitivity. **(Discuss)**

Q2: A- Answer the following : (20 marks , 5 marks / each)

1. How can Insulators block the action of enhancers?
2. How can proteins read the outside of DNA helix?
3. From your study, give an example of coupling between energetically favorable and unfavorable reactions.
4. Explain the structure of ATP synthase.

Q3: A- Explain the following points (10 Marks):

1- Head polymerization with a detailed example
2- The role of both NAD NADP inside the cell
3- NADH and $FADH_2$ produce 2.5 ATPs and 1.5 ATPs respectively
4- The difference between mitochondria and chloroplasts in proton flow and ATP synthase orientation

B- What would happen if (10 Marks)?

1- the bacterial cell wants to generate proton gradient while the electron transport chain proteins are not working
2- Sun light energy reaches to the special pair of chlorophylls
3- DNA replication goes in the direction 3-5
4- The ratio between NAD^+/NADH became < 1

Examiner: **Dr. Ashraf Elsayed** **Dr. Amr M. Hassan**

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Final Examination in Botany
Second Term: May 2015

Educational Level: 4th level
Program (Branch): Microbiology
Subject: ٤١١ م
Course(s): Genomics and Biosafety
Time: 2 hrs Date: May/2015
Full mark: 80 **Question mark:** 20/30

Answer the following questions:

Q1: (20 marks)

A- Insert the appropriate Containment Level 1-4, next to the description below (one mark each):

1- .....Laboratory that is requires a highly complex facility design, maximum engineering controls, specialized biosafety equipment and redundant biosafety features. The researcher is completely isolated from the pathogen.
2- .....Laboratory where biosafety and biosecurity are achieved through comprehensive operational practices and physical containment requirements including stringent facility design and engineering controls; access is strictly controlled and all work with the pathogen is done in a Biological Safety Cabinet.
3- .....Laboratory where biosafety is achieved through a basic level of operational practices and physical design features although due care should be exercised and safe work practices including good microbiological lab practices should be followed.
4- ..... Laboratory where biosafety and biosecurity are achieved through operational practices and physical containment requirements that are proportional to the risks associated with the agents being handled there in. For example, all work that may create aerosols is performed in a biological safety cabinet and all waste is decontaminated prior to disposal

B- List the following key techniques to prevent the release of contaminated material during a spill clean-up in the correct order (1-6) (one mark each).

1- ---------Use forceps to pick up any broken glass or sharps and place them in a leak-proof puncture resistant container.
2- ---------Allow aerosols to settle.
3- ---------While wearing protective clothing, gently cover the spill with paper towels.
4- --------- Allow sufficient contact time before clean up.
5- ----------Use a gentle flooding action to reduce the creation of aerosols.
6- ---------- Apply appropriate disinfectant, starting at the perimeter, working inwards towards the center

C- Determine if each of the following sentences is true (T) or False (F) and correct the false one(s): (one mark each)

1- Bacterial genes contain intron and exon sequences within their genetic structure ( )
2- Stop codon is coded for Methionine during the translation process ( )
3- Gene splicing phenomena takes place after the translation process ( )
4- Protein sequencing is method or technology that is used to determine the order of the translated amino acids in a polypeptide chain ( )
5- The coding sequence or CDS is that portion of a gene's DNA or RNA which composed of introns ( )
6- In FASTA format, the nucleotide sequence starts directly after the > symbol ( )
7- MinIon is a sequencer developed via laser technology ( )

D- Based on Sanger method, Draw the Manual DNA sequencing gel for the following sequence: (3 marks)

guacccgaaaucagga

Q2: Choose the most correct answer (1.5 marks each)

1- Transgenic plant containment involves preventing accidental release into the environment of:
a. Seeds b. Pollen c. Whole Plants d. All of the above

2- The biosafety officer
- a- Can help complete the BSL-2 checklist or conduct a risk assessment.
- b- Can help labs determine and/or meet reporting obligations in the event of an accident or spill.
- c- Serves the Instituional Biosafety Committee (IBC) in an administrative capacity.
- d- Is available for questions regarding this training.
- e- All of the above.

