

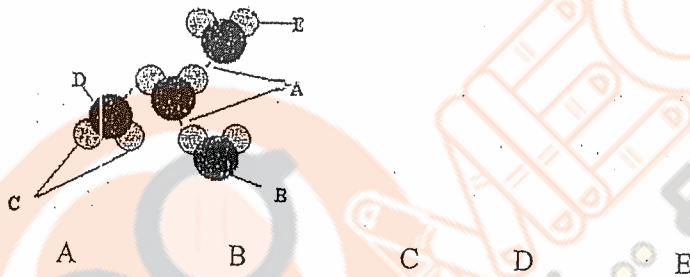
Name _____ Section _____ Reg.number _____

General Instructions: Answer all questions on the computerized answer sheet.
Shade the letter corresponding to the correct answer in pencil. Be sure to code in
your Reg. number correctly

Select the best answer

- 1) Which pair below is mismatched?
A. amino acid - protein B. glycerol - glycogen C. glucose - starch
D. unsaturated fatty acids - oil E. glucose amine - chitin

- 2) Which letter describes the hydrogen bonding between water molecules?



- 3) Based on the following cartoon the letter A represents which property of water?



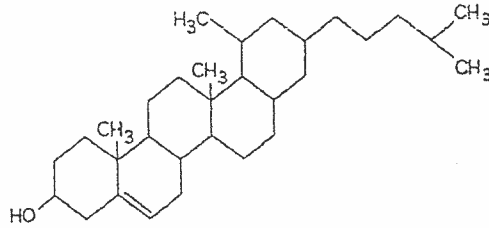
- a. surface tension b. adhesion c. polarity d. cohesion
e. none of the above
- 4) You learn the term hydration shell while studying which of the following water properties?
a. surface tension b. adhesion c. polarity d. cohesion
e. versatility as a solvent
- 5) The functional group of ketones is
a. COOH b. C=O c. SH d. OH e. NH₂
- 6) The unreactive group you learn about while studying the functional groups is
a. hydroxyl b. carbonyl c. phosphate d. methyl e. all of the above

عبد السلام العياشي
B.S.S
2012

غير متساوي

7. The molecule shown in the figure at right is a:

- A. cholesterol
- B. purine
- B. Fatty acid \times H + C
- C. phospholipid \times
- D. protein \times

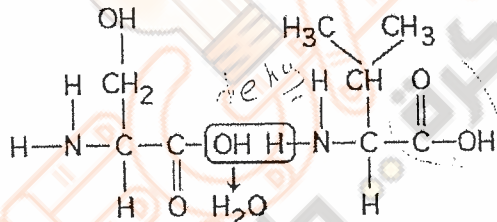


8. Which of the following is true of cellulose?

- A. composed of sucrose monomers
- B. a storage polysaccharide of plant cells
- C. has few unsaturated fatty acids
- D. a polymer of Beta glucose
- E. helical and branched molecule

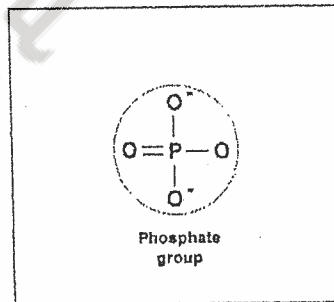
9. Which of the following is true of the chemical reaction shown below?

- A. It is a hydrolysis reaction
- B. It results in a peptide bond \times
- C. It joins two fatty acids together \times
- D. it make a polynucleotide chain \checkmark
- E. none of the above



protein
Amino acid + ...
(R)

10. The group shown is always present in
A. carbohydrates B. steroids C. proteins D. Nucleic acids E. C and D



11. R group interactions determine which level of protein structure?

- A. primary structure
- B. secondary structure
- C. tertiary structure
- D. quaternary structure
- E. none of the above

↑ polypeptide

A
T
C

12. Which of the following is not found in DNA?

- A. Uracil B. adenine C. guanine D. thymine E. cytosine

13. The stored form of sugar in humans is

- A. Glycogen B. lactose C. collagen D. Triacylglycerol E. amylase

14. The presence of disulfide bonds in proteins can contribute to the:
 A. primary structure B. secondary structure C. tertiary structure
 D. quaternary structure E. both C and D.

15. What type of reaction will form a bond between monomers to form a polymer?
 A. condensation B. reduction C. hydrolysis D. oxidation
 E. none of the above

Match compounds (16-18) with its class of macromolecules (A-E). Answers may be used more than once:

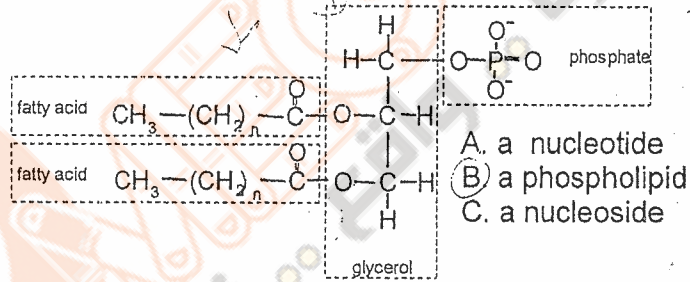
A. disaccharide B. lipid C. protein D. polysaccharide E. nucleic acid

16. albumin

17. corn oil

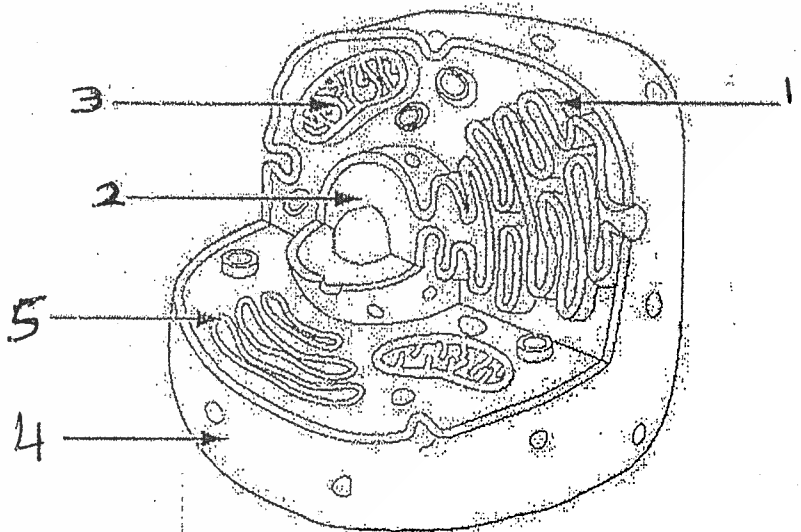
18. chitin

19. The molecule shown is



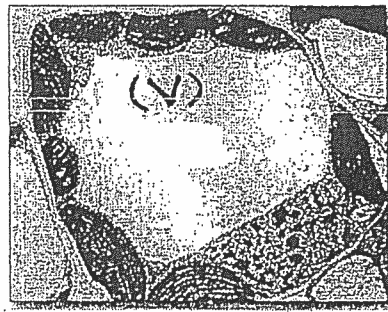
- D. amylopectin
 E. none of the above

20. Which of the following is only found in plant cells?
 A. Ribosome B. plasmodesmata C. Mitochondrion D. peroxisomes
 E. Rough endoplasmic reticulum



21. Which of the following cell parts shown in the figure contains DNA?
 A. 1&2 B. 2&3 C. 4&5 D. 3&4
 E. 1, 2 & 3

22. Which cell organelle in the figure shown is dynamic and polar?
 A. 1 B. 2 C. 3 D. 4 E. 5



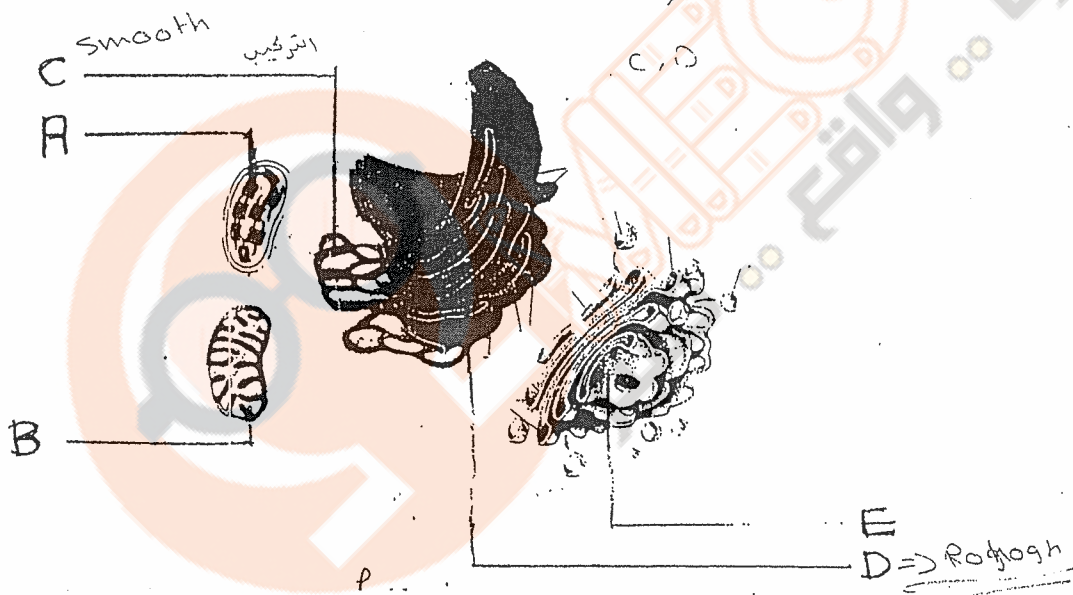
23. The organelle represented by the letter (V) in the figure
- A. is surrounded by a tonoplast
 - B. is part of the endomembrane system
 - C. controls plant cell growth
 - D. stores a variety of materials
 - E. all of the above

