

# YAKEEN NEET 2.0

**2026**

*Cell - The Unit of Life*

**Botany**

**Lecture - 06**

**Rupesh Chaudhary Sir**





## Topics to be covered

1

VACUOLE

2

MITOCHONDRIA

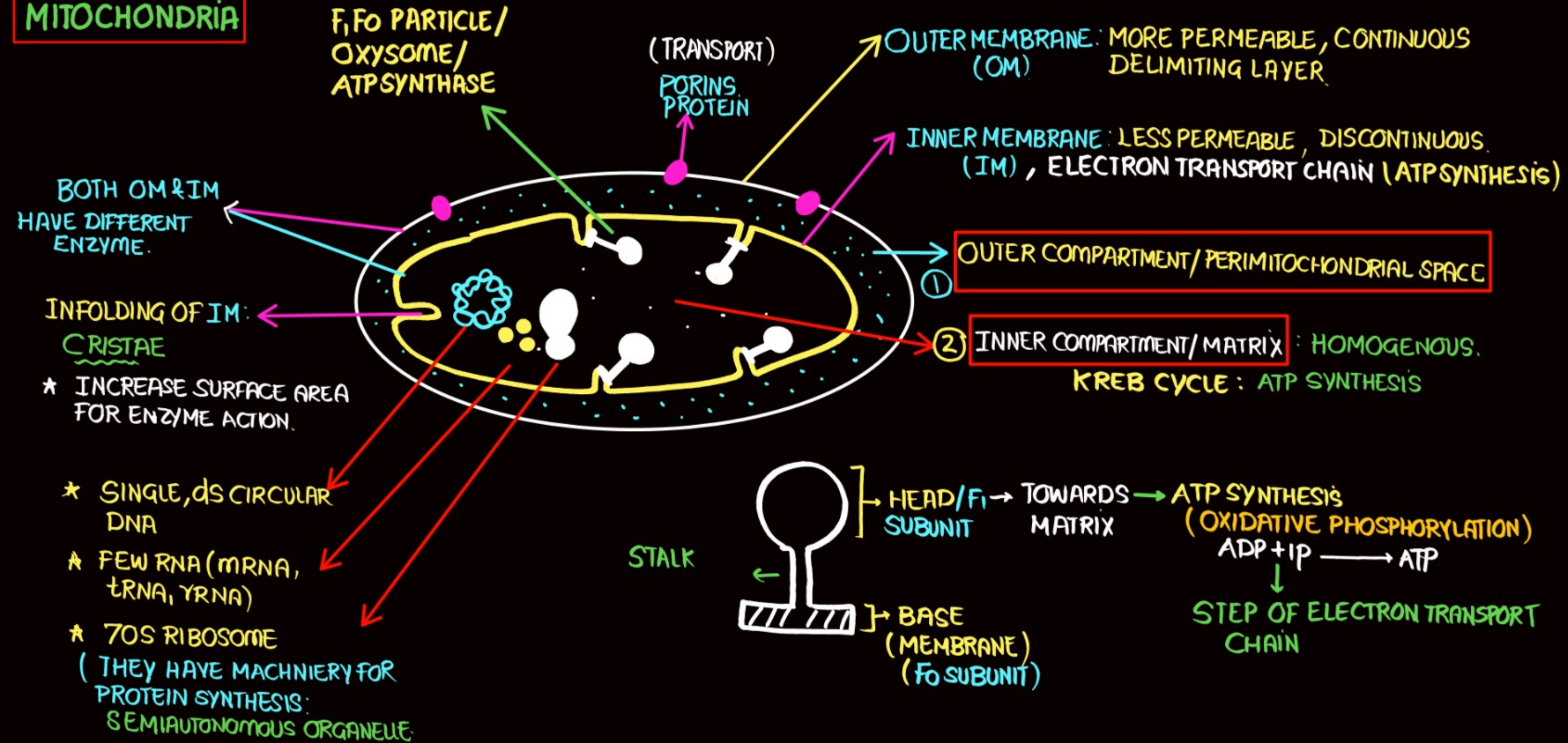
3

PLASTID

4



# MITOCHONDRIA



★ NOT EASY TO VISIBLE IN MICROSCOPE UNLESS STAIN WITH DYE. (JANUS GREEN)

★ SAUSAGE/CYUNDRICAL SHAPE

★ DIAMETER: 0.2 to 1.4  $\mu\text{m}$   
AVERAGE : 0.5  $\mu\text{m}$

★ LENGTH: 1  $\mu\text{m}$  to 4.1.

