



Faculty of agriculture
Agricultural Botany Dep.
Level one (First semester 2014 2015)

Benha Univ.
Agricultural Biotechnology Program
Course : Cell biology (AB 0802 Selective)

model answer

Answer of the first question :

(15 M)

1 - The main principle of cell theory are

- All living organisms are composed of cells and products of cells
- All cells arise from pre existing cells through the process of cell division
- The body of living organisms is made up of one or more cells

Protoplasm : The protoplasm is a semi fluid matrix containing cytoplasm and Nucleus. It is a living substance of the cell that possesses all vital products made up of inorganic and organic molecules. So it is called protoplasm as “**physical basis of life**”

2 - Functions of : Nucleus

- - It is considered as apparatus of heredity :
- - It Control heredity characters
- - It is center of vital activities in cells

Plasma membrane

- - It protect the cytoplasm
- - It maintains selective permeability
- - It regulates the movement of water and minerals
- - It helps in protein synthesis and excretion of waste materials
- - It acts as elements ; interaction between cells ; energy transformations in chloroplast and mitochondria ; all cytosoms originate from plasma membranes

Cell wall of plant cell

- - It provides a definite shape and strength to the cell
- - It protects plasma membrane and protoplasm from external shocks
- - It plays role in cell enlargement

3- The types of : Plastids

Plastids are classified into three types based on the type of pigments.

1. **Chromoplasts:** These are different coloured plastids containing carotenoids. These are present in fruits, flower and leaves.

2. **Leucoplasts:** These are colourless plastids which store food materials.

Ex: Amyloplasts: Store starch Aleuronoplasts: Store proteins Elaeioplasts: Store lipids

3. **Choloroplasts:** These are green coloured plastids containing chlorophylls and carotenoids (carotenes & xanthophylls).

Microbodies

The microbodies of cell can be classified into different groups on the bases of their structure , location and functions: these are as follows

- Peroxisomes - glyoxysomes - spherosomes - lysosomes

Different stages of mitosis division

Mitosis cell division: besides interphase four different stages : prophase - metaphase – anaphase – telophase

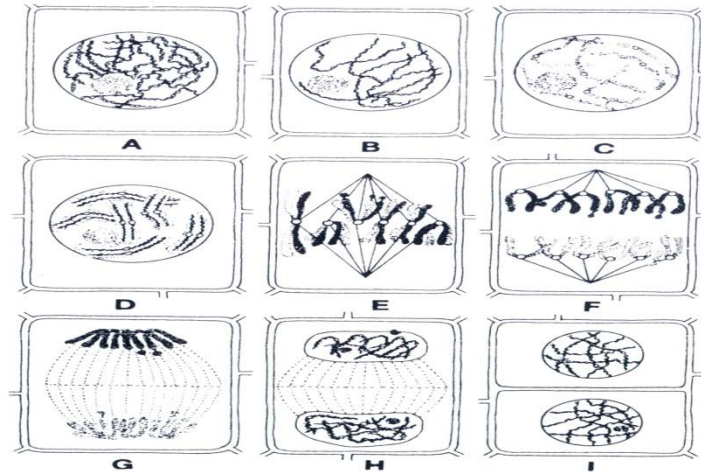


Fig. 3.3. Schematic representation of mitosis in plant cell, A to D—different stages of prophase; E—metaphase, F—anaphase, G and H—telophase and I—newly formed daughter cells.

Second question :

(15 M)

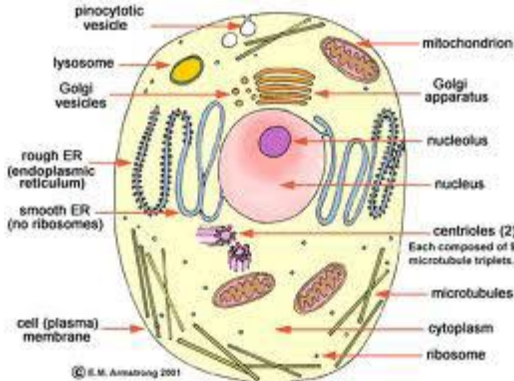
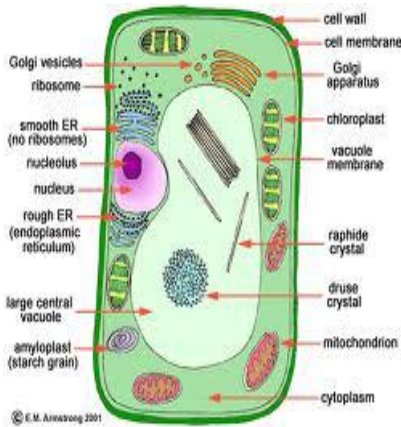
1- The differences between plant cell and animal cell:

Plant cell




- Cell wall is present
- Centrioles are absent
- Plastids are present
- Have large vacuole

Animal cell

- Cell wall is absent
- Centrioles are present
- Plastids are absent
- May have small vacuoles

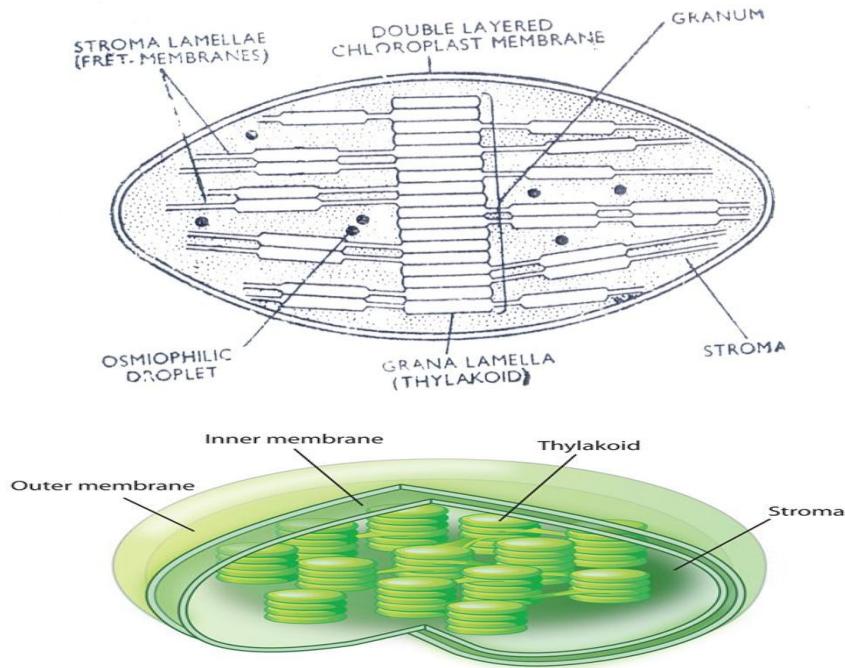


2 - The differences between prokaryotic cell and eukaryotic cell

	Prokaryote 	Animal 	Plant 
EXTERIOR STRUCTURES			
Cell wall	Present (protein-polysaccharide)	Absent	Present (cellulose)
Cell membrane	Present	Present	Present
Flagella/cilia	May be present (single strand)	May be present	Absent except in sperm of a few species
INTERIOR STRUCTURES			
ER	Absent	Usually present	Usually present
Ribosomes	Present	Present	Present
Microtubules	Absent	Present	Present
Centrioles	Absent	Present	Absent
Golgi apparatus	Absent	Present	Present
Nucleus	Absent	Present	Present
Mitochondria	Absent	Present	Present
Chloroplasts	Absent	Absent	Present
Chromosomes	A single circle of DNA	Multiple; DNA-protein complex	Multiple; DNA-protein complex
Lysosomes	Absent	Usually present	Present
Vacuoles	Absent	Absent or small	Usually a large single vacuole

3 - The structure of chloroplast (with drawing)

- Chloroplasts are larger and more complex than mitochondria
- Grana – closed compartments of stacked membranes
- Thylakoids – disc shaped structure – light capturing pigment
- Stroma – fluid matrix
- Double membranes



Functions of chloroplast: the most important function of chloroplast :

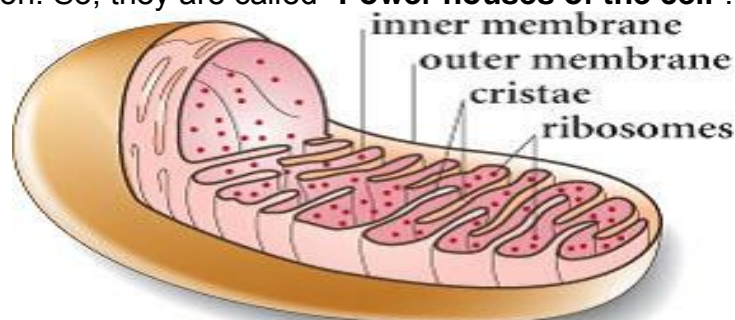
- Sits of photosynthesis : the process of photosynthesis includes a- light reaction (which takes place in grana) b- dark reaction (stroma)
- synthesis of starch , protein and fatty acids