- * 24. Which of the following is not a component of the animal cell extracellular matrix? *
- A. Elastin
 - B. Collagen
 - C. Fibronectin
 - D. Proteoglycan
 - E. none of the above
- علون plant cell wall*

25. Which cell component is associated with amoeboid movement? *
- A. Microtubules
 - B. Microfilaments
 - C. Keratin filaments
 - D. Nuclear lamina
 - E. Collagen fibers

26. White blood cells engulf bacteria by a process called
- A. autophagy
 - B. phagocytosis
 - C. autolysis
 - D. denaturation
 - E. oxidation

27-29. Refer to the figure to answer questions 27-30



- * 27. Which organelle functions in detoxification of drugs? A, B, C, D, or E
- * 28. Which organelle is responsible for modification & shipping of secretory proteins? A, B, C, D, or E
29. Which organelle contains thylakoids? A, B, C, D, or E
30. Which organelle does not belong to the endomembrane system?
- A. Lysosome
 - B. Mitochondrion
 - C. Golgi apparatus
 - D. Central vacuole
 - E. Endoplasmic reticulum
31. Adjacent located animal cells communicate together through
- A. tight junctions
 - B. desmosomes
 - C. plasmodesma
 - D. gap junctions
 - E. direct contact of their plasma membranes
- gap*

32. All of the following are functions of plasma membrane proteins except:
 A. transport B. receptors C. signal transduction D. catalysis
 E. Anchor of chromosomes

33. The predominant type of molecules in plant plasma membrane is:
 A. fats B. steroids C. oils D. phospholipids
 E. triacylglycerides

34. Membrane potential is due to unequal distribution on both sides of:
 A. ions B. water molecules C. lipid molecules
 D. hydrophobic molecules E. uncharged molecules

35. Which of the following is not a typical component of the extracellular matrix of animal cells?
 A. Proteoglycans B. Collagen C. Fibronectin D. Pectin
 E. None of the above

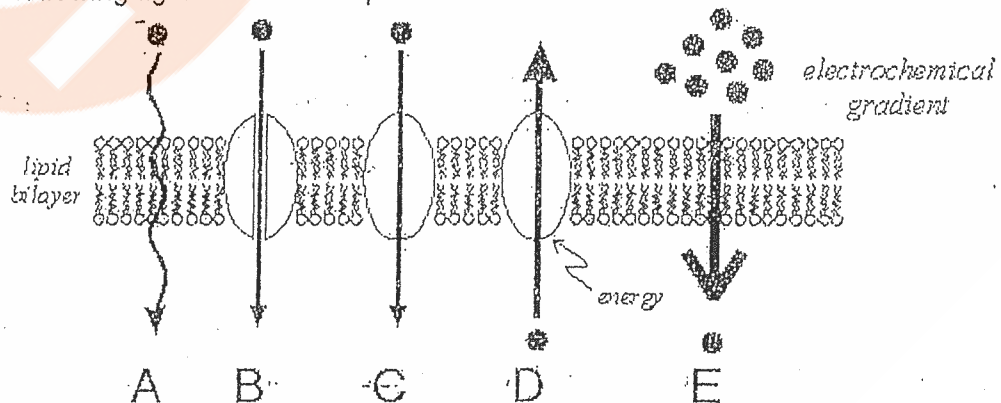
36. Red blood cells shrink and plant cells undergo plasmolysis when both are placed in:

- A. hypertonic solution
- B. isotonic solution
- C. hypotonic solution
- D. all of the above
- E. none of the above

37. Na^+/K^+ pumps:

- A. transport Na^+ down their concentration gradient
- B. transport K^+ down their concentration gradient
- C. transport K^+ and Na^+ through channel proteins
- D. are electrogenic
- E. all of the above

Refer to the following figure to answer question 38-40:

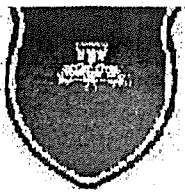


38. Which arrow indicates the direction of active transport of the molecules?
 A. B. C. D. E.

39. The process indicated by arrows "B" and "C" represents:
 A. simple diffusion B. osmosis C. facilitated diffusion D. exocytosis
 E. co-transport

40. Which of the following passes most easily through the lipid bilayer of a cell membrane?

- A. CO_2 B. K^+ C. Glucose D. Starch E. Proteins



Multiple Choice Questions: Choose the most appropriate answer and shade the letter corresponding to the correct answer on the computerized answer sheet.

1. Which of the following types of molecules are the major structural components of the animal cell membrane?

- A. phospholipids and cellulose B. nucleic acids and proteins (C) phospholipids and proteins
D. proteins and cellulose E. glycoproteins and chitin

Refer to the figure on the right to answer questions (2-4)

2. The primary function of component B is to

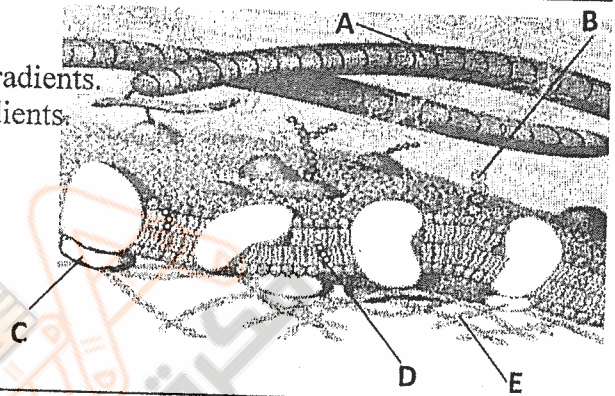
- A. facilitate diffusion of molecules down their concentration gradients.
B. actively transport molecules against their concentration gradients.
(C) maintain the fluid mosaic membrane.
D. maintain membrane fluidity at low temperatures.
E. mediate cell-to-cell recognition.

3. Which component is the peripheral protein?

- A B (C) D E

4. Which component is cholesterol?

- A B C (D) E



Refer to the following figure on the right to answer questions (5-6)

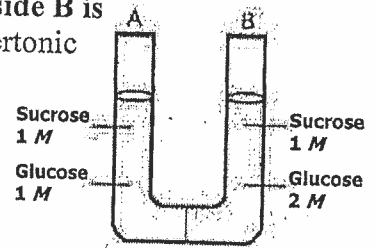
The solutions in the two arms of this U-tube are separated by a membrane that is permeable to water, glucose and sucrose.

5. Initially, in terms of tonicity, the solution in side A with respect to that in side B is

- A. hypotonic. B. plasmolyzed. C. isotonic. (D) saturated. E. hypertonic

6. After the system reaches equilibrium, what changes are observed?

- A. The concentration of sucrose and glucose are equal on both sides.
B. The concentration of glucose is higher in side A than in side B.
C. The water level is higher in side A than in side B.
D. The water level is higher in side B than in side A.
(E) Both A and D



7. Ions diffuse across membranes through specific ion channels

- A. down their chemical gradients. B. down their concentration gradients.
C. down their electrical gradients. (D) down their electrochemical gradients.
E. down the osmotic potential gradients

8. The sodium-potassium pump is called an electrogenic pump because it

- A. pumps equal quantities of Na⁺ and K⁺ across the membrane.
B. pumps hydrogen ions out of the cell.
(C) creates a voltage across membranes.
D. ionizes sodium and potassium atoms.
E. is used to transport sucrose and H⁺ against their concentration gradients.

9. Water passes quickly through cell membrane because

- (A) the bilayer is hydrophilic. B. it moves through hydrophobic channels.
(C) it is a small, polar, charged molecule. D. water movement is coupled to ATP hydrolysis.
E. it moves through aquaporins in the membrane.

10. Which of the following would likely move most rapidly through the lipid bilayer of a plasma membrane?

- A. CO₂ B. Amino acid C. Glucose (D) K⁺ E. Starch

11. Cellular breakdown of glucose into CO₂ and H₂O is described as

- A. catalysis B. catabolism C. anabolism D. dehydration (E) None of the above

30. β -oxidation

- A. is the second step in the oxidation of glucose.
- B. is a process used to oxidize fatty acids.
- C. is a process used to deaminate amino acids.
- D. is a process used to digest some polysaccharides.
- E. B and C

31. In electron transport, which respiratory complex is NOT involved in the flow of electrons from $FADH_2$?

- A. complex I
- B. complex II
- C. complex III
- D. complex IV
- E. all of the above

32. Which of the following molecules is NOT a carrier of electrons in the electron transport chain?

- A. flavoproteins
- B. copper-nickel compounds
- C. cytochromes
- D. iron-sulfur proteins
- E. coenzyme Q

33. Which of the following is NOT a product of alcohol fermentation of glucose?

- A. ATP
- B. CO_2
- C. ethanol
- D. NAD^+
- E. sucrose

34. The purpose of the alcohol fermentation process is the

- A. regeneration of NAD^+ .
- B. generation of additional energy in the form of ATP.
- C. production of inorganic compounds.
- D. only A and B.
- E. all of the above

35. Which of the following enzymes of glycolysis responds to citrate and ATP as inhibitors?

- A. Phosphofructokinase.
- B. Hexokinase.
- C. Pyruvate kinase.
- D. Enolase.
- E. Isomerase.