3- Which of the following require prior approval from the IBC for use:
- a- recombinant DNA in organisms, or the creation of transgenic plants or animals, human and other primate-derived substances (blood, body fluids, cell lines or tissues),
- b- organisms and viruses infectious to humans, animals or plants (e.g. parasites, viruses, bacteria, fungi, prions, rickettsia), or biological materials that may contain these microorganisms;
- c- biologically active agents (i.e. toxins, allergens, venoms) that may cause disease in other living organisms or cause significant impact to the environment or community.
- d- all of the above require approval

4- Which of the following is FALSE when working in a Class II biological safety cabinet?
- a- The person working at the hood is protected because materials used within the cabinet are contained by room air that is drawn into the cabinet.
- b- Cultures in the cabinet are kept sterile because the air in the cabinet has passed through a high-efficiency particulate air (HEPA) filter.
- c- Using a Bunsen burner within the cabinet will help keep cultures sterile.
- d- Air exhausted from the cabinet is filtered by high-efficiency particulate air filters, so contaminants do not enter the lab.

5- What is meant by the term "exposure incident?"
- a- An exposure to mucous membranes such as the eyes and nose.
- b- An exposure to non-intact skin such as skin that has a rash or is chapped.
- c- A stick from a contaminated needle or sharp.
- d- Any skin exposure to BSL-2 materials, independent of whether the skin is intact or non-intact.
- e) e. a, b and c.

6- A researcher is working with a retroviral vector purchased from Invitrogen to transfect human cell lines. Choose the best answer that describes the necessary steps before conducting this work.
- a- This work must be carried out at BSL-2, but registration is not required with the IBC.
- b- This experiment is exempt from the rDNA guidelines and registration with your campus IBC is not required.
- c- An rDNA and Pathogen Registry Form must be submitted to your IBC.

7- Which is <u>not</u> a limitation of traditional plant breeding?
- a- Breeding can only be done between two plants that can sexually mate with each other. This limits the new traits that can be added to those that already exist within that species.
- b- Traits from any living organism can be transferred into a plant.
- c- Second, when plants are mated, (crossed), many traits are transferred along with the trait of interest including traits with undesirable effects on yield potential.

8- How many steps are involved in the process of genetic engineering?
a- 4 b- 6 c-5 d- 7

9- What is an advantage of genetic engineering over traditional plant breeding?
- a- The method of genetic engineering is a fool-proof method where plant breeding is not.
- b- Potentially, traits from any living organism can be transferred into a plant and is also more specific in that a single trait can be added to a plant.

c- Genetically engineering is less costly than traditional plant breeding.

10- Which is not a step in making a marketable genetically engineered plant?

a- Backcross Breeding b- Transformation c- Horizontal Gene Transfer

11- When you begin a new project using biological materials, what is the FISRT consideration in your risk assessment?

a- What type of biosafety cabinet should be purchased and where will it be located?
b- What is the risk group of the material that will be used?
c- What manipulations will produce aerosols?
d- Will I concentrate human pathogens or work with concentrated stocks?
e- What is the largest volume of infectious material that could spill?

12- Which is an example of poor practice in the biosafety cabinet?

a- Certifying the biosafety cabinet annually.
b- Use of gas flame burners inside the biosafety cabinet.
c- Preplanning work and minimizing movement in/out of the biosafety cabinet.
d- Collecting biohazard waste (discards) inside the biosafety cabinet.

13- Who is ultimately held accountable for the policies, practices, training, and documentation of biosafety in the laboratory?

a- The Principal Investigator b- The lab workers c- Environment Health Officer

14- Lab coats, gloves, eye protection, and close-toed shoes are examples of

a- Standard Personal Protection Equipments (PPE) at BSL-1.
b- Standard PPE at BSl-2
c- Standard PPE for using the autoclave d- All of the above

15- Which of the following would be the most reliable at containing aerosols from escaping to the lab while centrifuging?

a- A centrifuge in the lab with sealed safety cups that are removed and opened in a biosafety cabinet.
b- A centrifuge in the lab with a gasket mounted on the lid.
c- A centrifuge located in a biosafety cabinet.
d- A centrifuge in the lab with a sealed rotor.

