4. Which one of the following amino acids lacks a chiral α-carbon

(a) Arginine
(b) Glycine
(c) Alanine
(d) Proline
(e) Valine

5. Which one of the following properties is NOT exhibited by water

(a) Forms no H-bonds in pure form
(b) Solvates hydrophilic molecules
(c) Solvates hydrophobic molecules
(d) Polar molecule
(e) Highly cohesive

6. All of the following are triglycerides EXCEPT

(a) Cerumen
(b) Olive oil
(c) Butter fat
(d) Corn oil
(e) Lard

7. Which one of the following reactions is unique to pentose sugars

(a) Cyanohydrin reaction
(b) Reduction of copper
(c) Glycoside formation
(d) Osazone reaction
(e) Furfural reaction

8. Where would you normally find branching points of glycogen

(a) α (1→4)
(b) β (1→4)
(c) α (1→ 6)
(d) β (1→ 6)
(e) α (1→ 2)

9. All of the following fatty acids lack a hydroxyl group in their structure EXCEPT

(a) Oleic
(b) Stearic
(c) Linoleic
(d) Arachidonic
(e) Cerebronic

10. Which one of the following is a mixed triglyceride

(a) Triolein
(b) Tripalmitin
(c) Tristearin
(d) Dipalmitostearin
(e) Oleopalmitin

11. Which amino acid is specified by the start codon during transcription and translation

(a) Proline
(b) Methionine
(c) Tryptophan
(d) Lysine
(e) Leucine

12. Which one of the following nitrogenous bases is NOT found in DNA

(a) Thymine
(b) Uracil
(c) Cytosine
(d) Guanine
(e) Adenine

13. When both carbon-1 aldehyde and carbon 6 alcoholic groups are oxidized in glucose, th resulting acid is

(a) Gluconic acid
(b) Glucuronic acid
(c) Glucaric acid
(d) Gluconolactone
(e) Sialic acid

SECTION C:- LONG ESSAY QUESTIONS (LEQs)
(20 MINUTES)

INSTRUCTIONS :-

(I) THERE IS ONE (1) LEQs IN THIS SECTION.
(II) ANSWER THE QUESTIONS. TWENTY (20) MARKS.

LEQ 1. Describe the various classes of carbohydrates highlighting their major properties and chemical reactions.

19. What percentage of body weight does water constitute in women

(a) 45 – 50%
(b) 20 – 25%
(c) 35 – 45%
(d) 55 – 65%
(e) 65 – 75%

20. Which of the following results in complete hydrolysis of starch

(a) Glucose units
(b) Glucose and maltose
(c) Galactose units
(d) Fructose units
(e) Maltose units

SECTION B:- SHORT ANSWER QUESTIONS (SAQs)
(10 marks each)

INSTRUCTIONS :-

I. THERE ARE FIVE (5) SAQs IN THIS SECTION.
II. ANSWER ALL THE FIVE (5) QUESTIONS
III. START QUESTION EACH QUESTION ON A FRESH PAGE OF THE BOOKLET. FIFTY MARKS EACH

SAQ 1. Describe the difference between uncompetitive and non-competitive enzyme inhibition using line-weaver burk plots only.

SAQ 2. Describe how ninhydrin reacts with amino-acids to form a blue-coloured compound.

SAQ 3. Draw the structure of a named triglyceride.

SAQ 4. With aid of structures differentiate between reducing and non-reducing sugar.

SAQ 5. Highlight the functions of various proteins involved in the process of DNA replication.

SECTION A:- MEDICAL BIOCHEMISTRY
PART I : MULTIPLE CHOICE QUESTIONS (MCQs)
(20 MINUTES) (20 MARKS)
TYPE III

INSTRUCTIONS:-

(I) ANSWERE ALL QUESTIONS.

(II) EACH OF THE QUESTIONS IN THIS SECTION CONSISTS OF A STATEMENT/QUESTION WHOSE MOST APPROPRIATE COMPLETION/ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBERED (a) - (e).

(II) FOR EACH QUESTION, SELECT THE MOST APPROPRIATE OPTION AND INDICATE BY PRINTING AN X IN THE APPROPRIATE BOX IN THE ANSWER SHEET PROVIDED. IF YOU DO NOT KNOW THE ANSWER, PRINT 'X' IN THE BOX IN THE 'DK' COLUMN.

(III) A CORRECT RESPONSE EARNS YOU PLUS ONE MARK.

1. The common feature in the primary structure of protein is;
   a) Ionic bonds
   b) Hydrogen bonds
   c) Peptide bonds
   d) Hydrophobic interactions
   e) Disulfide interactions

2. To which of the four (4) orders (levels) of architecture in proteins does myoglobin belong?
   a) α- helix
   b) Tertiary
   c) Secondary
   d) Quarternary
   e) Primary

14. Which amino acid produces a yellow colour with ninhydrin

(a) Alanine
(b) Valine
(c) Proline
(d) Leucine
(e) Lysine

15. Which one of the following is s 'STOP' codon?

(a) TTA
(b) TAA
(c) CAG
(d) GGT
(e) GTG

16. Oxidation of polyunsaturated fatty acids will yield

(a) Acrolein
(b) Drying oils
(c) Soluble soaps
(d) Fatty aldehyde
(e) Ketone bodies

17. Which one of the following initiates the synthesis of heme

(a) Lysine and succinylCoA reaction
(b) Glycine and succinate reaction
(c) Formation of porphobilinogen
(d) Availability of iron
(e) Glycine and succinyl CoA reaction

18. Which one of the following solutions exhibits the highest boiling point

(a) Camphor
(b) Ethylether
(c) Carbon disulfide
(d) Benzene
(e) Water

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(a) Camphor
(b) Ethylether
(c) Carbon disulfide
(d) Benzene
(e) Water

SECTION B: MEDICAL MICROBIOLOGY & PARASITOLOGY (90 minutes)

SHORT ANSWER QUESTIONS SAQs)

INSTRUCTIONS:

(I) THERE ARE ELEVEN (11) QUESTIONS IN THIS SECTION
(II) ANSWER ALL THE ELEVEN (11) QUESTIONS
(III) ANSWER EACH QUESTION ON A FRESH PAGE OF THE BOOKLET.