Refer to the figure on the right to answer question (36-38)

36. The letter A represents

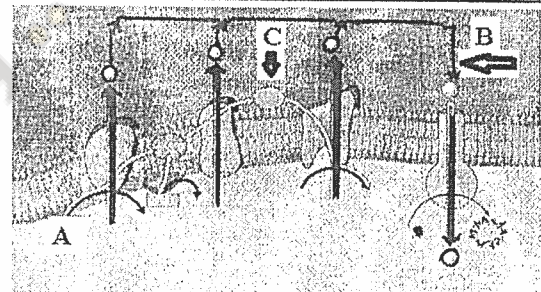
- A. $FADH_2$
- B. NAD^+
- C. FAD
- D. NADH
- E. ATP synthase

37. The letter B represents

- A. electrons flow
- B. protons flow
- C. Na^+ flow
- D. active transport
- E. B and C

38. The letter C represents

- A. Cyt b
- B. Cyt c
- C. ubiquinone
- D. Cyt a3
- E. ATP synthase



39. Plants are

- A. photoautotrophs.
- B. heterotrophs.
- C. decomposers.
- D. any of the above.
- E. none of the above

40. In photosynthesis, the light energy is converted to chemical energy in the form of

- A. $NADP^+$
- B. NADPH
- C. ADP
- D. ATP
- E. both B and D

41. Which wavelength of light is/are most effective in driving photosynthesis?

- A. Violet-blue
- B. Green
- C. Red
- D. All of the above
- E. Both A and C

42. Carotenoids

- A. are accessory pigments
- B. function in photoprotection
- C. absorb violet-blue light
- D. are components of light harvesting complexes of a photosystem
- E. all of the above

43. Chlorophyll *a* is anchored in the thylakoid membrane through

- A. the porphyrin ring
- B. Mg^{++}
- C. the hydrocarbon tail
- D. the CH_3 group
- E. all of the above

44. The cyclic electron flow of the light reaction includes all of the following EXCEPT

- A. photosystem I
- B. ferredoxin (Fd)
- C. plastocyanin (Pc)
- D. cytochrome complex
- E. $NADP^+$ reductase

45. Which of the following translocates H^+ from stroma to the thylakoid space?

- A. Cytochrome complex
- B. Plastocyanin (Pc)
- C. Plastoquinone (Pq)
- D. Ferredoxin (Fd)
- E. $NADP^+$ reductase

46. Transport of H^+ from the thylakoid space to stroma results insynthesis.

- A. CO_2
- B. ATP
- C. ADP
- D. $NADP^+$
- E. Sucrose

Name Amal Rashed Reg. number _____

General Instructions: Answer all questions on the computerized answer sheet. *Shade the letter* corresponding to the correct answer in *pencil*. Be sure to code in your Reg. number *correctly*

1. In the graph shown the chemical reaction

A → B

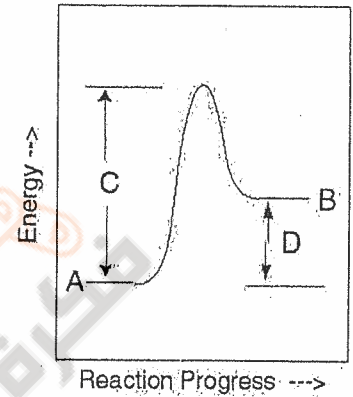
A. is exergonic

B. has positive ΔG

C. has negative ΔG

D. is a spontaneous reaction

E. A & C



2. Competitive inhibitors stop an enzyme from working by;

A. changing the shape of the enzyme

B. binding with the substrate

C. blocking the active site of the enzyme

D. modifying the product of the reaction

E. A & C

3. If an enzyme requires Fe^{2+} for its activity in a reaction. The Fe^{2+} is best identified as a (n):

A. coenzyme

B. cofactor

C. substrate

D. product

E. inhibitor

4. Hydrolysis of ATP results in a release of free energy of:

A. 7.3 Kcal/mole

B. 1.2 Kcal/mole

C. 168 Kcal/mole

D. 180 Kcal/mole

E. 20.5 Kcal/mole

5. Which of the following figures illustrates the activity curve for an enzyme with a pH 6 optimum?

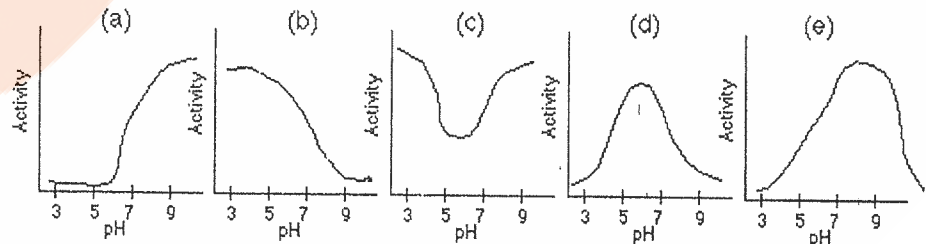
A. a

B. b

C. c

D. d

E. e



6. Which of the following is **false** about enzymatic reactions?

A. enzymes can be used repeatedly.

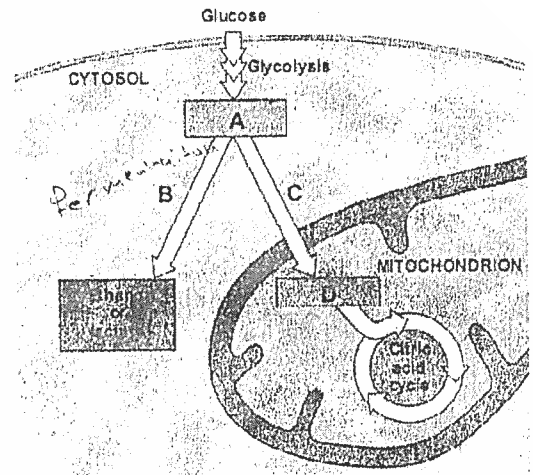
B. each enzyme catalyzes a specific reaction.

C. substrates temporarily bind to the active site of enzymes.

D. the E_A required for a reaction is increased by the presence of enzymes

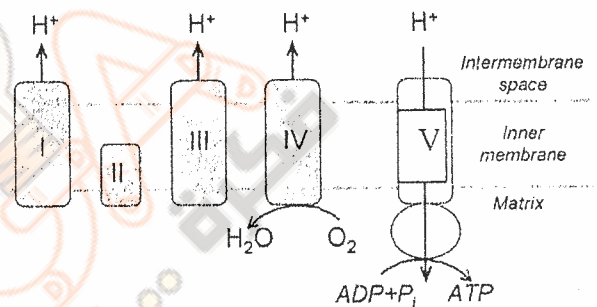
E. All except D

Use the figure to answer questions 15 and 16.



15. The letter A in the figure represents
- citrate
 - pyruvate
 - acetyl CoA
 - Oxaloacetate
 - NADH
16. The process represented by the letter B
- produces oxygen. ✗
 - produces ATP ✓
 - consumes NADH ✗
 - produces NADPH
 - only A and D ✗

Use the figure to answer questions 17-20



17. NADH feeds its electrons to complex
- I
 - II
 - III
 - IV
 - V
18. Which complexes have cytochrome c?
- I
 - II
 - III
 - IV
 - V

19. From 2 pyruvate molecules entering the mitochondrial matrix, how many ATP molecules will be produced through this pathway (shown above)?
- 22
 - 28
 - 30
 - 24
 - none of these

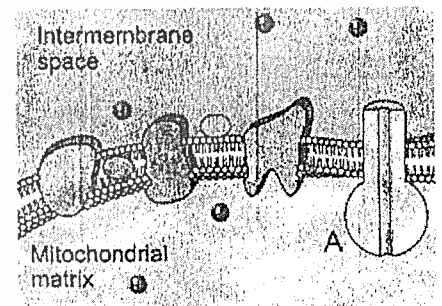
32 34

20. Which of the following changes is most likely to occur when electrons flow along this pathway from NADH to O₂?
- the pH of the matrix increases.
 - ATP synthase complex pumps H⁺ from the matrix to the intermembrane space
 - NAD⁺ is reduced.
 - H₂O is oxidized
 - ATP is consumed

21. A key enzyme that regulates glycolysis is
- hexokinase
 - phosphofructokinase
 - aldolase
 - pyruvate kinase

C. dehydrogenase

22. In the figure shown, which is true for structure A?
- multisubunit protein complex
 - found in mitochondria and chloroplasts
 - responsible for chemiosmosis
 - synthesize ATP
 - all of the above



اعداد طلبة العلم الحياتية 2012
عزرا حسان

32. Each NADH that enters the mitochondrial electron transport system gives rise to _____ ATP.
 A. 2 B. 3 C. 24 D. 36 E. 38

33. What does non-cyclic (linear) electron flow provide for the Calvin cycle?
 A. ATP and FADH₂ B. NADPH C. ATP and NADPH D. Oxygen E. water

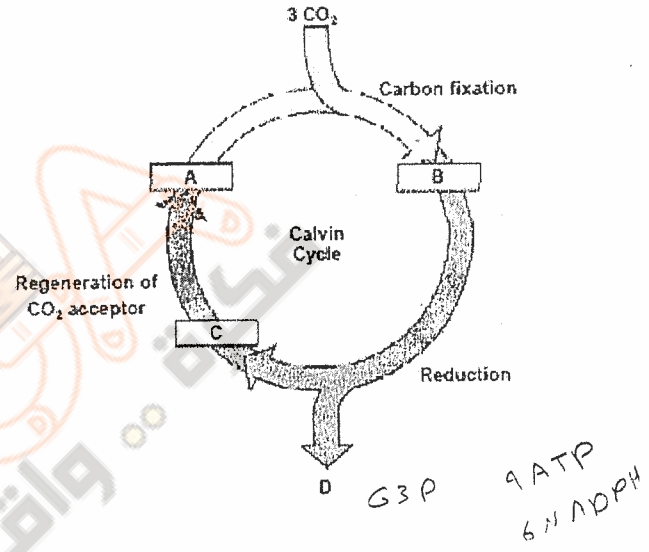
34. Which is not found in thylakoid membranes?
 A. Photosynthetic pigments B. Electron transport chains
 C. ATP synthase D. RubisCo E. NADP⁺ reductase

Use the figure to answer questions 35 and 36.