★ DIVIDE: FISSION

★ ATP FACTORY OF CELL / POWER HOUSE OF CELL

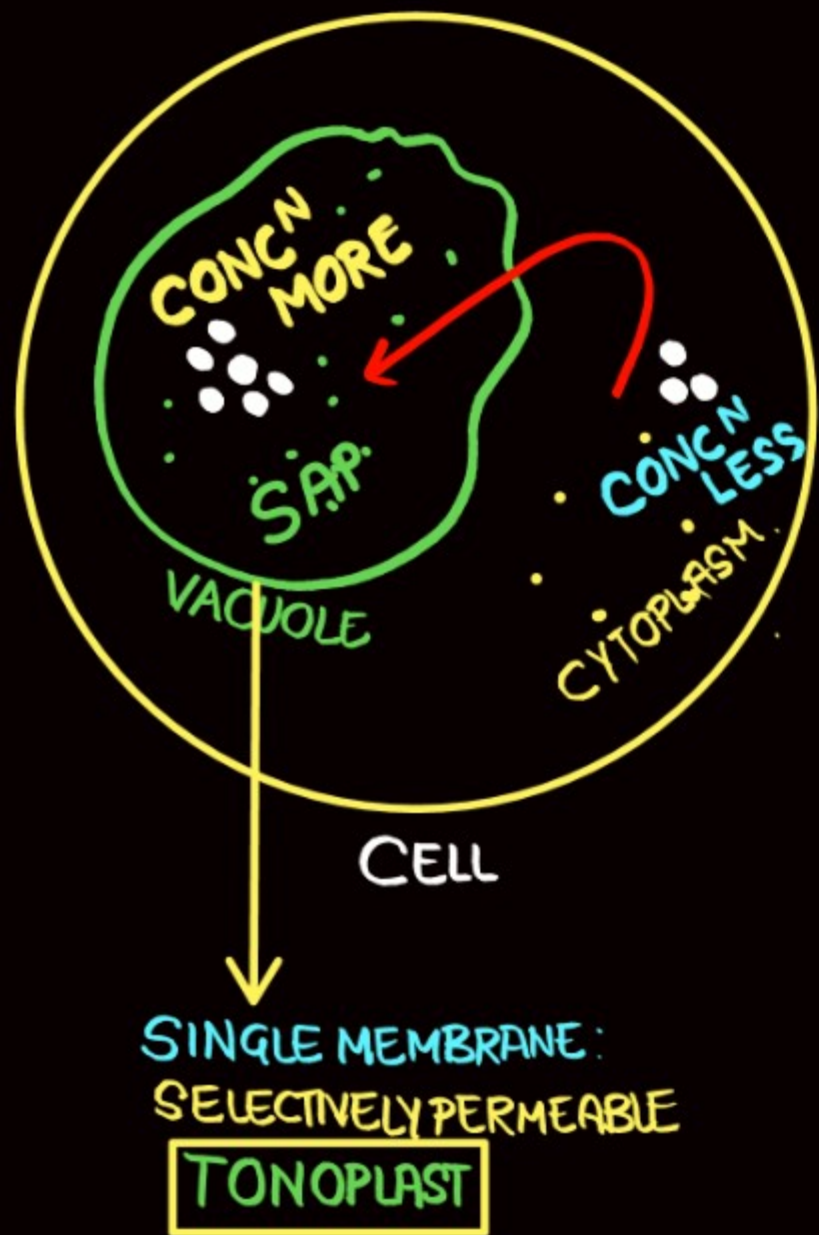
★ AEROBIC RESPIRATION (EUKARYOTE)

★ SHAPE, SIZE, NO: VARY.

★ DEPENDS: PHYSIOLOGY OF CELL / ORGANISM (WORK DONE BY CELL).



## VACUOLE



- ★ CYTOPLASM TO VACUOLE: MOVEMENT OF MOLECULE (LOW  $CON^N$  TO HIGH  $CON^N$ )
- ★ AGAINST THE CONCENTRATION GRADIENT
- ★ NEED ENERGY/ATP [ACTIVE TRANSPORT]
- ★ LIQUID/REGION IN VACUOLE: SAP  
 $H_2O$ , salt, protein, sugar, amino acid,  
Excretory substance / MATERIAL NOT NEED FOR CELL.
- ★ WATER SOLUBLE PIGMENT: ANTHOCYANIN (BLUE/YELLOW) EXTRA
- ★ MEMBRANE BOUND SPACE, OCCUPY 90% VOLUME IN PLANT CELL.