SAQ 1. Write short notes on the following:
a) Phagotrophy
b) Phototrophy
c) Heteroxenous
d) Deleterious effects of parasites on human body. **(10 minutes)**

SAQ 2: Explain the following giving an example of each:
a) Mutualism
b) Epidemic infection. **(10 minutes)**

SAQ 3: List four (4) routes used by parasites of medical importance to infect humans. **(10 minutes)**

SAQ 4: Bacteria are prokaryotic cells, unlike fungi which are eukaryotic cells. Using a table, make a comparison of prokaryotic and eukaryotic cells. **(10 minutes)**

SAQ 5: List the criteria used in the classification of bacteria, and name the various groups of bacteria based on oxygen requirement. **(10 minutes)**

SAQ 6: Name five bacterial species and the diseases they cause **(5 minutes)**

SAQ 7: Name five scientists and state their contribution to bacteriology. **(5 minutes)**

SAQ 8: Compare and contrast the structure and composition of viruses and bacteria. **(10 minutes)**

SAQ 9: Name five (5) families of DNA viruses and five (5) families of RNA viruses of medical importance. **(10 minutes)**

SAQ 10: Citing suitable examples, name the disorders caused by fungi. **(5 minutes)**

SAQ 11: Write short notes on growth requirements by fungi. **(5 minutes)**

19. Which one of the following enzymes is a lyase?

a) Triacylglycerol
b) Fumerase
c) Phosphoglycerate mutase
d) DNA polymerase
e) Pyruvate carboxylase

20. Covalent catalysis would be found in which one of the following enzymes?

a) Catalase
b) Urease
c) Dihydrofolate reductase
d) Transpeptidase
e) Chymotrypsin

PART II: SHORT ANSWER QUESTIONS (SAQs) (10 marks each)

SAQ 1. Define the term 'buffer'. Name one weak buffer.

SAQ 2. Briefly describe any two water soluble vitamins.

SAQ 3. Differentiate, giving examples, between storage and structural polysaccharides.

SAQ 4. Describe briefly what happens when foods which contain fats become rancid. Differentiate between oxidative and hydrolytic rancidity.

SAQ 5. Using structures only, differenciate between tocopherol and tocotrienol.

SAQ 6. Outline the 4 types of catalysis exhibited by enzymes.

SAQ 7. Describe two chemical reactions exhibited by carbohydrates.

11. Naturally occurring saturated fatty acids that have one to eight carbon atoms have ... following properties except being;

a) Readily measurable acid properties
b) Volatile acids
c) Very soluble in water
d) Liquids at room temperature
e) Highly insoluble in water

12. Which of the following fatty acids contains only one hydroxyl group in its structure?

a) Stearic acid
b) Linoleic acid
c) Arachidonic acid
d) Prostaglandin E2
e) Cerebronic acid

13. Which of the following functions of lipids is not true?

a) They are used as a reserve of food supply
b) They are used as a source of potential energy
c) They are used as sources of fat-soluble vitamins
d) They are used as structural components of cell membrane
e) They are used as sources of essential fatty acids

14. Glucose can have upto - isomers due to the presence of 4 asymmetric carbon atoms;

a) 4
b) 2
c) 12
d) 16

SAQ 10. Name four (4) different shapes (morphological features) of bacteria. Give one example for each.

(5 minutes)

SAQ 11. List five (5) staining methods used in the diagnosis (identification) of bacteria.

(5 minutes)

SAQ 12. Describe a typical gram positive bacterial cell wall.

(5 minutes)

SAQ 13. Name three (3) methods used in studying viruses, stating the viral components which each method may demonstrate,

(5 minutes)

SAQ 14. Name one genus in the following groups of viruses.

(a) Enveloped ds DNA
(b) Enveloped ssRNA
(c) Non-enveloped dsDNA
(d) Non-enveloped ssDNA
(e) Non-enveloped ssRNA Arboviruses.

(5 minutes)

SAQ 15. Viruses were once described as filterable infectious agents. Explain this description.

(5 minutes)

SAQ 16. Draw and label a structurally complete virus (virion).

SAQ 17. Briefly describe the following with regard to fungi:

(i) Budding
(ii) Spore
(iii) Mycelium
(iv) Hyphae

(5 minutes)

SAQ 18. Describe the role of fungi in disease causation.

(5 minutes)

4. In amylopectin, the intervals of glucose units of each branch is;
   a) 8 – 12
   b) 10 – 20
   c) 24 – 30
   d) 30 – 40
   e) 40 – 50

5. Which of the following is an example of a stable secondary structure of proteins?
   a) Alpha helicase
   b) Beta helicase
   c) Omega helicase
   d) Delta helicase
   e) Omicron helicase

6. Which colour that characterizes the Ninhydrin reaction?
   a) Purple
   b) Blue
   c) Black
   d) Yellow
   e) Green

7. Which of the following is true about uncompetitive inhibitors?
   a) Km increases
   b) Vmax increases
   c) Both km and vmax increase
   d) Km decreases and vmax increases
   e) Both km and vmax decreases

8. _____ is associated with haemoglobin structure
   a) Cu^{2+}
   b) Fe^{2+}
   c) Pb^{2+}
   d) Co
   e) Mg^{2+}

9. _____ is LEAST likely to be found in organic compounds
   a) Carbon
   b) Magnesium
   c) Nitrogen
   d) Oxygen
   e) Hydrogen

10. Which of the following elements and valence electron pairs is NOT correct?
    a) Al – 3
    b) C – 4
    c) O – 6
    d) Br – T
    e) Mg – 12