35. Molecule A shown in the figure is
 A. Ribulose biphosphate (RuBP)
 B. G3P
 C. Fructose -6- phosphate
 D. 1, 3 biphosphoglycerate
 E. 3- phosphoglycerate

36. The energy needed for the net synthesis of one molecule of the compound represented by the letter D is:

- A. 18 ATP+ 12 NADPH B. 12 ATP+ 6 NADPH
 C. 9 ATP+ 6 NADPH D. 6 ATP+ 6 NADPH
 E. 6 ATP+ 9 NADPH



37. When chloroplast pigments absorb light, _____.
 A. they gain electrons B. their electrons become excited
 C. they lose energy D. their photons become excited E. all of these

Refer to the figure to answer questions 38-40

38. The primary electron acceptor is represented by the letter:

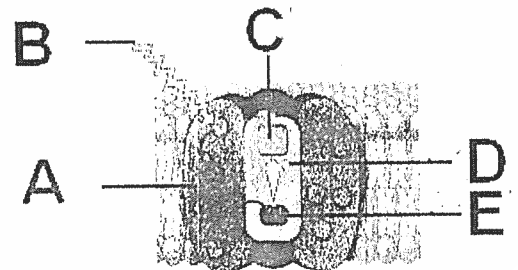
- A. B. C. D. E.

39. The light harvesting complex is represented by the letter:

- A. B. C. D. E.

40. The letter E in the figure represents

- A. a dimer of special chlorophyll a molecules
 B. a dimer of special chlorophyll b molecules
 C. a pair of plastoquinon molecules
 D. an antenna molecule in the LHC (light harvesting complex)
 E. a pair of plastocyanin molecule



تعلیم فلیس اکر یولہ عالمہ دلیس احو علم کن ہو جاہل

48. Rubisco functions in
- A. the light reaction of photosynthesis
 - B. Photophosphorylation
 - C. RuBP regeneration reactions
 - D. Carbon fixation**
 - E. NADPH oxidation

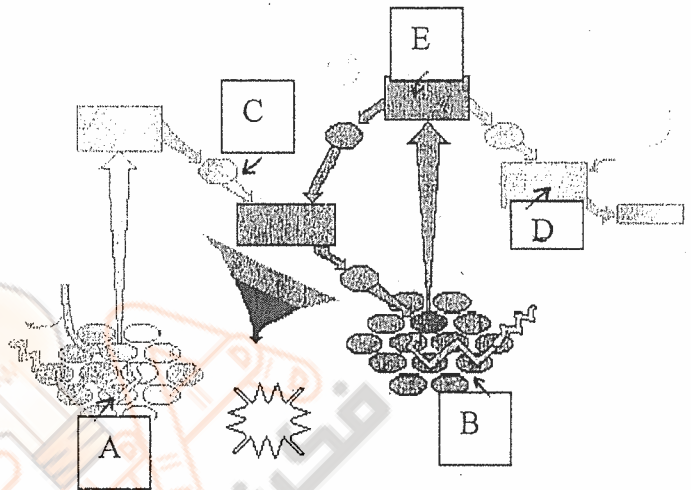
Use the figure to answer questions 49 and 50

49. Which letter represents PSI ?

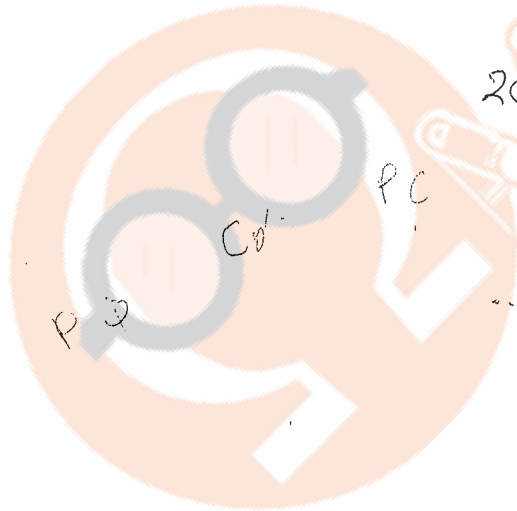
- A **B** C D E

50. Plastoquinone (PQ) is represented by the letter

- A B **C** D E



الامتحان العام للبيولوجيا 2012
عبد الرحمن



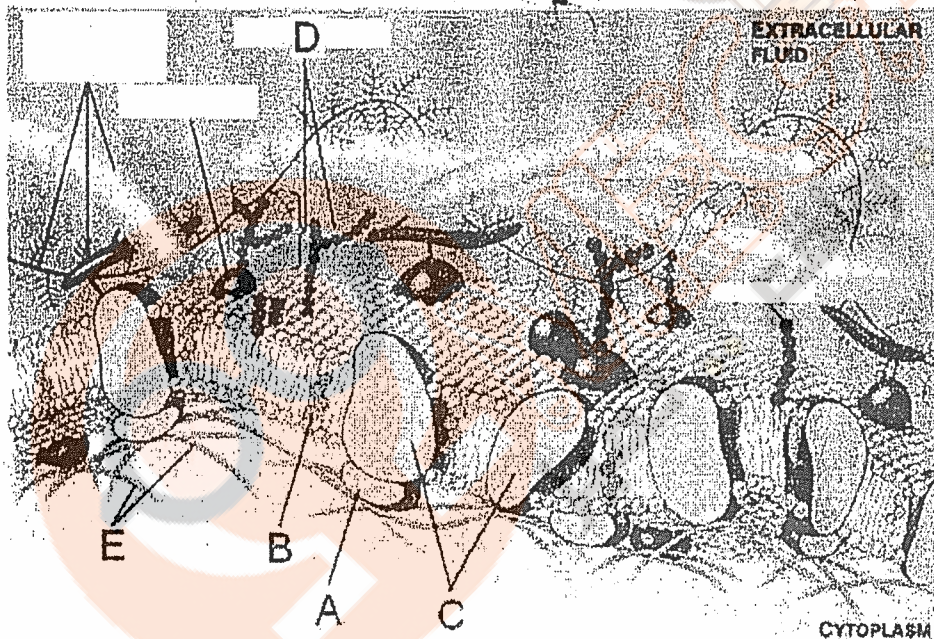
Name ~~.....~~ Lecture Section No. Registration No.

Instructions: Fill out the information on the answer sheet: Use pencil to write your name, registration number, and lecture section number.

The exam has multiple choice questions. Select the correct answer in each question and shade the corresponding letter on the answer sheet.

- Glucose is taken up by red blood cells by a mechanism called
 - Simple diffusion
 - facilitated diffusion
 - active transport
 - cotransport
 - pinocytosis
- All of the following are functions of membrane proteins, EXCEPT
 - Enzyme activity
 - RNA production
 - Facilitated diffusion
 - Intercellular joining
 - Hormone receptor

Use the following figure to answer questions 3-5.



- Which of the following labeled structures represent(s) integral membrane protein(s)?
 - A.
 - B.
 - C.
 - D.
 - E.
- Which lipid molecule is not a phospholipid?
 - A.
 - B.
 - C.
 - D.
 - E.
- The hydrophilic structures which play a major role in cell-cell recognition are represented in:
 - A.
 - B.
 - C.
 - D.
 - E.
- In which solution plant cells are turgid?
 - A. Isotonic
 - B. Hypertonic
 - C. Hypotonic
 - D. Dead sea water
 - E. Non of the above
- The physiological saline is equivalent to 0.9% NaCl solution. Red blood cells will shrink in
 - distilled water
 - B. 0.9 % NaCl
 - C. 0.1% NaCl
 - D. 9% NaCl
 - E. none of the above

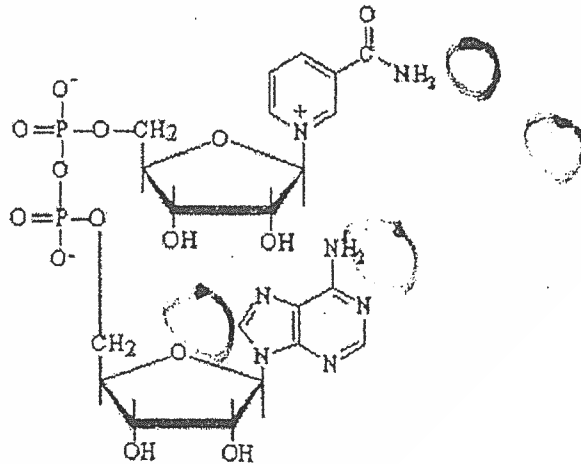
Handwritten notes in Arabic: "مادة الخلية النباتية" (Plant Cell Material) and "B.S.S." (Biology Student Society).

Handwritten notes: "Hypotonic", "shrink", "Hypertonic", "Hyper", and "Hypotonic".