## CONTRACTILE VACUOLE

- ★ AMOEBA, PARAMECIUM.
- ★ OSMOREGULATION & EXCRETION.
- ★ EXPELLED OUT EXCESS  $H_2O$ .

## FOOD VACUOLE

- ★ PROTISTA
- 
- Diagram illustrating the formation of a food vacuole in a protist. It starts with a "FOOD CELL" and a "FOOD" particle. An arrow labeled "INVAGINATION OF MEMBRANE" shows the membrane folding to engulf the food. The final stage shows a "FOOD VACUOLE" containing the food particle.
- ★ ENGULFING OF FOOD MATERIAL.



# PLASTID

★ DOUBLE MEMBRANE ★ LARGE (VISIBLE IN MICROSCOPE) ★ PRESENT IN ALL PLANTS & EUGLENOID

**TYPES** → BASIS OF PIGMENTS: 3 TYPES

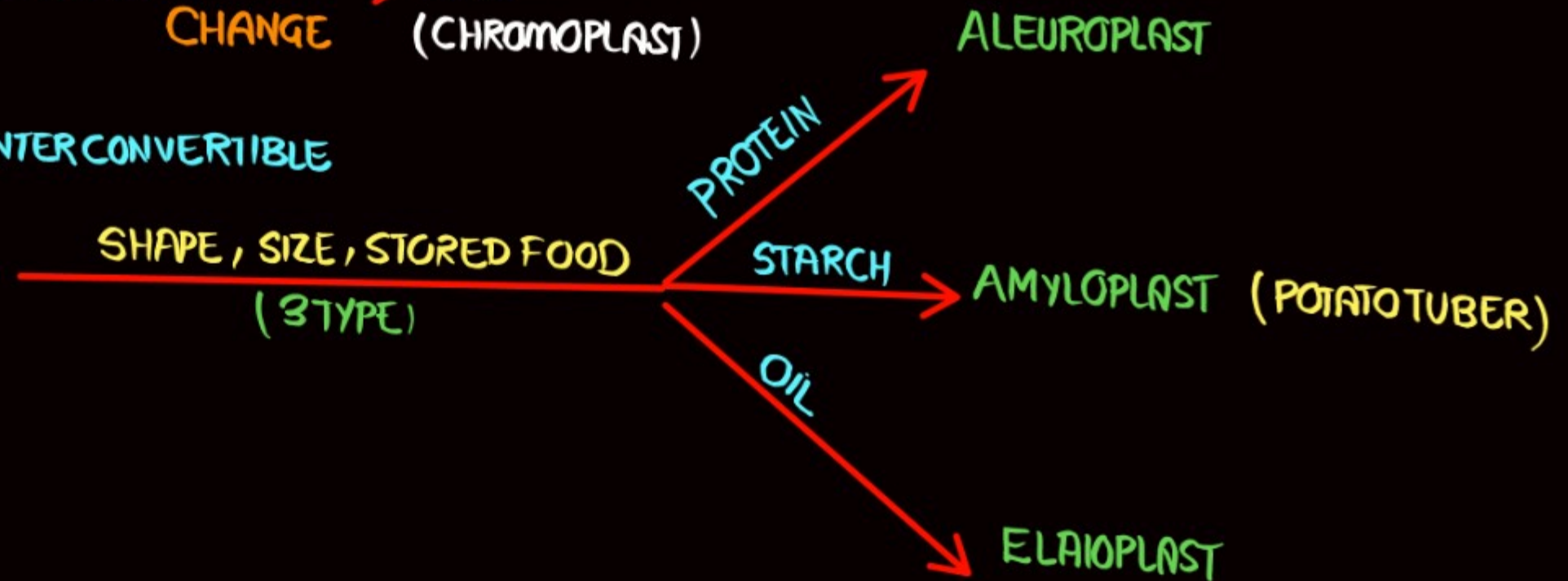
① CHLOROPLAST [CHLOROPHYLL, CAROTENE + XANTHOPHYLL] → CAROTENOIDS (FAT SOLUBLE PIGMENTS)  
(GREEN)

② CHROMOPLAST : RED COLOUR OF TOMATO (FRUIT), CARROT (ROOT) [CHLOROPHYLL ABSENT/REDUCED, BUT CAROTENOIDS PRESENT]  
(YELLOW/RED/ORANGE NOT GREEN)

NOTE : CHILIES, TOMATO (GREEN) CHLOROPLAST → RED (CHROMOPLAST)  
CHANGE

NOTE : PLASTIDS ARE INTERCONVERTIBLE

③ LEUCOPLAST : PIGMENTS ABSENT  
(COLOURLESS)



#### 8.5.3.4 Vacuoles

The vacuole is the membrane-bound space found in the cytoplasm. It contains water, sap, excretory product and other materials not useful for the cell. The vacuole is bound by a single membrane called tonoplast. In plant cells the vacuoles can occupy up to 90 per cent of the volume of the cell.