11. Which of the following is NOT likely to be formed from incomplete combustion of organic compounds?
    a) Carbon monoxide
    b) Carbon dioxide
    c) Water
    d) Heat
    e) Sulfur dioxide
12. Which of the following is the first product of halogenation of methane?
    a) CH_4
    b) CH_3cl
    c) CH_2cl_2
    d) $CHcl_3$
    e) Ccl_4
13. Lipids are a group of substances characterized by their insolubility in the following except;
    a) Hot alcohol
    b) Chloroform
    c) Acetone
    d) Hot water
    e) Ether
14. Which of the following characteristics of unsaturated fatty acid is not correct?
    a) They are fatty acids with double bonds in the structure
    b) They are fats whose melting points rise with increase in molecular weight
    c) They are fats which are more reactive than saturated fats
    d) They are fats capable of taking up more H – atoms at the double bounds
    e) They are fats capable of producing a variety of as – trans isomers
15. Sphingomyelin is a complex lipid that contains all of the following except;
    a) Fatty acid
    b) Phosphoric acid
    c) Choline
    d) Sphingosine
    e) Glycerol
16. Which of the following is an unsaturated fatty acid?
    a) Acetic acid
    b) Stearic acid
    c) Cerebronic acid
    d) Ricinoleic acid
    e) Lauric acid
17. Which of the following is simple triglycerides?
    a) Oleopalmitostearin
    b) Dipalmitostearin
    c) Oleodipalmitin
    d) Oleodistearin
    e) Stearodiotein

Dennis XI 10/15

4 Which of the following is an essential fatty acid?

(a) Stearic acid - saturated
(b) Linoleic acid - unsaturated
(c) Oleic acid - unsaturated
(d) Cerebronic acid - hydroxyl
(e) Lignoceric acid

Essential F.A.
linoleic
linolenic
Arachidonic
also called Fatty acids

Oleic
linoleic
linolenic
Arachidonic

5. Which of the following is a mixed triglyceride?

(a) Dipalmitostearin - palmitic, stearic - simple
(b) Olepdipalmitin - oleic, palmitic
(c) Tripalmitin - simple - Palmitic
(d) Triolein - simple - Oleic acid
(e) Oleodistearin - oleic, stearic

Which one of the following amino acids does NOT posses an aliphatic side chain

(a) Glycine - aliphatic
(b) Serine - Hydroxyl
(c) Alanine - Aliphatic
(d) Valine - Aliphatic
(e) Leucine - Aliphatic

Glycine
Alanine
Valine

Which of the following amino acids contains sulphur in its structure?

(a) Aspartic acid - Acidic
(b) Asparagine - Acidic
(c) Histidine - Acidic
(d) Arganine - Basic
(e) Methionine & Cysteine

What is the number of amino acid per turn of an alpha helix of a protein?

a) 1
b) 2
c) 36
d) 4

SECTION B: MEDICAL MICROBIOLOGY AND PARASITOLOGY
(30 minutes)

INSTRUCTIONS:

(I) THERE ARE SEVEN (7) QUESTIONS IN THIS SECTION

(II) ANSWER ALL THE SEVEN (7) QUESTIONS

(III) START EACH QUESTION ON A FRESH PIECE OF PAPER OF THE BOOKLET.

1. List two (2) different genera of bacteria in each of the following categories.

(a) Gram positive facultative anaerobe rod
(b) Gram positive strict anaerobe rod
(c) Gram negative facultative anaerobe cocci
(d) Gram negative strict anaerobe rod
(e) Obligate intracellular bacteria

(10 minutes)

2. (a) Name five (5) protozoan parasites (genus and species) that can infect man.
(b) For each parasite named above (a):

(i) State how the infection can be acquired
(ii) State the laboratory method used to identify the parasite.

(10 minutes)

3. List five (5) viral families and their nucleic acid composition.

(5 minutes)

4. State what you understand by the following terms:

(a) Mycology
(b) Spore
(c) Mycelium
(d) Budding
(e) Yeast

(5 minutes)

Distinguish between the first order, the mixed order, and the zero order kinetics of an enzyme reaction

Which of the following statements is not true about isoelectric pH?

a) NH_3^+ will move to the cathode
b) Amino acids are dipolar at neutral pH
c) NH_3 will move to the anode
d) Amino acids are zwitterionic at neutral pH
e) Coo will move to the cathode

Which of the following α-amino acid groups gives an amino acid its distinctive reaction features?

a) An amino group
b) A side chain
c) A hydrogen atom
d) An aldehyde group
e) A carboxyl group

Which of the following amino acids has sulfur containing side chain?

a) Lysine
b) Threonine
c) Methionine
d) Serine
e) Asparagine

Which of the following amino acids has an acidic side chain?

a) Aspartate
b) Valine
c) Tyrosine
d) Alanine
e) Leucine

To which ordered conformation of polypeptides does myoglobin belong?

a) Primary structure
b) Quarternery structure
c) α-helix
d) Tertiary structure
e) β-pleated sheet

Which of the following amino acids produces a yellow color with ninhydrin?

a) Threonine
b) Lysine
c) Arginine
d) Phenylalanine
e) Proline (and 4-Hydroxyproline)

Which of the following statements is true about michaelis constant (Km)?

a) Km is equal to the substrate concentration at which the reaction rate is equal its maxi[mal]
b) Km is half the substrate concentration at which the reaction rate is half its maximal v[elocity]
c) Km is equal to the substrate concentration at which the reaction rate is half its maxim[al]
d) Km is equal to the substrate concentration at which the reaction rate is twice its maxi[mal]
e) Km is twice the substrate concentration at which the reaction rate is half its maximal

Which of the following statements is not true of enzyme inhibition?

a) In competitive inhibition the enzyme can bind substrate forming an ES complex
b) In competitive inhibition the enzyme can bind inhibitor forming an EI complex
c) In competitive inhibition the enzyme can bind both substrate and inhibitor forming a
d) Competitive inhibition can be overcome by sufficiently high concentration of subst[rate]
e) Non competitive inhibition can be overcome by increasing the substrate concentr[ation]

SECTION C: BIOCHEMISTRY
(30 Minutes)

SECTION C 1: MULTIPLE CHOICE QUESTIONS (MCQs) (10 Minutes)
TYPE III

INSTRUCTIONS:

(i) EACH OF THE QUESTIONS IN THIS SUBSECTION CONSISTS OF A STATEMENT/QUESTION WHOSE MOST APPROPRIATE COMPLETION/ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBERED (a) - (e).

(ii) FOR EACH QUESTION SELECT THE MOST APPROPRIATE OPTION AND INDICATE BY PRINTING AN X IN THE APPROPRIATE BOX IN THE ANSWER SHEETS PROVIDED.

(iii) A CORRECT RESPONSE EARNS YOU ONE MARK.