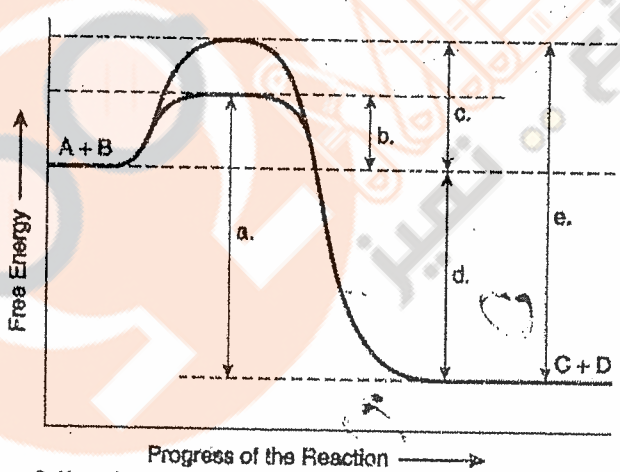
8. In certain type of cells, passage of large amount of water is facilitated (made easy) through the
 A. membrane lipid bilayer **B. membrane aquaporins**
 C. active transport system D. cotransporter Na^+ ion E. cotransporter H^+
9. Contractile vacuoles in *Paramecium*
 A. pump excess water outside the cell
 B. help *Paramecium* live in fresh water
 C. are involved in phagocytosis D. are involved in endocytosis
E. A & B are correct
10. The sodium-potassium pump is an example of:
A. active transport B. endocytosis C. exocytosis
 D. facilitated transport E. phagocytosis
11. The process of engulfing a solid substance by a cell is:
A. Phagocytosis B. Exocytosis C. Pinocytosis
 D. Receptor mediated endocytosis E. Plasmolysis
12. Chloride ions move down their electrochemical gradient by
 A. passive transport **B. active transport** C. osmosis
 D. exocytosis E. endocytosis
13. Large soluble molecules enter cells by
 A. phagocytosis B. active transport C. endocytosis **D. pinocytosis**
 E. cotransport
14. Sodium- potassium pump in a cell
 A. transports three sodium ions from outside into inside
 B. transports two potassium ions from inside into outside
 C. Uses one molecule of ATP per sodium ion transported
D. is an electrogenic pump.
 E. transports chloride ions in and out of the cell.
15. LDL-cholesterol complex in blood is transported into body cells by
A. receptor mediated endocytosis B. simple diffusion
 C. active transport D. facilitated transport E. cotransport with Na^+ .
16. A proton pump is an example of
 A. Facilitated transport B. Active transport C. Electrogenic pump
 D. Cotransport system **E. B & C.**
17. Plant cells take up sucrose by the mechanism of
A. Simple diffusion B. Facilitated transport C. Pinocytosis
D. Cotransport with H^+ E. Cotransport with Na^+ .

18. The molecule to the right is:

- A. ATP
 B. ADP
 C. NADP
D. NAD^+
 E. NADH



19. In a reaction, if the total energy stored in the products is greater than the total energy stored in the reactants, the reaction is described as;
 A. Entropic **B. Endergonic** C. Exergonic
 D. Activation E. Thermogenic
20. Most enzymes are/have
 A. Named after the reaction they catalyze and the name ends in *ase*
 B. pH and temperature dependent. C. Specific
 D. Active site **E. All of the above**
21. A chemical reaction that transfers phosphate group from phosphoenolpyruvate to ADP is described as
A. Substrate-level phosphorylation. B. Enzymes-coupled reaction
 C. Oxidative phosphorylation D. Photophosphorylation
 E. Oxidation - Reduction
22. If an enzyme is inhibited by competitive molecule, then
 A. ΔG of the reaction would be negative.
B. The active site of the enzyme would be occupied by the inhibitor.
 C. The inhibitor would bind to any site in the enzyme
 D. Substrate concentration at saturation level would not affect inhibition.
 E. all of the above
23. Coupling of the exergonic reaction to an endergonic reaction is:
 A. Feedback regulation B. Entropy **C. Energy coupling**
 D. Bioenergetics E. Cooperativity
- Questions 24 and 26 are based on the reaction $A + B \rightarrow C + D$ shown in the figure



24. Which of the following represents the activation energy required for the enzyme-catalyzed reaction?
 A. a **B. b** C. c D. d E. e
25. Which represents the free energy for the noncatalyzed reaction?
 A. a B. b C. c **D. d** E. e
26. The reaction above as described is:
 A. Endergonic **B. Exergonic** C. At equilibrium D. B & C E. A & C
27. A pathway consists of the reactions $A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F$
 The end product F inhibits the enzyme which converts A to B. The inhibition is:
 A. Feedback inhibition B. Reversible **C. A & B**
 D. Irreversible E. Competitive
28. The name of the enzyme in the reaction,
 $\text{Fructose 6-phosphate} + \text{ATP} \rightarrow \text{Fructose 1,6 bisphosphate} + \text{ADP}$, is:
 A. Adenosine triphosphatase B. ADP kinase C. ATP synthase
D. Phosphofructokinase E. Fructose 6-phosphatase

29. In glycolysis

- A. Oxygen is needed & CO₂ is not produced
- B. Oxygen is not needed & CO₂ is not produced
- C. Water is not produced
- D. (A & C)
- E. (B & C)

30. The junction reaction between glycolysis and Krebs cycle (it is not in glycolysis and is not in the cycle) involves the production of:

- A. O₂, NADH and pyruvate.
- B. CO₂, NADH and pyruvate.
- C. O₂, NADH and acetyl~ CoA.
- D. CO₂, NADH and acetyl~ CoA.
- E. NADH and acetyl~ CoA only.

31. The cyclic sequential reactions that convert acetyl~ CoA to CO₂ and H₂O in mitochondria are known as:

- A. Krebs' cycle
- B. Calvin cycle
- C. Citric acid cycle
- D. (A & B)
- E. (A & C)

32. What is/are not correct about the cycle in question 31?

- A. ATP & CO₂ are produced
- B. Oxaloacetate is regenerated
- C. Citric acid is regenerated
- D. It occurs in mitochondrial matrix
- E. None of the above

33. The net production of NADH, FADH₂, & ATP by the cycle in question 31 based on one glucose molecule is:

- A. 3NADH + 1FADH₂ + 1ATP
- B. 6NADH + 2FADH₂ + 2ATP
- C. 3FADH₂ + 1NADH + 1ATP
- D. 6FADH₂ + 2NADH + 2ATP
- E. 6NADPH + 2FADH₂ + 2ATP

Handwritten notes for Q33:
 6 ← 3NADH
 2 ← 1FADH₂
 2 ← 1ATP
 6 ← 3CO₂
) X2

34. Which of the following is true about the electron transport chain?

- A. The heme of the cytochromes has Fe that accepts then donates electrons.
- B. At the end of the chain, 4 electrons combine with 2H₂ & O₂ to form 2H₂O
- C. The molecules of the chain give their energy to form ATP
- D. ATP is produced by the electron carriers
- E. (A & C) only

35. Which of the following pair of phrases are mismatched?

- A. Transmembrane proton gradient : proton motive force
- B. ATP synthase : Innermitochondrial membrane
- C. Chemiosmosis : Substrate-level phosphorylation
- D. Only A & B
- E. Only B & C

36. In an anaerobic glycolysis as in skeletal muscle cells, the products are:

- A. Lactate
- B. 2ATP
- C. (A & B)
- D. Pyruvate
- E. Conversion of pyruvate to ethanol

37. In yeast, anaerobic glycolysis yields (gives)

- A. Acetaldehyde
- B. Acetyl~CoA
- C. Ethanol
- D. CO₂
- E. (C&D)

38. Phosphofructokinase (PFK in glycolysis) is:

- A. Present in the cytosol
- B. An allosteric enzyme
- C. inhibited by citrate
- D. inhibited by ATP
- E. all of the above

39. Fats (Fs) are catabolized through, which sequence?

- A. Fs → glycerol → acetyl~CoA → glyceraldehyde 3-P (G-3-P) → pyruvate
- B. Fs → fatty acids → acetyl~CoA → citric acid cycle
- C. Fs → fatty acids → glycerol → G-3-P → pyruvate
- D. Fs → pyruvate → glycerol → acetyl~CoA → citric acid cycle
- E. Fs → pyruvate → G-3-P → acetyl~CoA → citric acid cycle

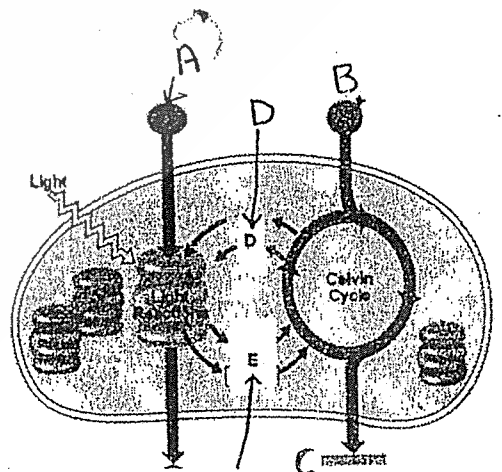
Use the figure to answer questions 40-41

40. Which letter represents ATP and NADPH

- A, B, C, D, or E

41. Which letter represents CO₂ molecule?

- A, B, C, D, or E?



42. In photosynthesis, oxygen is released as a result of
 A. Reduction of NADP^+ B. Splitting H_2O C. Chemiosmosis
 D. Splitting the CO_2 E. Oxidation of chlorophyll a
43. Photosynthesis utilizes
 A. The entire electromagnetic (light) spectra B. Only blue & red light
 C. Gamma rays D. Radio & microwaves E. All of the above
44. The light-dependent reactions take place in the
 A. stroma B. thylakoids C. cytosol D. cristae E. matrix
45. The electrons lost from the reaction center of photosystem I are replaced by electrons coming directly from
 A. ATP B. CO_2 C. H_2O
 D. plastocyanin E. plastoquinone
46. CO_2 fixation occurs when CO_2 is combined with
 A. Ribulose 1,5-bisphosphate B. Ribose 1,5-bisphosphate
 C. Glyceraldehyde 3-P D. NADP D. C3-sugar E. C4-sugar
47. Photophosphorylation differs from oxidative phosphorylation in that
 A. ATP synthesis is driven by a proton flow into ATP synthase
 B. the final electron acceptor is NADP^+ and not oxygen.
 C. it involves an electron transport chain.
 D. energy is stored in the form of a proton gradient.
 E. enzymes involved are membrane-bound
48. In C3 plants, photosynthesis does not require
 A. Chlorophylls B. Light C. O_2 D. CO_2 E. H_2O
49. In photosynthesis, production of ATP by chemiosmotic mechanism
 A. is analogous to the production of ATP in mitochondria.
 B. requires the input of NADPH. C. is done by the Calvin cycle.
 D. All of the choices are correct. E. requires oxygen
50. Photophosphorylation differs from oxidative phosphorylation in that
 A. regeneration of ATP is driven by a flow of protons through an ATP synthase.
 B. the final electron acceptor is NADP^+ and not oxygen.
 C. it involves an electron transport chain.
 D. energy is stored in the form of a proton gradient.
 E. enzymes involved are membrane-bound

2012

انجمن طالبات العلوم الحياتية

عبد الرحمن بن عبد الله

B.S.S

أساء الحبال

Dept. Of biological Sciences
University of Jordan
18.12.06

General Biology 304101
Mid-term exam

2012

Name _____ Reg.#: 6066185

Name of Lecturer _____ Lecture seat#: _____

Select the best answer. Transfer the letter corresponding to the correct answer to your answer sheet.