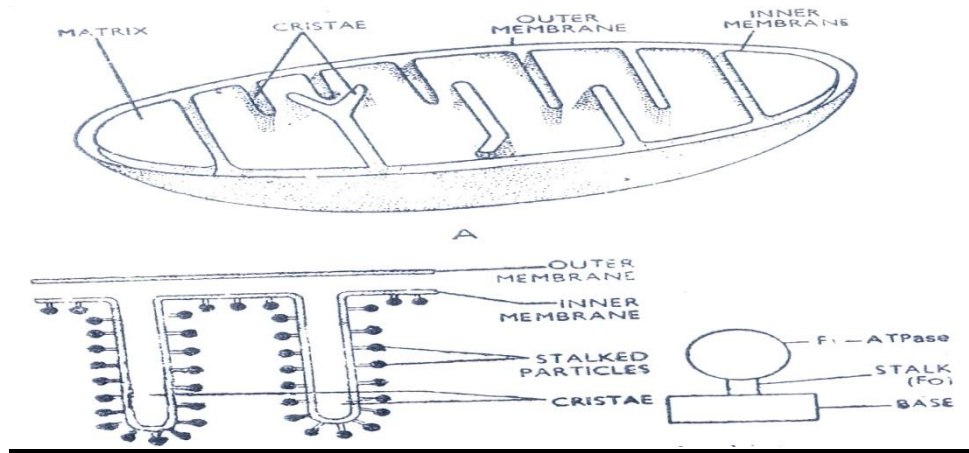
Mitochondria (with drawing). (7.5 M)

Mitochondrion is a spherical or rod shaped cell organelle. It has two membranes. The outer membrane is smooth. The inner membrane produces finger like infoldings called **cris**tae. The inner membrane has stalked particles called **ATP synthase complex**. The mitochondrial cavity is filled with a homogenous granular **mitochondrial matrix**. The matrix has circular mitochondrial DNA, RNA, 70s ribosomes, proteins, enzymes and lipids.

Functions:

Mitochondria synthesise and store the energy rich molecules ATP (Adenosine triphosphate) during aerobic respiration. So, they are called "**Power houses of the cell**".



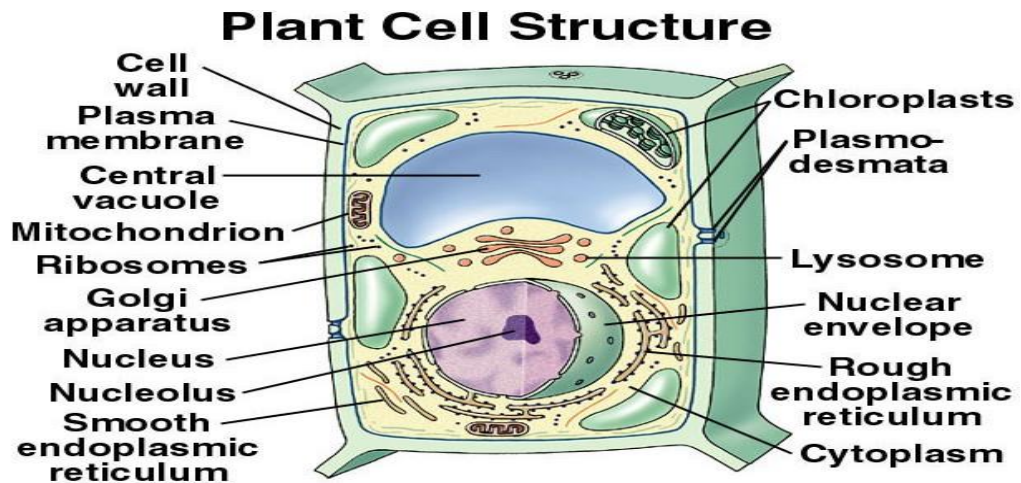


Third question:

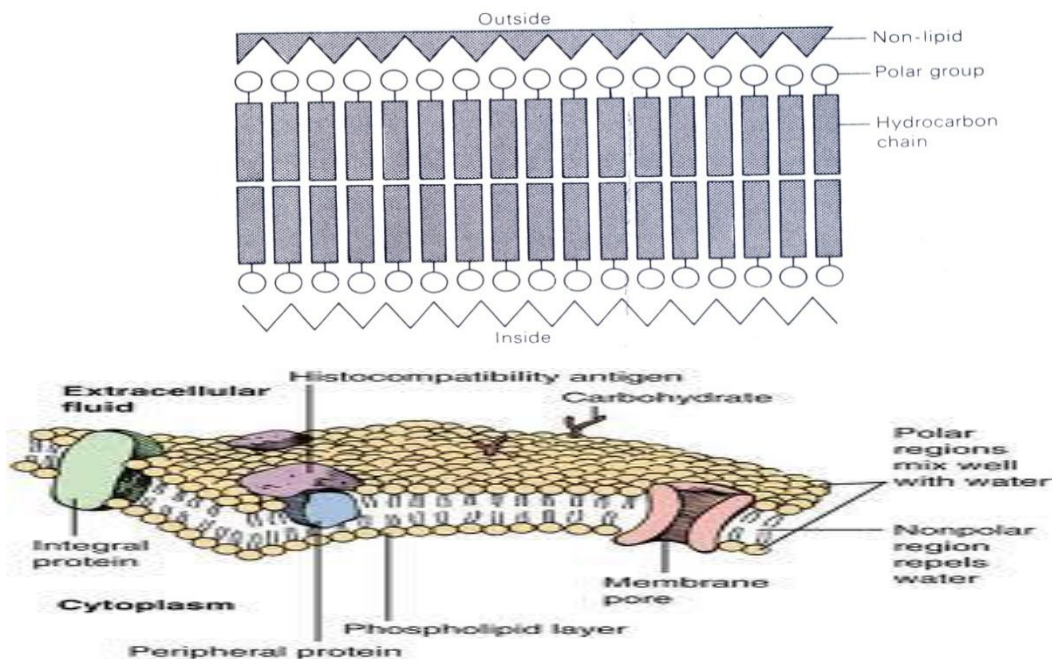
(15 M)

Illustrate with drawing the structure for each of :

1- Mature plant cell .



2- Plasma membrane model



Free diffusion through membrane .

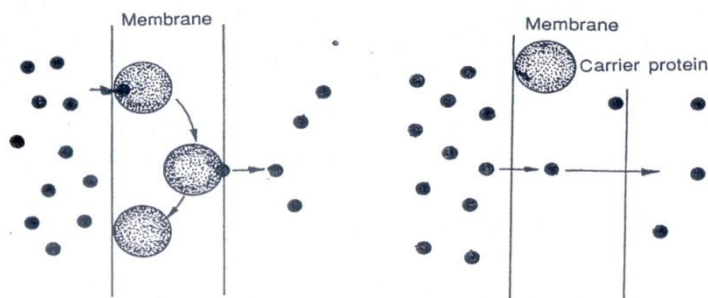


Fig. Facilitated diffusion.

Fig. Free diffusion.

3- Relationship between endoplasmic reticulum and golgi bodies in transfer of protein .

(7.5 M)

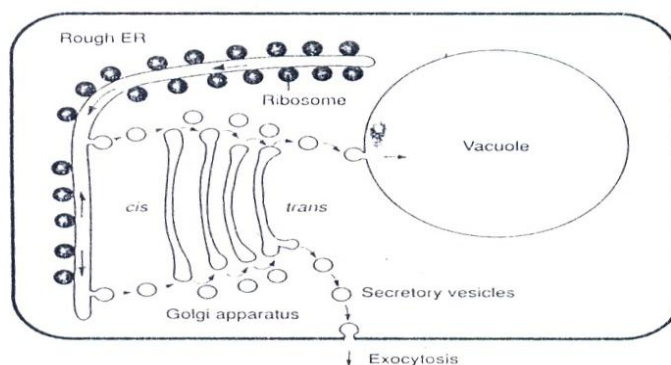


Figure 1.16 Scheme of the interplay between the endoplasmic reticulum and the Golgi apparatus in the transfer of proteins from the ER to the vacuoles and in the secretion of proteins from the cell.

Fourth question:

(15 M)

A- Mark (√) or (×) for each of the following :

(7.5 M)

- 1- Anthocyanin pigments and mineral crystals are found in the vacuoles . (√)
- 2- Cell cycle occurs commonly in prokaryotic cells . (×)
- 3- Glyoxysomes are surrounded by a double- membrane . (×)
- 4- The dark reaction of photosynthesis take place in stroma . (√)
- 5- Lysosomes are called power houses of the cell . (×)

B- Choose the right answer for each of the following :

(7.5 M)

- 1- Peroxisomes are associated with :
 a- Respiration **b- Photorespiration** c- Phosphorylation
- 2- Primary wall is mainly composed of :
 a- **Cellulose chains** b- Cutin c- Calcium pectates
- 3- The sites of protein synthesis of the cell occur in :
 a- Mitochondria **b- Ribosomes** c- Spherosomes
- 4- Conversion of fat into carbohydrate in plant cell occurs in :
 a- Lysosomes **b- Glyoxysomes** c- Peroxisomes
- 5- The protoplasm of adjacent plant cells are connected to each other by :
 a- **Plasmodesmata** b- Tonoplast c- Plastids

Good luck

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