1. Which amino acid can stabilize protein structures by forming covalent cross-links between polypeptide chains?

(a) Methionine
(b) Serine
(c) Glycine
(d) Glutamine
(e) Cysteine

2. Which of the following statements about tertiary structure of a protein is true?

(a) It is the linear sequence of amino acids in a polypeptide chain
(b) It is a spatial arrangement of amino acids that are near each other
(c) It is the tendency of the polypeptide chain to undergo coiling
(d) It is an association of several protein subunits
(e) It is an interaction between α-helical and β-sheet structures

3. Which of the following is not a general property of enzymes?

(a) Most enzymes are proteins
(b) Enzymes have great catalytic power
(c) All enzymes can bind specific substrates
(d) The catalytic activity of enzymes can be regulated
(e) All enzymes use hydrophobic site to bind substrates

INSTRUCTIONS:-

(I) ANSWER ALL QUESTIONS.

(II) EACH OF THE QUESTIONS IN THIS SECTION CONSISTS OF A STATEMENT/QUESTION WHOSE MOST APPROPRIATE COMPLETION/ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBERED (a) - (e).

(II) FOR EACH QUESTION, SELECT THE MOST APPROPRIATE OPTION AND INDICATE BY PRINTING AN X IN THE APPROPRIATE BOX IN THE ANSWER SHEET PROVIDED. IF YOU DO NOT KNOW THE ANSWER, PRINT 'X' IN THE BOX IN THE 'DK' COLUMN.

(III) A CORRECT RESPONSE EARNS YOU PLUS ONE MARK.

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQs) – TYPE III

(20 MINUTES) (20 MARKS)

1. Two sugars which differ from one another only in configuration around a single carbon atom are termed;
   a) Epimers
   b) Anomers
   c) Optical isomers
   d) Hemiketals
   e) Stereoketals
2. The general formula of monosaccharides is;
   a) $C_nH_{2n}O_n$
   b) $C_{2n}H_2O_n$
   c) $C_nH_2O_{2n}$
   d) $C_2OH_2O_{2n}$
   e) $C_nH_2NO_{2n}$
3. The most abundant carbohydrate found in nature is;
   a) Starch
   b) Glycogen
   c) Cellulose
   d) Glucose
   e) Chitin

What is an example of a protein exhibiting tertiary protein structure?

(a) Myoglobin
(b) Haemoglobin
(c) Alumin
(d) Apoprotein
(e) Glyceroprotein

10. Which one of the following is NOT a direct bond found in protein structure

(a) Hydrogen bonding
(b) Disulfide bidges
(c) Hydrophobic interactions
(d) Van der Waals forces
(e) Electrostatic bonding

11 What colour is usually shown by a protein during the biuret reaction?

(a) Yellow
(b) Green
(c) Pink
(d) Purple
(e) Red

12 Which group is associated most with covalent modification of enzymes?

(a) Phosphate
(b) Chloride
(c) Sulphide
(d) Carboxylic
(e) Hydroxyl

13 The enzyme that belongs to the group of transferases below is?

(a) Trypsin
(b) Amylase
(c) Glukokinase
(d) Citrate synthase

(e) Substitution of transferase

At its isoelectric pH, an amino acid has

(a) Net negative charge

(b) No net charge

(c) Net positive charge

(d) Carboxylic group is not ionizable

(e) The pH is 7.0

Which of the following does not describe an active site?

(a) It takes up a relatively small part of the enzyme

(b) It is a three dimensional entirety

(c) It is a cleft or crevice

(d) It binds molecules

(e) It binds a substrate

Lactate dehydrogenase can exist in how many number of isoenzymes

(a) 2

(b) 3

(c) 4

(d) 5

(e) 6

Which one of the following is not a glycolipid?

(a) Cerebroside

(b) Lanolin

(c) Ganglioside

(d) Sulpholipid

(e) Proteolipid

Which of the following chemical property of monosaccharides is specific to pentoses?

(a) Cyanohydrin reaction

(b) Furfural formation

(c) Osazone formation

(d) Formation of saccharic acids

(e) Hemiketal condensation

Parallel linearweaver Burk plots for a particular enzyme occurs in the presence of

(a) Competetive inhibitor

(b) Un-competetive inhibitor

(c) Non-competetive inhibitor

(d) Dis-competetive inhibitor

(e) Zero amount of inhibitor

Which one of the following is not a triacylglycende?

(a) Lard

(b) Corn oil

(c) Butter fat

(d) Cerumen

(e) Olive oil

The main features of secondary structure of proteins are

(a) α - helix and triple helix

(b) α-helix and β-pleated sheets

(c) triple helix and β-pleated sheets

(d) α-helix, triple helix and β-pleated sheets

(e) peptide bond and triple helix

Water has the following except

(a) It is highly cohesive

(b) It is a polar molecule

(c) Solvates hydrophobic molecules

(d) Solvates hydrophilic molecules

(e) Pure water forms no H-bonds

Describe the main features of

(i) Acid-base catalysis

(ii) Catalysis by strain

With specific examples differentiate isozymes from cloners

4. The boiling point of any liquid is

(a) 100°C
(b) The temperature at which vapor pressure is equal to osmotic pressure
(c) The temperature at which many molecules leave the liquid as return to it
(d) The temperature at which no molecules can return to the bulk of the liquid
(e) The temperature at which vapor pressure is equal to external pressure

5. An amino acid that is incompatible with α-helix is

(a) Tyrosine
(b) Glycine
(c) Histidine
(d) Proline
(e) Phenylalanine

6. An amino acid that contains a disulfide bond is

(a) Cysteic acid
(b) Methionine
(c) Homocysteine
(d) Cystine
(e) Lysine

7. Which of the following amino acids has two asymmetric carbon atoms?

(a) Valine
(b) Serine
(c) Threonine
(d) Methionine
(e) Glycine

8. HCOOH can change electrophoretic properties of peptides containing

(a) Lysine
(b) Threonine
(c) Tyrosine
(d) Cysteine
(e) Hydroxylysine

Sphingosine – long-chain unsaturated amino alcohol $C_{18}H_{37}O_2N$ found especially in nervous tissue and cell membrane

- Glycolipids- *Sphingosine + fatty acids + sugar residue*
- Sphingolipids- *Sphingosine + fatty acids + H_3PO_4 + choline*
- Sulfolipids- *Sphingosine + fatty acid + sugar residue + sulphuric*
- Gangliosides- *Sphingosine + fatty acids + 3sugar residues + Non-acetyl neuraminic acid (nana).*

Choline – has a compound $C_5H_{15}NO_2$, found in egg yolk & legumes or soybeans. This compound is lecithin (part of phospholipids), essential to the body.