1. Exergonic reaction occurs spontaneously with

- A. $\Delta G > 0$ B. $\Delta G < 0$ C. $\Delta G = 0$ D. no change in free energy
E. none of the above

2. ATP powers cellular work when

- A. hydrolyzed B. synthesized C. loses phosphate groups
 D. A and C E. none of the above

3. Enzymes catalyze reactions by

- A. lowering energy of activation (E_A)
B. increasing amount of heat required to begin the reaction
C. allowing reactants to reach transition state faster
D. all of the above
 E. A and C

4. Aquaporins:

- A. are active transport proteins B. transport water against concentration gradient
C. found only in plant cells D. are a type of facilitated transport channels
E. none of the above is correct

5. The region of the enzyme which binds a substrate is called

- A. allosteric site B. the N-terminus C. the C-terminus D. active site E. all of these

6. Transferring energy of exergonic reaction to an endergonic reaction is called

- A. cooperativity B. feed-back regulation C. allosteric regulation
 D. energy coupling E. symbiosis

7. Which enzyme controls glycolysis via allosteric regulation by AMP /ATP/ citrate levels?

- A. phosphohexose isomerase B. phosphofructokinase C. enolase
D. isomerase E. aldolase

8. An organic molecule that act as a helper of enzymes is called

- A. cofactor B. coenzyme C. co-regulator D. activator E. none of the above

9. The process in which the end product of a metabolic pathway inhibits enzyme acting in the beginning of the pathway is called

- A. allosteric regulation B. feed back inhibition C. positive regulation
D. cooperative binding E. all of the above

10. Which of the following pairs is mismatched

- A. ΔG : free energy
- B. enzyme: substrate
- C. ATP : mechanical work
- D. enzyme : sucrase
- endergonic: spontaneous ✓

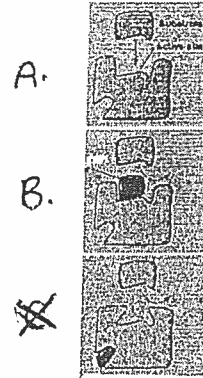
Handwritten note: * غير متوافق

(11-13) which part (A, B, C) of this figure represents

11. None-competitive inhibition of enzyme activity ✓

12. Normal enzyme activity

13. Competitive inhibition of an enzyme action



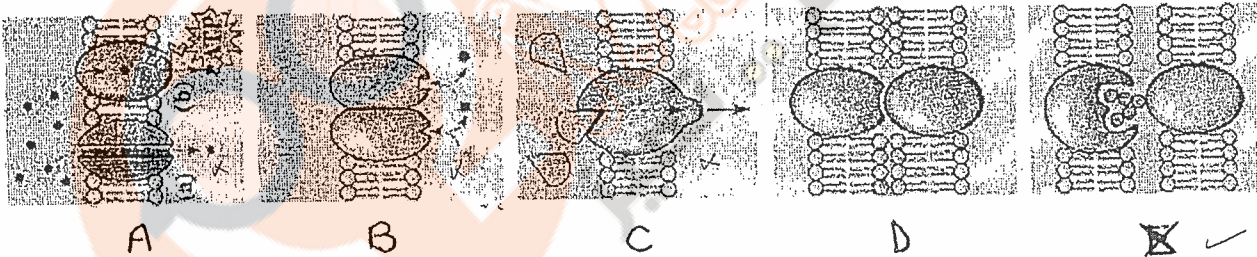
14. Which of the following best describes the phospholipids of plasma membrane?

- A. amphipathic
- B. sandwiched between two layers of proteins
- C. held together by covalent bond
- D. rarely move laterally
- E. both A and C

12. In plasma membrane of animal cells, which substance works as a "temperature buffer"

- A. glycolipids
- B. saturated fatty acids
- C. cholesterol ✓
- D. triacylglycerol
- E. all of these

13. Which part of this figure (A, B, C, D or E) represents cell-cell recognition function of membrane proteins.



14. A cell takes droplets of liquid containing dissolved materials by:

- A. facilitated diffusion.
- B. exocytosis.
- C. phagocytosis.
- D. pinocytosis. ✓
- E. the sodium potassium pump.

15. Which of the following can freely diffuse across phospholipid bilayer ;

- A. glucose and oxygen ✓
- B. glucose and water ✗
- C. carbon dioxide and oxygen ✓
- D. hydrocarbons and K^+ ions ✗
- E. both C and D

16. Which process does not directly require ATP?

- A. cell movement ✗
- B. Na^+/K^+ pump ✗
- C. glycolysis ✓
- D. active transport ✗
- E. diffusion ✓

17. Na^+/K^+ pumps

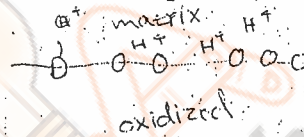
- A. transport Na^+ down their concentration gradient
- B. transport K^+ down their concentration gradient
- C. transport both K^+ and Na^+ through channel proteins
- D. are electrogenic ✓
- E. all of the above

18. Red blood cells **shrink** and plant cells undergo **plasmolysis** when both are placed in ;
~~X~~ hypertonic solution ✓ B. isotonic solution ~~X~~ C. hypotonic solution ~~X~~
 D. any of the above ~~X~~ E. none of the above ~~X~~

19. Facilitated diffusion

- A. requires energy. ~~X~~
 B. is highly specific for a particular molecule being transported. ✓
 C. moves molecules only down their gradient. ✓
~~X~~ Only B and C are correct. ✓ E. all of the above are correct ~~X~~

20. During electron transport in the mitochondrial electron transport system; ~~X~~
~~X~~ the pH of the matrix decreases ~~X~~ the pH of the intermembrane space decreases
~~X~~ hydrogen ions are translocated into the matrix
 D. ATP is synthesized directly by the redox reaction
 E. both B and D are correct



21. In the **reversible** reaction below; Which molecules act as electron donors? ~~X~~
 $\text{Glyceraldehyde 3-P} + \text{NAD}^+ + \text{Pi} \leftrightarrow \text{1,3-bisphosphoglycerate} + \text{NADH} + \text{H}^+$

- A. Glyceraldehyde 3-P / NAD^+ ~~X~~ B. Glyceraldehyde 3-P / 1,3-bisphosphoglycerate ~~X~~
~~X~~ Glyceraldehyde 3-P / NADH D. NAD^+ / NADH / H^+ ~~X~~
 E. 1,3-bisphosphoglycerate / NADH ~~X~~

22. During cellular respiration, ATP is produced by **substrate level** phosphorylation in;

- A. acetyl-CoA production B. glycolysis C. the citric acid cycle
 D. glycolysis and acetyl-CoA production ~~X~~ glycolysis and citric acid cycle ✓

23. Which of the following electron carrier in the mitochondrial electron transport chain is **mobile**. ~~X~~

- ~~X~~ FMN B. Cytochrome a_3 ~~X~~ Ubiquinone D. Cytochrome b E. none of these

24. Which is **not** true for glycolysis?

- A. occurs in the cytosol ✓ ~~X~~ produces a total of 4 ATP molecules ✓
 C. is common to aerobic and anaerobic respiration ✓
~~X~~ produces no NADH ~~X~~ E. all of the above

25. At which stage in respiration does oxygen participate?

- A. glycolysis B. the citric acid cycle C. hydrogen ion transport
 D. acetyl-CoA formation ~~X~~ electron transport. ✓

26. How many carbon atoms each pyruvate molecule feed into the Citric acid cycle?

- A. 8 B. 1 C. 6 ~~X~~ 2 E. 4

27. **Chemiosmosis** in mitochondria;

- A. involves facilitated diffusion of H^+ through ATP synthase complex
 B. occurs across the cristae
 C. occurs only under aerobic conditions
 D. couples oxidation of NADH with ADP phosphorylation ✓
~~X~~ all of the above. ✓

28. During cellular respiration, energy flows in the following sequence:

- A. Glucose → electron transport chain → NADH → proton motive force → O₂ ✗
- B. Glucose → NADH → ATP → electron transport chain → proton motive force ✗
- C. Glucose → ATP → electron transport chain → NADH → O₂ ✗
- D. Glucose → NADH → electron transport chain → proton motive force → O₂ ✓
- E. Glucose → NADH → electron transport chain → proton motive force → ATP. ✗

29. The number of ATP and CO₂ molecules produced from complete oxidation of one pyruvate in mitochondria is:

- A. 19 ATP / 2 CO₂
- B. 9 ATP / 1 CO₂
- C. 12 ATP / 6 CO₂
- D. 15 ATP / 3 CO₂
- E. 18 ATP / 4 CO₂

30. Which is the best description of the products of lactic acid fermentation? Assume one molecule of glucose is metabolized.

- A. 2 molecules of ATP ✗
- B. 2 molecules of ATP, 2 molecules of lactic acid and 2 molecules of NADH ✗
- C. 2 molecules of ATP, 2 molecules of CO₂ and 2 molecules of lactic acid. ✗
- D. 2 molecules of ATP and 2 molecules of lactic acid. ✓
- E. 2 molecules of lactic acid.