16- Which of the following require prior approval from the IBC for use:

a- recombinant DNA in organisms, or the creation of transgenic plants or animals, human and other primate-derived substances (blood, body fluids, cell lines or tissues),
b- organisms and viruses infectious to humans, animals or plants (e.g. parasites, viruses, bacteria, fungi, prions, rickettsia), or biological materials that may contain these microorganisms;
c- biologically active agents (i.e. toxins, allergens, venoms) that may cause disease in other living organisms or cause significant impact to the environment or community.
d- all of the above require approval.

17- How can shoppers avoid products or ingredients derived from GM crops?

a. Buy products labeled Non-GMO or listed in a Non-GMO Shopping Guide.
b. Avoid foods with "at risk" ingredients from GM food crops.
c. Buy organic. d. All of the above.

18- Name 3 possible potential health risks associated with genetically modified foods.

a. Allergies and toxins b. New diseases
c. Nutritional problems d. All of the above

19- What are the *current* benefits of having foods made from genetically modified crops?

a. They improve farm profitability and make some farmers' jobs easier.
b. They allow farmers to greatly increase the amount of crops produced.
c. They improve convenience for consumers, e.g. by creating foods with longer shelf lives.
d. They improve the nutritional quality of foods.
e. They cause less damage to the environment than conventional chemical-intensive agriculture.

20- What effect does an eating genetically modified food have on your genes?

a. It could cause your own genes to mutate.
b. It could cause your own genes to absorb the excess genes.
c. It has no effect on your genes.
d. The effects on human genetics aren't known.

Q3: (30 marks)

A- Complete the following sentences: (18 Marks, 1.5 Marks each)

1- The number of reading frames in the 5 ⟶3 direction is _____.
2- A single gene sequence file could be considered as a contig when _____.
3- _____ is a database for all the possible metabolic pathways.
4- The inability to obtain a contagious sequence using two sequences files could be due to _____ or _____.
5- The GC contents of a sequence could be determined using _____ software.
6- Each single cell contains a copy of the whole genome except _____ and _____.
7- In Sanger method, the _____ enzyme action is stopped by the action of _____ in order to obtain pieces with different molecular sizes.
8- The ambiguity along various sites of DNA sequence chromatograms could be due to either _____ or _____ leading to the presence of "N" letters in such sites.

B- Match each item at the column (A) with the most appropriate sentence at the column (B) and re-write the full sentences: (12 Marks)

Column A	Column B
1- Finch TV	1- Could be used to visualize the crystalline structure of Taq-polymerases.
2- Accession number	2- Could be used to determine the action site of *Hind-III* enzyme,
3- NEB-cutter	3- Could be used to determine the coding and non-coding parts of bacterial plasmids.
4- Protein Data Bank	4- Could be used to determine the quality of a certain sequence
5- PlasMapper	5- It is a unique identifier given to a DNA or protein sequence record to allow for tracking of different versions of that sequence record.
6- CAP3	6- Open access database which collect the metabolic pathways for all whole genome sequenced organisms.
7- Expasy	7- Could be used as a translation and transcription tool
8- EMBL	8- Could be used to determine the ORF of a certain sequence.
	9- An Open access database built by the direct submissions from individual laboratories, as well as from bulk submissions from large-scale sequencing centers.
	10- Could be used to visualize the position of a certain gene among the microbial genome.

Examiners

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Final Examination in Botany
Second semester: May. 2015

Educational Year: First level **Program (Branch): Microbiology Students**
Code: M 409 **Courses: Plant biotechnology**
Time: 2 hours **Date: 26/5 /2015** **Full mark: 60 marks**

Answer the following questions:

Q1 Write only on four of the following, use diagrams and drawings if needed: (20 marks; 5 marks each)

1- Bioplastic from plant-derived starch, its problems and how to overcome.
2- Traits of an ideal crop plant.
3- Types of bioreactors based on the mode of operation.
4- The main steps in plant tissue culture.
5- The most common steps in the production of bioalcohols.