Derived lipids:-
They are lipids that are divided from other simple and compound lipids.
Examples include. free fatty acids, glycerol, fatty aldehyde, ketone bodies, and prostaglandins.

Fatty acids
They are long chain hydrocarbons with a carboxylic group on one end
Those with less than ten carbon atoms in their chains are called Volatile fatty acids because they easily evaporate very easily when left exposed to room temperature for an extended period of time
Examples include
Caproic – $CH_3(CH_2)_4COOH$- Coconut palm oil
Caprylic – $CH_3(CH_2)_6COOH$- Coconut palm oil
Capric – $CH_3(CH_2)_8COOH$- Coconut palm oil

Classification of fatty acids
Fatty acids are classified into five major classes:
Saturated fatty acids:- They don't have any double bond in their structure characterized with high melting point
- Palmitic 16- $CH_3(CH_2)_{14}COOH$
- Stearic 18- $CH_3(CH_2)_{16}COOH$

Unsaturated fatty acids:- Have got one to two double bonds with a relatively lower mpt.
- Oleic $CH_3(CH_2)_7CH=CH(CH_2)_7COOH$
- Linoleic $CH_3(CH_2)_4CH=CHCH_2CH=CH(CH_2)_7COOH$

Polyunsaturated fatty acids:- Have more than two double bonds with very low mpts
- Linolenic $CH_3CH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_7COOH$
- Arachidonic $CH_3(CH_2)_4CH=CHCH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_3COO$

Hydroxyl fatty acids:-Can be either saturated or unsaturated but with a hydroxyl group.
- Richoleic
- Cerebronic
- Ricinoleic

Cyclic fatty acids:-
They are mainly unsaturated and a mixture e.g prostaglandins, thromboxane, leukotriene
They are important for they assist during birth, act as hormones help the muscles of a mother who's given birth to go back to normal

(b) 3
(c) 4
(d) 5
(e) 6

Which one of the two are anomers?
(a) D-glucose and L-glucose
(b) D-fructose and L-fructose
(c) α-D-glucose and β-D-glucose
(d) α-D-glucose and β-L-glucose
(e) α-D-fructose and β-L-fructose

Which is the main buffer in the extracellular fluid?
(a) Haemoglobin
(b) Bicarbonate
(c) Proteinate
(d) Phosphate
(e) Water

Which of the following amino acid contains sulphur?
(a) Lysine
(b) Isoleucine
(c) Aspartate
(d) Serine
(e) Cysteine

To which of the following levels of protein structure does myoglobin belong?
(a) Quaternary structure
(b) Secondary structure
(c) Tertiary structure
(d) Primary structure
(e) β-pleateal sheet

What is the normal pH range of human blood?
(a) 6.80 – 7.80
(b) 5.50 – 6.50
(c) 7.36 – 7.42
(d) 8.36 – 8.42
(e) 6.36 – 6.42

The glycosidic bond between the two glucose residues in cellobiose is
(a) α(1 ——4)
(b) α(1 ——2)
(c) α(1 ——6)
(d) β(1 ——4)
(e) β(1 ——2)

The main difference between a phosphatide and a glycosphingolipid is the following except
(a) A phosphatide has a glycerol moiety while glycosphingolipid does not
(b) A phosphatide lacks sphingosine moiety while glycosphingolipid has it
(c) A phosphatide has two fatty acids while a glycosphingolipid has one
(d) A phosphatide has a phosphate moiety while a glycosphingolipid lack it
(e) Ceramide is a moiety in glycosphingolipid and not in phosphatide

In the enzyme commission number is 2 7 1 1, what does the digit 7 represent?
(a) Subclass of phosphonyl group transfer
(b) Subclass of isomerase
(c) Subclass where alcohol is phosphonyl acceptor
(d) Class of transferase

SECTION D: MICROBIOLOGY AND PARASITOLOGY (30 minutes)
SECTION D (i) - MULTIPLE CHOICE QUESTIONS (MCQs) (10 minutes)
TYPE 2

INSTRUCTIONS

(i) EACH OF THE QUESTIONS IN THIS SECTION HAS A STEM STATEMENT FOLLOWED BY FIVE COMPLETIONS NUMBERED (a) TO (e). A GIVEN COMPLETION, WHEN ADDED TO THE STEM STATEMENT MAY PRODUCE A COMPLETE STATEMENT THAT IS TRUE (T) OR FALSE (F).

(ii) INDICATE AGAINST THE APPROPRIATE NUMBERS IN THE ANSWER SHEETS PROVIDED WHETHER THE COMPLETE STATEMENTS IS TRUE (T) OR FALSE (F) BY PRINTING AN X IN THE BOX IN THE COLUMN HEADED T FOR TRUE OR F FOR FALSE.

(iii) IF YOU DO NOT KNOW WHETHER THE COMPLETE STATEMENT IS TRUE OR FALSE, PRINT THE X IN THE COLUMN HEADED D (FOR DO NOT KNOW).

(iv) A CORRECT RESPONSE EARNS YOU PLUS ONE MARK. AN INCORRECT RESPONSE EARNS MINUS ONE - HALF OF A MARK. AN X IN THE D COLUMN EARNS YOU ZERO MARK. ANY UNANSWERED OPTION COUNTS AS WRONG.