##### Vacuole

- ☒ (A) double membrane bound space in cytoplasm
- ☒ (B) It contain water, sap, excretory product
- ☒ (C) it's membrane is tonoplast which is ~~semipermeable~~
- ☒ (D) occupy 90% volume in ~~animal cell~~
- ☐ (E) all are incorrect



In plants, the tonoplast facilitates the transport of a number of ions and other materials against concentration gradients into the vacuole, hence their concentration is significantly higher in the vacuole than in the cytoplasm.

**Assertion (A):** material enter into vacuole from cytoplasm by active transport

**Reason (R):** material move against concentration gradient into vacuole

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is NOT the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.



In *Amoeba*, the contractile vacuole is important for osmoregulation and excretion. In many cells, as in protists, food vacuoles are formed by engulfing the food particles.

Correct

- (A) Contractile vacuole found only in amoeba
- (B) ~~contractile vacuole perform only excretion not osmoregulation~~
- ☒ (C) in Protista food vacuole present formed by engulfing food
- (D) none



### 8.5.4 Mitochondria

Mitochondria (sing.: mitochondrion), unless specifically stained, are not easily visible under the microscope. The number of mitochondria per cell is variable depending on the physiological activity of the cells. In terms of shape and size also, considerable degree of variability is observed. Typically it is sausage-shaped or cylindrical having a diameter of  $0.2-1.0\mu\text{m}$  (average  $0.5\mu\text{m}$ ) and length  $1.0-4.1\mu\text{m}$ .

#### Correct

- A. Mitochondria ~~not~~ visible even after staining
  - B. ✓ number of mitochondria is not constant
  - C. ✓ it's number depend upon physiology
  - D. shape, size is ~~constant~~ in mitochondria
  - E. ✓ it is sausage shape
  - F. ~~diameter 0.2 to 0.1 um length 1-4.1um~~
- (A) 1      (B) 2      ✓ (C) 3      ~~(D) 4~~

#### Mitochondria

- (A) single membrane organelle ~~X~~
- ~~(B)~~ energy currency of cell (ATP)
- ✓ (C) ATP factory of cell
- (D) both (B) & (C) are correct



Each mitochondrion is a double membrane-bound structure with the outer membrane and the inner membrane dividing its lumen distinctly into two aqueous compartments, i.e., the outer compartment and the inner compartment. The inner compartment is filled with a dense homogeneous substance called the matrix. The outer membrane forms the continuous limiting boundary of the organelle.

### Mitochondria (Incorrect)

- ☒ A. membrane divide its lumen into two compartment
- ☒ B. inner compartment filled with heterogenous substance matrix
- ☒ C. outer membrane is delimiting layer and discontinuous
- ☒ D. Inner membrane forms infolding called cisternae

(A) 1      (B) 2      ☒ (C) 3      (D) 4

### Correct

- ☒ (A) Cristae form away from matrix
- ☒ (B) cristae decrease surface area
- ☒ (C) inner membrane is discontinuous
- ☒ (D) all are incorrect



The inner membrane forms a number of infoldings called the cristae (sing.: crista) towards the matrix (Figure 8.7). The cristae increase the surface area. The two membranes have their own specific enzymes associated with the mitochondrial function. Mitochondria are the sites of aerobic respiration. They produce cellular energy in the form of ATP, hence they are called 'power houses' of the cell. The matrix also possesses single circular DNA molecule, a few RNA molecules, ribosomes (70S) and the components required for the synthesis of proteins. The mitochondria divide by fission.

### Incorrect

- (A) Two membrane do not have same enzyme
- (B) outer membrane is more permeable compare to inner membrane
- (C) outer membrane have porins ~~lipid~~
- (D) site of aerobic respiration

### Correct

- ~~A~~ matrix posses single circular ~~single~~ strand DNA
- ~~B~~ power house of cell as synthesis ~~lipid~~
- ~~C~~ also contain few RNA and 70 s Ribosomes
- ~~D~~ these component require for synthesis of ATP **PROTEIN**
- ~~E~~ mitochondria divide by fission