Q2 A- Choose the most correct answer or answers: (10 marks, 1 mark each)

1- ……..are the simplest types of active and passive hydroponics.
a- Wick system b- Water culture
c- Flood and drain system d- Recovery drip system

2- …… is a biofuel derived from oil content of algal biomass.
a- Oilgae b- biodiesel
c- Third generation biofuel d- bioethanol

3- All of these bioreactors use sparger for mixing ……..
a- Stirred tank bioreactor b- Tower bioreactor
c- Bubble column bioreactor d- Drum rotating bioreactor

4- All of these hydroponics need a timer except ……
a- EBB and Flow system b- Drip system
c- Nutrient film technique d- Aerobonics

5- To introduce foreign genes into plants we could use one of the following …..
a- Indirect gene transfer b- vector based gene transfer
c- Electroporation d- Particle bombardment

6- Biobutanol is formed by …… fermentation
a- Butanol b- Ester
c- Ethanol d- Acetone

7- Aggregation of plant cells in culture result in …….
a- Sedimentaion b- High growth rate
c- Insufficient mixing d- Low biochemical diffusion

8- ……..….. are types of airlift bioreactors.
a- Airlift internal loop b- Airlift external loop
c- Tower bioreactors d- Airlift mixing loop

Please turn over
من فضلك اقلب الصفحة

9- Bio-butanol is similar to Bio-ethanol in .....

a- No separation occur if contaminated with water

b- Produced from wheat, corn and sugar beet

c- Transport via existing pipelines

d- Used in engines without modification

10- ..... can generate plants from a completely single cell

a- Vasil b- White

c- Haberlandt d- Hildebrandt

B- Complete the following sentences: (10 marks; 0.5 mark each)

a. ...(1)... and ...(2)... are two ways of forming compost..

b. ...(3)... and ...(4)... are examples of plants that pests avoid.

c. ...(5)...prepared a medium by increasing the concentration of salts ...(6)... higher than ...(7)....

d. Urban agriculture is defined as ...(8)... and it includes ...(9)..., ...(10)..., ...(11)... and ...(12)...

e. PHA is an abbreviation of ...(13)... and it formed inside bacterial cells under limitation of ...(14)... and excess of ...(15)...

f. ...(16)...is a scale that measures the weight of bioreactor.

g. Airlift bioreactors contain a ...(17)... and a ...(18)...

h. ...(19)... and ...(20)... are to state the amount of biodiesel and bioethanol in any fuel mix, respectively.

Q3 A- Differentiate between each of the following in a table: (16 marks; 4 marks each)

1- Conventional and organic farming.

2- Natural pest control and chemical control

3- Fossil fuel and biofuel.

4- Aerobonics and Nutrient film technique.

B- Mention the different components of bioreactor used in mixing, referring to their composition. (4 marks)

With our best wishes

Examiners: Prof. Dr. Mohammed N. A. Hasaneen

Dr. Amany M. S. Kazamel

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Botany Department

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4th level Microbiology	Subject : Instruments and Microbial Techniques		Code: M412
Time: 2 hours	Date: 2 June 2015	Full mark: 60	Question mark: 20

Question No.1: Write short notes with labeled diagrams (if possible) on the following:

1. Koch's Postulates (5 marks).
2. PCR technique (5 marks).
3. Steps for isolation of causal organisms from diseased water hyacinth leaves (5 marks).
4. Four apparatus used in microbiological laboratory (5 marks).

Question No.2:

Part A:Complete the following sentences (2 marks for each point)

1. Formalin acetic alcohol (FAA) used for ....., and consisted of..... '.....'.....'....
2. Disease levels were classified into four types as.....'..... '.....'.....
3. Mycorrhizal colonization levels were..... '.....'..... '.....
4. Wet sieving and decanting method used for ....., through a set of sieves with pore sizes of.....'.....'.....'.....'.....
5. AMF trapping from soil sample by using .....and ..... as the suitable trap plants.

Part B: Answer the following questions

1. Mention the applications proposed for *Dunaliella* species (4 marks)
2. Illustrate two-phase bioreactor in algae milking technique explaining the mechanism of extraction (6 marks)

Question No.3:

Part A:Complete the following sentences (1 mark for each point)

1. Plastic bags considered as ..... algal production system
2. Algae can be used in agriculture as .....
3. Entrapment methods are based on .....
4. For algal immobilization the most frequently used natural gels are ..... and .....

Part B: Answer the following questions

1. Write short notes on 3 types of immobilization techniques (6 marks)
2. Define the Biodiesel, and write on three of its ASTM specifications (8 marks)
3. Draw a schematic diagram of tubular photobioreactor (2 marks)

"Best wishes"

Examiners:

Prof. Dr. Gamal M. Abdel-Fattah **Dr. Eladl Galal**