In symbiotic relationships

(a) Commensalism is an association beneficial to both organisms
(b) Mutualism is where one organism benefits and the other does not
(c) Parasitism is where one organism benefits at the expense of the other
(d) Inguilism is where one organism lives in another but does not alter its life cycle
(e) Phoreis is where a smaller organism uses a larger organism as transport host

These statements define hosts

(a) Definitive host is where sexual reproduction takes place
(b) Intermediate host is where a sexual reproduction takes place
(c) Reservoir hosts are those that harbour parasite but not necessarily cause disease
(d) Paratenic hosts are accidental hosts
(e) Incidental hosts are those that the parasite lives on the host but no morphological changes take place

LIPIDS

[illegible] fatty like substances insoluble in water but are soluble in other [illegible] like benzene, chloroform, ether and hot alcohol
[illegible] adipocytes, bone marrow and animal [illegible]
[illegible] plant seeds like sunflower, maize, groundnuts, fruits like [illegible]
[illegible] polar and non polar end

- [illegible] structural components in cell membrane - phospholipids
- [illegible] as essential sources of energy rich foods and cooking oils
- [illegible] shock absorbers prevent organs from mechanical injury
- [illegible] they are used in the manufacture of fats, soap, candles, paints [illegible] industrial manufacture
- [illegible] carriers of fat soluble vitamins
- [illegible] serve as means of transporting proteins in blood
- [illegible] lipids serve as electric insulators allowing rapid propagation of waves along myelinated nerves.
- [illegible] serve as insulators between the cells and the environment
- Are sources of essential fatty acids like linoleic, linolenic and arachidonic

There are three main classes of fatty acids

- Simple lipids
- Compound lipids
- Derived lipids

Simple lipids
[illegible] esters of fatty acids with various alcohols
Are divided into two main classes

- Saponifiable e.g. neutral fats e.g. triglycerides from corn oil, olive oil, butter fat, adipose tissue etc.
- *Triglycerides can be classified into simple(consist of fatty acids of the same class) and mixed triglycerides(consist of triglycerides of different classes)* - R not the same
- Non-saponifiable e.g. beeswax, steroids, esters of Vit E and A

Compound lipids:
Contain more groups than just glycerol and fatty acids
Are divided into five main classes

- Lipoproteins: *Lipids + Proteins + carbohydrate*
- Phospholipids-*made up of glycerol + 2 molecules of fatty acid + nitrogenous base + H_3PO_4*

MOI UNIVERSITY

SCHOOL OF MEDICINE
END OF YEAR EXAMINATION (EVE) 2008/2009
COURSE TITLE: INTRODUCTION TO COMMUNITY HEALTH (COBES I)
COURSE CODE: (CBS 100/MSB 105)
PROGRAMME: M.B.Ch.B, B.Sc NURSING YEAR OF STUDY: 1(ONE)
DATE: 28TH OCTOBER, 2009 TIME: 09.00 A.M. - 12.00 NOON

GENERAL INSTRUCTIONS:-

(i) Write your University Registration Number on every piece of paper you use.

(ii) Do not write your names on any piece of paper you use.

(iii) This paper consists of two (2) sections headed, Section A – Multiple Choice Questions (MCQs) Type II and Section B – Short Answer Questions (SAQs). These are to be answered in a total time of three (3) hours.

(iv) Follow the instructions as indicated in each section.

(v) Questions in each section must be answered in separate answer booklets/sheet, so that they can be handed in separately at the end of the examination.

(vi) Read carefully any additional instructions preceeding each section.

SAQ 14 (a) State the three services offered to clients when they visit the MCH/FP clinics (3 minutes)

(b) Health education is an important aspect in the care of clients attending the MCH/FP clinic. List any four (4) topics you would include in your health education of the pregnant mother (4 minutes)

SAQ 15. In a COBES I Community attachment, students found that the three most common sexually transmitted diseases were syphilis, herpes, genitalia and gonorrhoea.

(a) Indicate the causative agent for each
(b) List five other sexually transmitted disease and for each STD listed indicate the causative agent
(c) Outline the different classifications of STDs
(d) Outline interventions to prevent STDs (14 minutes)

4. Molecular mechanisms that control the catalytic activity of enzymes include all of the following except

(a) Feedback inhibition
(b) The binding of regulatory proteins
(c) Covalent modification
(d) Proteolytic cleavage
(e) The binding of hydrophobic site of the enzyme

5. Hydrolysis of maltose yields

(a) Glucsoe + glucose → Maltose
(b) Glucose + galactose → Lactose
(c) Galactose + fructose
(d) Glucose + fructose → Sucrose
(e) Glucose + mannose

6. Which sugar is structurally odd among the following?

(a) α-D-Glucose
(b) α-D-Galactose
(c) β-D-Glucose
(d) α-D-Mannose
(e) α-D-Fructose

7. Which of the following amino acids dose not have aliphatic side chain?

(a) Glycine
(b) Alanine
(c) Histidine
(d) Leucine
(e) Valine

8. Spontaneous oxidation of polyunsaturated fatty acids yields

(a) Fatty aldehydes
(b) Acrolein
(c) //Drying oils
(d) Ketone bodies
(e) Short chain saturated fatty acids

9. Which of the following fatty acids has highest melting point?

(a) Ricinoleic (10)
(b) Stearic (70)
(c) Arachidonic (-50)
(d) Oleic (11)
(e) Cerebronic (80)

(e) Value

Dissociation constant Ka for AH can be represented by which of the following expressions?

(a) $\frac{[H^+][A^-]}{[AH]}$

(b) $\frac{[H^+][AH]}{[A^-]}$

(c) $\frac{[AH][A^-]}{[H^+]}$

(d) $[H^+][A^-]$

(e) $[H^+][AH]$

The number of chiral centres in glucopyranose is

(a) 2
(b) 3
(c) 4
(d) 5
(e) 6

Which one of the two are anomers?

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In the enzyme commission number is 2.7.1.1, what does the digit 7 represent?

(a) Subclass of phosphoryl group transfer
(b) Subclass of isomerase

(b) 3
(c) 4
(d) 5
(e) 6

15 Which one of the following is not a glycolipid?
(a) Cerebroside
(b) Lapolin
(c) Ganglioside
(d) Sulpholipid
(e) Proteolipid

16 Which of the following chemical property of monosaccharides is specific to pentoses?
(a) Cyanohydrin reaction
(b) Furfural formation
(c) Osazone formation
(d) Formation of saccharic acids
(e) Hemiketal condensation

17 Parallel lineanweaver-Burk plots for a particular enzyme occurs in the presence of
(a) Competetive inhibitor
(b) Un-competetive inhibitor
(c) Non-competetive inhibitor
(d) Dis-competetive inhibitor
(e) Zero amount of inhibitor

18 Which one of the following is not a triacylglycende?
(a) Lard
(b) Corn oil
(c) Butter fat
(d) Cerumen
(e) Olive oil

19 The main features of secondary structure of proteins are
(a) α - helix and triple helix
(b) α-helix and β-pleated sheets
(c) triple helix and β-pleated sheets
(d) α-helix, triple helix and β-pleated sheets
(e) pepude bond and triple helix