(A) 2      (B) 3      (C) 4      (D) 1



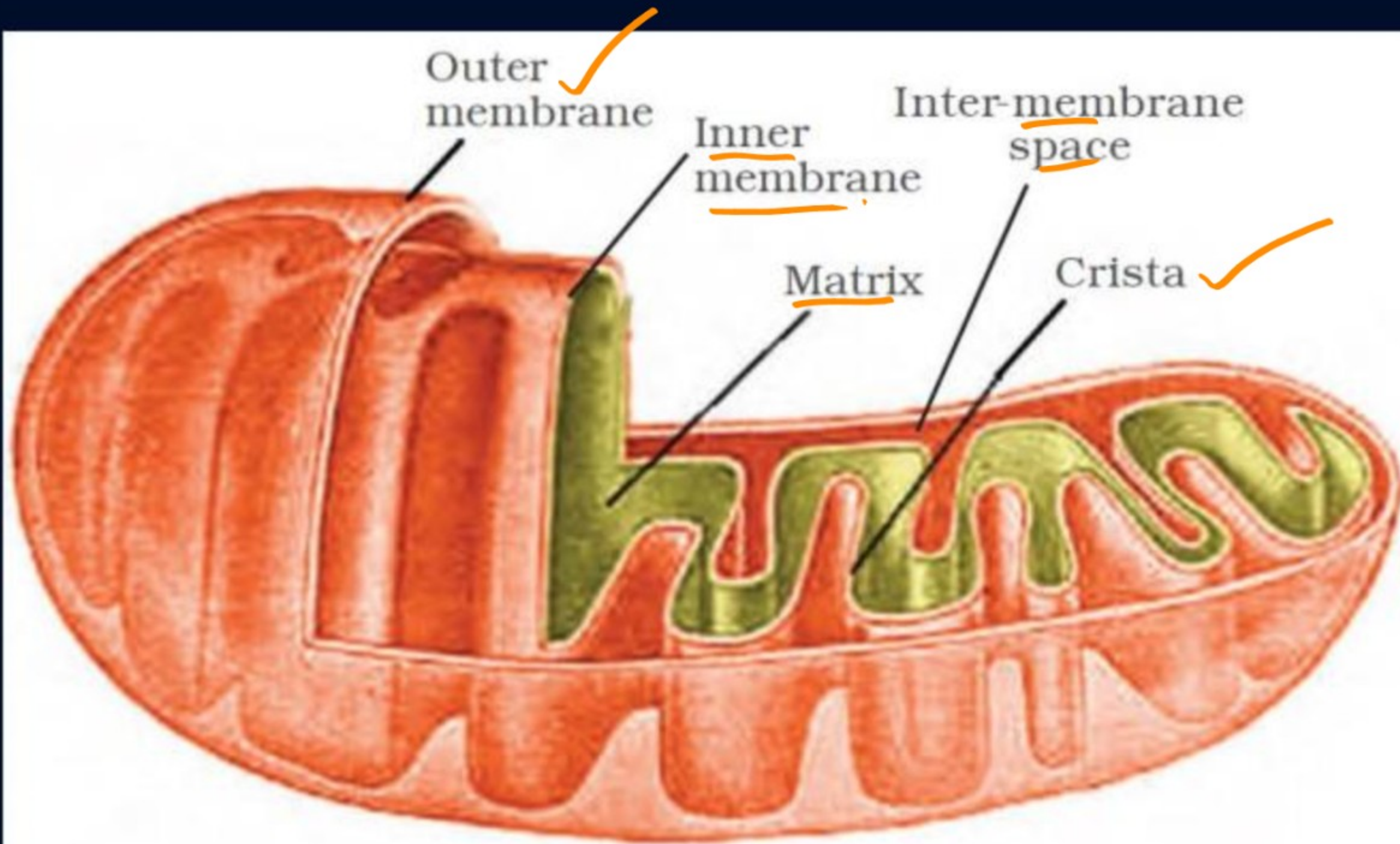


Figure 8.7 Structure of mitochondrion (Longitudinal section)



# Homework from **YAKEEN NEET 2.0 2026** Module



## REVISION PLANNER.

SAT: L-6 (<1) + L-5 & L-4 (20 minutes)

SUN: L-1 to L-3 (20 minutes)

MON: L-7 (<1) + L-6 (15 minute)

TUES: L-8 (<1) + L-7 (15 minute)

WED: L-1 to L-8 (TEST (INCORRECT) + NCERT BOOSTER

THUR:  $\longleftrightarrow$  RELAX.

FRID: L-8 & L-7 (15 MINUTE)

TIL  
= MITOCHONDRIA  
( PRARAMBH  
EXERCISE)

⇒ CHAPTER (COMP)

↓  
ALL PYQ  
DISCUSS

→ 475 QUESTION  
(LEVEL-3)



**THANK**  
**YOU**