31. Most CO₂ molecules released from catabolic pathway of fatty acid is during:

- A. glycolysis ✗
- B. citric acid cycle ✗
- C. the intermediate reaction between glycolysis and citric acid cycle
- D. electron transport chain
- E. none of the above.

Refer to the figure below to answer questions 32-35 (select the correct answer from choices A-E as follows):

- A. matrix
- B. thylakoid space
- C. thylakoid membrane
- D. O₂
- E. NADP⁺

32. Region X in mitochondria represents

- 1. A
- 2. B
- 3. C
- 4. D
- 5. E ✓

33. Region Y in the chloroplast represents

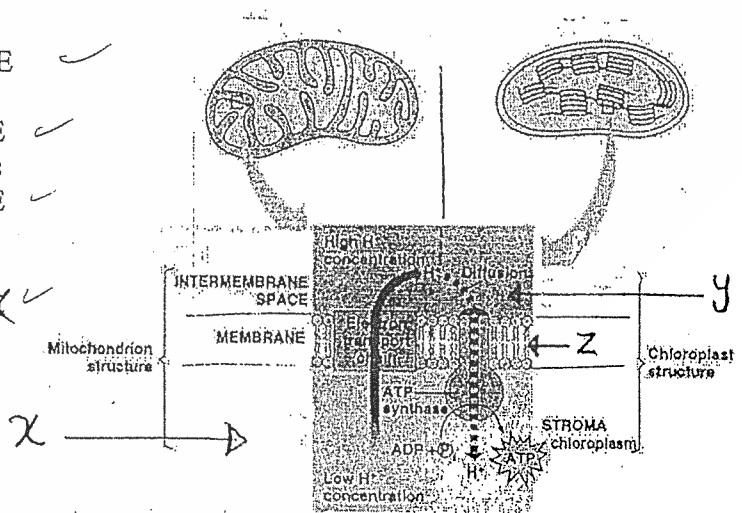
- 1. A
- 2. B
- 3. C
- 4. D
- 5. E ✓

34. Structure Z in the chloroplast represents

- 1. A
- 2. B
- 3. C
- 4. D
- 5. E ✓

35. The final electron acceptor in the chloroplast

- 1. A
- 2. B
- 3. C
- 4. D
- 5. E ✓



36. A phosphorylating enzyme which requires ATP is called
 A. phosphorylase B. phosphatase Kinase D. hydrolase
 E. dehydrogenase

37. In plants, carbon dioxide is fixed during
 A. cyclic electron flow. B. non-cyclic electron flow.
 C. the light reactions of photosynthesis. the Calvin cycle.
 E. non of the above is true

38. Chlorophyll and other photosynthetic pigments are associated with the:
 A. stroma. thylakoid membranes. mesophyll membranes.
 ATP synthase complex. chloroplast envelop.

39. In the Calvin cycle, ribulose bis phosphate is re-generated from:
 A. $NADP^+$ B. pyruvate. G3P. D. RuBP. E. CO_2

40. When water splits in the process of photosynthesis what does it supply to oxidized P680. \rightarrow PS II
 electrons B. hydrogen C. carbon dioxide D. oxygen E. ATP

41. Chlorophyll mainly absorbs which colors of light?
 A. red light only B. green light only C. blue light only both red and blue light
 E. both green and far red light

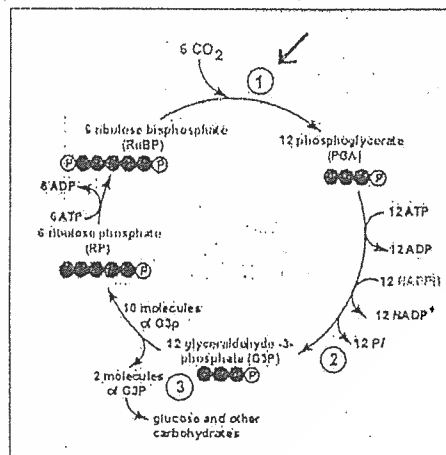
42. When electrons of P700 molecules are excited to a higher energy level, they
 A. are donated to P680 molecules B. directly enter the Calvin cycle
 are transferred to a primary electron acceptor
 D. generate ATP by passage through ATP synthase complex
 E. none of the above is true

43. Which are the end-products of photosynthetic non-cyclic electron flow?
 oxygen, ATP, and NADPH B. G3P, protons, and carbon dioxide
 C. water, ADP, and ribulose bisphosphate D. ATP, water, and carbon dioxide
 E. $FADH_2$, NADH and ATP

44. P680 is
 the reaction center of PSI the reaction center of PSII
 C. a secondary pigment molecule D. an antenna molecule
 E. all of the above.

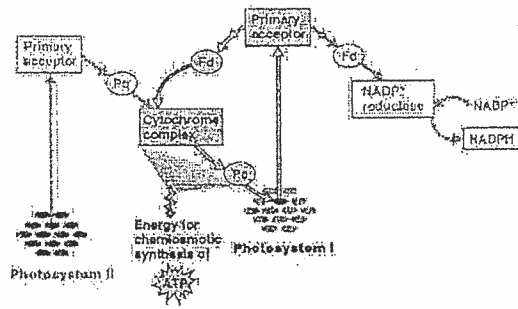
45. The figure below represents
 Calvin cycle B. Citric acid cycle
 C. Cell cycle D. Quinone cycle
 E. none of the above

46. In this figure, the enzyme responsible for the reaction (1) is
 Rubisco B. Catalase
 C. Dehydrogenase D. Hexo-kinase
 E. De-carboxylase.



47. All components of the figure below represents

- A. Cyclic electron flow
- B. Non cyclic electron flow
- C. Mitochondrial electron transport system
- D. A+B
- E. None of these

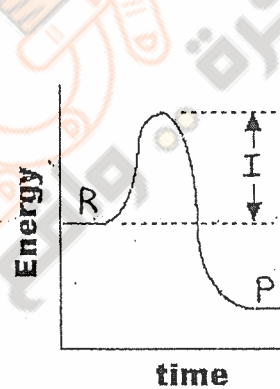


48. The reactions shown in the figure occur in

- A. the stroma
- B. thylakoid membranes
- C. intermembrane space
- D. the ATP synthase
- E. cristae

49. In the diagram below (if R = reactants, P = Products of a reaction) what does letter (I) represent?

- A. the free energy change (ΔG)
- B. the amount of energy the enzyme must supply to make the reaction happen
- C. the entropy change of the reaction
- D. the activation energy of the reaction
- E. the heat released during the reaction



50. Both photosystem I and photosystem II

- A. receive electrons from other photosystems
- B. must function together to generate NADPH
- C. donate protons to each other
- D. contain chlorophyll a molecules
- E. B+D

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 كبريتا

Name: Registration No. Section:
Name of Lecturer: Lecture seat No. Hall:

B-5.5

Multiple Choice Questions

Refer to the following figure to answer questions (1- 3)

1. An integral protein is indicated by the letter

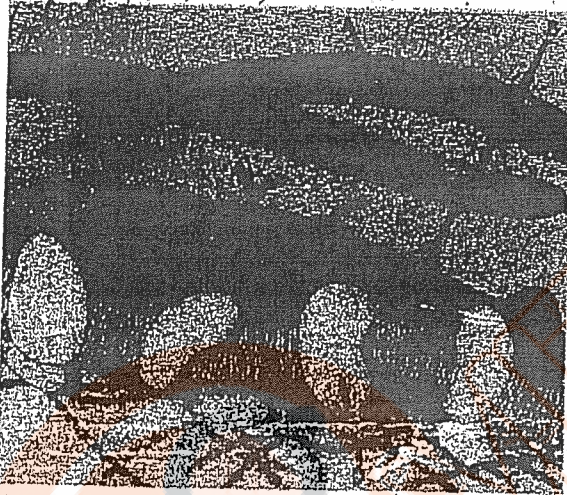
(A, B, C, D, or E)

2. A glycolipid is indicated by the letter

(A, B, C, D, or E)

3. A collagen fiber is indicated by the letter

(A, B, C, D, or E)



بشرى الحوراني
سنة II كيمياء

مركز طلبة العلوم الحياتية
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4. Which of the following is not part of the cell membrane?

A. lipids B. nucleic acids C. proteins D. phosphate groups E. steroids

5. According to the fluid mosaic model of cell membranes, which of the following is a true statement about membrane phospholipids?

- A. They can move laterally along the plane of the membrane.
- B. They frequently flip-flop from one side of the membrane to the other.
- C. They occur in an uninterrupted bilayer, with membrane proteins restricted to the surface of the membrane.
- D. They are free to leave the membrane and dissolve in the surrounding solution.
- E. They have hydrophilic tails in the interior of the membrane.