20 Water has the following except
(a) It is highly cohesive
(b) It is a polar molecule
(c) Solvates hydrophobic molecules
(d) Solvates hydrophilic molecules
(e) Pure water forms no H-bonds

Describe the main features of
(i) Acid-base catalysis
(ii) Catalysis by strain

Write specific examples differentiate anomers from epimers

Describe the Ninydrin reaction

(e) Part of organic [illegible]

Which of the following metal ions does not function as a cofactor of an

(a) Mn^{--}
(b) Fe^{--} [illegible]
(c) Zn^{--}
(d) Ca^{--}
(e) Cu^{++}

The catalytically active unit of an enzyme is called — protein part of an enzyme

(a) Proenzyme
(b) Activator
(c) Coenzyme
(d) Apoenzyme
(e) Holoenzyme

In the absence of allosteric inhibitor, allosteric enzymes would exhib

(a) Reversible inactivation
(b) Sigmoidal velocity curves
(c) Hyperbolic saturation kinetics
(d) Competitive type kinetics
(e) Non competitive type kinetics

In concerted model for allosteric interaction, substances that bind pr

(a) Allosteric inducers
(b) Allosteric inhibitors
(c) Allosteric activators
(d) Co-repressors
(e) Proenzymes

Describe the differences between starch and cellulose and

Which of the following amino acid has a basic group side chain?

(a) Alanine
(b) Leucine
(c) Methionine
(d) Lysine

27. Which of the following applies to

(a) Rape is an indication
(b) Male partner disapproving of regular contraception is the commonest indication
(c) Postor is taken within the first 72 hours of the sortical event repeated after 12 hours
(d) The protection rates are the same as that for combined pill taken as a regular contraceptive
(e) The strategy has the added advantage of protecting against pelvic infections

28. Which is applicable to pap smear

(a) It is the diagnostic test for cervical cancer
(b) The test is best done premenstrually
(c) Pregnancy is one of the contraindications
(d) The spatula used is called Ayre's spatula
(e) Bloody smear is necessarily inadequate for the test

29. These are measures of spread

(a) Mean
(b) Standard deviation – Measures of spread
(c) Range – Measures of spread
(d) Mode
(e) Interquartile Range – Measures of spread

30. Concerning Sampling

(a) It is the process of selecting a part of the population
(b) It is a procedure used to achieve greater scope in field studies
(c) It is only applied to obtain subjects/objects for study when the entire population cannot be studied
(d) Used whenever finances are a limitation to the researcher
(e) The results obtained from sample studies are only estimates actual population parameters

31. Concerning continuous data

(a) Measures of central tendency can be interpreted
(b) Measures of dispersion can be interpreted
(c) A Box-and-whisker plot can be drawn
(d) A Bar graph can be obtained
(e) Stem-and-leaf plot can be drawn

SECTION B: SHORT ANSWER QUESTIONS (SAQs)
(120 minutes)

INSTRUCTIONS:

I) THERE ARE FIFTEEN (15) QUESTIONS IN THIS SECTION
II) ANSWER ALL THE FIFTEEN (15) QUESTIONS
III) START EACH QUESTION ON A FRESH PIECE OF PAPER.

SAQ 1. Discuss briefly the importance of community entry in research. (10 minutes)

SAQ 2. Outline the characteristics of qualitative research. (10 minutes)

SAQ 3. One of the rotation undertaken during COBES I OPS is maternal child health and family planning. State what takes place with respect to maternal child health. (4 minutes)

SAQ 4. State three (3) purposes why people use contraceptives. (3 minutes)

SAQ 5. A child comes to the well child clinic at 10 weeks gestation.

(a) List the immunizations the child will receive on this day. (5 minutes)
(b) At what age will this child be started on vitamin A? (1 minute)

SAQ 6. List two malaria vectors and describe their control methods. (9 minutes)

SAQ 7. List three (3) objectives of the National Health Sector Strategic Plan II. (6 minutes)

SAQ 8. Define cost sharing. Name the principles of healthcare financing at District level. (6 minutes)

(f) Cerebronic — 80°
(g) Lignoceric 85°
(h) Arachidonic — -50°
(i) Linolenic — -11°
(j) Stearic — 70

13. Which of the following fatty acids can form a less stable cis isomer?
(f) Linolein
(g) Palmitic
(h) Stearic
(i) Elaidic
(j) Caprylic

Saturated

4. Sphingomyelin is present in all of the following except
(f) Plasma membrane
(g) Nerve myelin membrane
(h) Ganglion cells of CNS
(i) Bile acids
(j) Spinal cord

Which of the following lipids is a precursor of lactose?
(f) Lysolecithin
(g) Cephalin (phosphatidyl serine)
(h) Sphingomyelin
(i) Kerasin
(j) Phosphatidyl choline (lecithin)

Apoenzyme is best defined as a
(f) Catalytically inactive enzyme
(g) Catalytically active enzyme — holoenzyme
(h) Nonprotein part of the enzyme — prosthetic
(i) Posthetic portion of the enzyme
(j) Part of organic portion of the enzyme

Which of the following metal ions does not function as a cofactor of a
(f) Mn^{++}
(g) Fe^{++} — ferritin (protein) in RBC
(h) Zn^{++}
(i) Co^{++}
(j) Cu^{++}

The catalytically active unit of an enzyme is called
(f) Proenzyme — is an inactive protein in an enz
(g) Activator
(h) Coenzyme — activated enzyme (activator)
(i) Apoenzyme — catalytically inactive form of an en
(j) Holoenzyme

In the absence of allosteric inhibitor, allosteric enzymes would exhib
(f) Reversible inactivation
(g) Sigmoidal velocity curves
(h) Hyperbolic saturation kinetics

1. Which of the following does not occur in nucleosides?
   (f) α-D-Glucose
   (g) β-D-Glucose
   (h) α-D-Galactose
   (i) β-L-Galactose
   (j) α-D-Fructose

2. Hydrolysis of lactose gives
   (f) Glucose + fructose
   (g) Two glucose molecules
   (h) Glucose + galactose
   (i) Galactose + fructose
   (j) Glucose + ribose