6. Which of the following is correct about peripheral membrane proteins?

- A. They lack tertiary structure
- B. They are loosely bound to the surface of the bilayer
- C. They are usually transmembrane proteins
- D. They are mobile within the bilayer
- E. They serve only in cell-cell recognition

7. What kinds of molecules pass through a lipid bilayer most easily?

- A. large and hydrophobic B. small and hydrophobic C. large polar
- D. ionic E. monosaccharides

8. Water passes quickly through cell membranes because

- A. the bilayer is hydrophilic
B. it moves through hydrophobic channels
C. water movement requires ATP hydrolysis
D. it is a small, polar, charged molecule
E. it moves through aquaporins in the membrane

9. Which of the following membrane activities does not require ATP?

- A. facilitated diffusion
B. active transport
C. Na ions moving out of the cell
D. proton pumps
E. potassium ions moving into the cell

10. Ions cross membranes down their

- A. chemical gradients
B. concentration gradients
C. electrical gradients
D. electrochemical gradients
E. A and B are correct

11. White blood cells engulf bacteria through the process of

- A. exocytosis
B. phagocytosis
C. pinocytosis
D. osmosis
E. receptor-mediated exocytosis

12. Red blood cells undergo hemolysis when placed in

- A. hypertonic solution
B. isotonic solution
C. hypotonic solution
D. A and B
E. none of the above

13. Breaking down large molecules into smaller ones is best described as

- A. catalysis
B. anabolism
C. catabolism
D. dehydration
E. B and D are correct

14. The structure of the ATP used in metabolism is most closely related to

- A. steroid
B. an amino acid with 3 phosphate groups
C. DNA nucleotides
D. RNA nucleotides
E. phospholipid

15. What is the change in free energy at chemical equilibrium?

- A. slightly increasing
B. slightly decreasing
C. greatly increasing
D. greatly decreasing
E. there is no net change

16. ATP drives most cellular work by

- A. releasing heat upon hydrolysis
B. acting as catalyst
C. forming phosphorylated intermediates
D. releasing high energy electrons
E. acting as a carrier

17. Which of the following is true about enzymes?

- A. decrease the rate of the reaction
B. lower the activation energy of the reaction
C. change the direction of chemical reactions
D. permanently alter their structure by the reactions they catalyze
E. provide activation energy for the reactions they catalyze

18. A substrate binds to an enzyme'ssite

- A. allosteric
B. reactant
C. regulatory
D. phosphate
E. active

19. The ΔG of ATP hydrolysis = -7.3 Kcal/mol. Which of the following endergonic reactions could be coupled to ATP

- A. $\Delta G = -5$
B. $\Delta G = -10$
C. $\Delta G = +4$
D. $\Delta G = +10$
E. none of the above

Based on the following figure, answer questions (20-22)

20. The reaction represented by the figure is

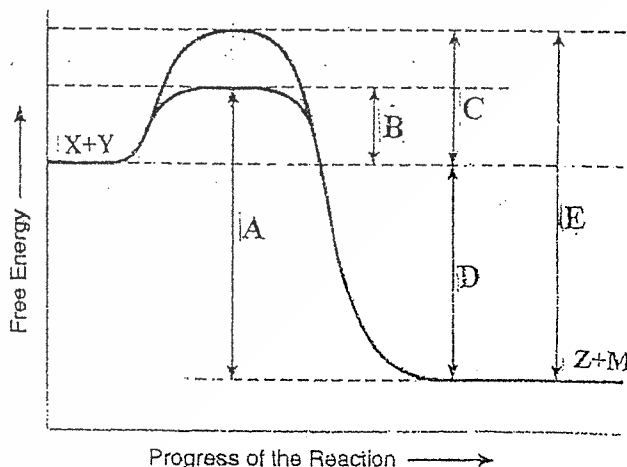
- A. endergonic
B. exergonic
C. anabolic
D. allosteric
E. non-spontaneous

21. Which of the following would be the same with or without enzyme

- A. B. C. D. E.

22. The activation energy, in the presence of enzyme, is represented by

- A. B. C. D. E.



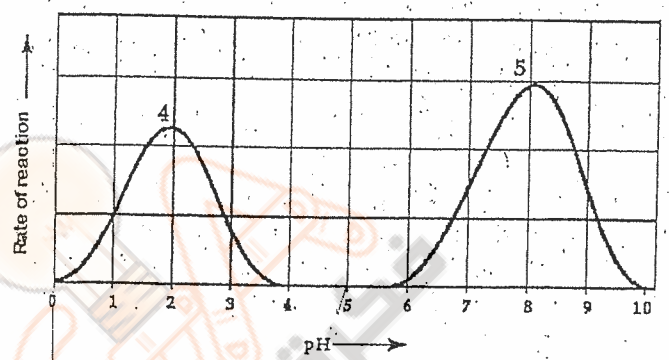
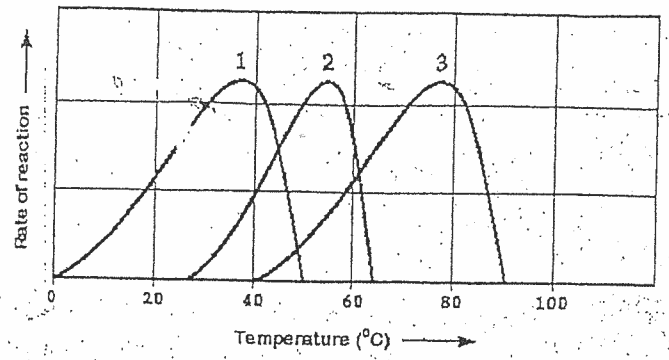
Refer to the following curves to answer questions (23-24)

23. Which curve represents an enzyme taken from a bacterium that lives in hot springs at temperature 70°C or higher?

- A. 1 B. 2 C. 3 D. 4 E. 5

24. Which curves represent an enzyme that functions in the human stomach?

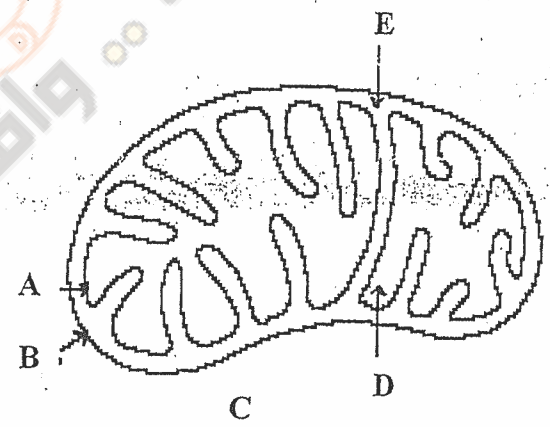
- A. 1 & 4 B. 1 & 5 C. 2 & 4
D. 2 & 5 E. 3 & 4



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* دراسة

Refer to the following figure to answer questions (25-26)

25. ATP synthase is found in (A, B, C, D, E).....
26. The electron transport chain energy is used to pump H⁺ into which location? (A, B, C, D, E).....



27. The first step in the activation of glucose for respiration is
A. removal of a water molecule B. addition of a hydrogen ion
C. removal of an oxygen atom D. addition of a phosphate group
E. addition of an oxygen atom
28. The final product of the electron transport chain in cellular respiration is a molecule of
A. Water B. ADP C. Coenzyme A D. Cytochrome oxidase E. NADH
29. Which of the following passes high-energy electrons into the electron transport chain?
A. NADH and FADH₂ B. ATP and ADP C. Citric acid
D. Acetyl - CoA E. None of the above

Answer the questions (30-31) based on
I. Glycolysis II. Fermentation III. Krebs cycle IV. Electron transport chain

30. Which of the following metabolic pathways occurs in the cytoplasm and results in a net gain of two ATP and zero NADH per glucose?

- A. IV B. II only C. I, II, & III D. I & II E. I only

31. In which of the metabolic pathways listed above oxygen is used?

- A. I only B. II only C. III only D. IV only E. I & II

32. For fatty acids to be able to enter the pathways of cellular respiration, they must be

- A. deaminated B. combined with glycerol C. combined with ATP
D. broken into acetyl groups E. be converted into five carbon sugars

33. Which of the following statements is true about phosphofructokinase in glycolysis pathway?

- A. It is stimulated by ATP B. It is stimulated by citrate
C. Acetyl CoA is one of its substrates D. Fructose phosphate is one of its products
E. Fructose bisphosphate is one of its products

34. What provides the energy which drives ATP synthesis by oxidative phosphorylation?

- A. an electrical current carried by the H^+ B. the proton motive force
C. the breaking of bonds between H^+
D. the interaction of H^+ and glucose molecules E. the interaction of H^+ and O_2

35. In cellular respiration, glucose is degraded to carbon dioxide and water. The carbon dioxide is produced in:

- A. glycolysis B. the electron transport chain C. the Krebs (citric acid) cycle
D. the conversion of pyruvate to acetyl-CoA step E. C and D

36. In substrate-level phosphorylation the enzyme which catalyzes the phosphorylation of ADP is called

- A. ATP synthase B. dehydrogenase C. oxidase D. Kinase E. aldolase

37. Which of the following is/are the products of the Krebs cycle?

- A. ATP B. NADH C. $FADH_2$ D. CO_2 E. all of these

38. Cellular respiration produces about 38 ATP from one glucose molecule. What happens to the rest of the energy in glucose?

- A. It is stored as fat B. It is converted to heat
C. It is released as CO_2 and H_2O D. It is used to make H_2O from H^+ & O_2
E. It is converted to starch

Refer to the following figure to answer questions (39-41)

39. The figure represents:

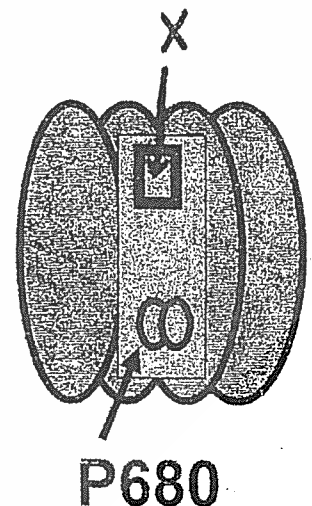
- A. Photosystem I B. Photosystem II
C. The photosystem which works in the noncyclic electron flow
D. The photosystem which works in the cyclic electron flow
E. both B and C

40. The special chlorophyll P680

- A. receives electrons that resulted from splitting of water
B. effectively absorbs the red part in the light spectrum
C. effectively absorbs the green part in the light spectrum
 D. A and B E. A and C

41. Molecule X is

- A. chlorophyll a B. carotenoid C. chlorophyll b
 D. a primary electron acceptor E. plastocyanin



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