3. Ice melts to water when
   (f) The container of ice is warmed
   (g) The temperature is equal to 0°C
   (h) Greater attractive forces appear
   (i) Molecules become less randomly oriented
   (j) Molecules become more randomly oriented

4. The boiling point of any liquid is
   (f) 100°C
   (g) The temperature at which vapor pressure is equal to osmotic pressure
   (h) The temperature at which many molecules leave the liquid as return to it
   (i) The temperature at which no molecules can return to the bulk of the liquid
   (j) The temperature at which vapor pressure is equal to external pressure

5. An amino acid that is incompatible with α-helix is
   (f) Tyrosine
   (g) Glycine
   (h) Histidine
   (i) Proline
   (j) Phenylalanine

6. An amino acid that contains a disulfide bond is
   (f) Cysteic acid
   (g) Methionine
   (h) Homocysteine
   (i) Cystine Cysteine + cysteine → cystine.
   (j) Lysine

7. Which of the following amino acids has two asymmetric carbon atoms?
   (f) Valine
   (g) Serine
   (h) Threonine, Uneven
   (i) Methionine
   (j) Glycine

8. HCOOH can change electrophoretic properties of peptides containing
   (f) Lysine, Arginine & histidine
   (g) Threonine
   (h) Tyrosine
   (i) Cysteine
   (j) Hydroxylysine

9. In electrophoresis, if pH is above isoelectric point, a protein will
   (f) Migrate to anode
   (g) Migrate to cathode
   (h) Cease to migrate in the pH
   (i) Form a zwitterion
   (j) Precipitate

10. [illegible] structure of a protein is stabilized by
   (f) Ionic bonds
   (g) Peptide bonds
   (h) Hydrogen bonds
   (i) Disulfide bonds
   (j) Hydrophobic bonds

11. Which of the following fatty acids is essentially insoluble in water?
   (f) Caproic
   (g) Butyric
   (h) [illegible]

Essential fatty acids.

Linoleic acid

Linolenic acid

The above must be obtained from the diet.

Non-Essential fatty acids.

They are non-obligatory in the diet

LIPIDS

- structural components in cell membrane - phospholipids
- used as essential sources of energy rich foods and cooking oils
- shock absorbers - prevent organs from mechanical injury - e.g. adipose tissue
- used in the manufacture of fats, soap, candles, paints
- industrial manufacture
- carriers of fat soluble vitamins
- act as means of transporting proteins in blood
- act as electrical insulators allowing rapid propagation of waves along myelinated nerves.
- act as insulators between the cells and the environment
- sources of essential fatty acids like linoleic, linolenic and arachidonic

There are three main classes of fatty acids

- Simple lipids
- Compound lipids
- Derived lipids

Simple lipids - e.g. fats and oils

Simple lipids are esters of fatty acids with various alcohols

Simple lipids are of two main classes

- Saponifiable e.g. neutral fats e.g. triglycerides from corn oil, olive oil, butter fat, adipose tissue etc
- Triglycerides can be classified into simple(consist of fatty acids of the same class) and mixed triglycerides(consist of triglycerides of different classes) R not the same
- Non-saponifiable e.g. beeswax, steroids, esters of Vit E and A

18. Which of the following is a structural polysaccharide?

(a) Starch
(b) Inulin
(c) Dextrin
(d) Cellulose
(e) Glycogen

19. Which of the following is a non-volatile fatty acid?

(a) Caprylic
(b) Capric
(c) Lauric
(d) Butyric
(e) Caproic

20. Which of the following is not an oxidative product of carbohydrates?

(a) Ascorbic acid
(b) Ribitol
(c) Uronic acid
(d) Saccharid acid
(e) Aldonic acid

Dennis XI 10/15

4 Which of the following is an essential fatty acid?

(a) Stearic acid - saturated
(b) Linoleic acid - unsaturated
(c) Oleic acid - unsaturated
(d) Cerebronic acid - hydroxyl
(e) Lignoceric acid

Essential F.A.
linoleic
linolenic
Arachidonic

Oleic, linoleic, linolenic, Arachidonic

5. Which of the following is a mixed triglyceride?

(a) Dipalmitostearin - palmitic, stearic - simple
(b) Oleodipalmitin - oleic, palmitic (oleic, Palmitoleic acid)
(c) Tripalmitin - simple - Palmitic
(d) Triolein - simple - Oleic acid
(e) Oleodistearin - oleic, stearic

Which one of the following amino acids does NOT posses an aliphatic side chain

(a) Glycine - aliphatic
(b) Serine - Hydroxyl
(c) Alanine - Aliphatic
(d) Valine - Aliphatic
(e) Leucine - Aliphatic

Glycine
Alanine
Valine

Which of the following amino acids contains sulphur in its structure?

(a) Aspartic acid - Acidic
(b) Asparagine - Acidic
(c) Histamine - Acidic
(d) Arganine - Basic
(e) Methionine & Cysteine

What is the number of amino acid per turn of an alpha helix of a protein?

a) 1
b) 2
c) 36
d) 18

13. Which of the following is not a phospholipid?

(a) Cephalin
(b) Lecithin
(c) Cariolipin
(d) Glycolipid
(e) Sphingomyelin.

14. Compounds containing a carbohydrate and a non carbohydrate residue are called:

(a) Ascorbic acids
(b) Aldaric acids
(c) Glycosides
(d) Mannitols
(e) Sorbitals

15. Which of the following is not a derived lipid?

(a) Oleic acid
(b) Glyceride
(c) Acetone
(d) Glycerol
(e) Cholesterol

16. Hydrolysis of trehatose will yield:

(a) Two glucose residues
(b) Two fructose residues
(c) Galactose and glucose
(d) Two galactose residues
(e) Fructose and glucose

17. The hydrophilic portion of lipid bilayer membrane is made up of all of the following except:

(a) Phosphate unit
(b) Nitrogenous base
(c) Sugar residue
(d) Hydroxyl group
(e) Sphingosine

Glycolipids

They are cerebrosides made up of *sphingosine and a galactose sugar fatty acid, e g*

Functions of Glycolipids

- [illegible] cell membranes
- [illegible] reactive sugar for the fermentation of lactose

Physical Properties of Fatty Acids:

- Unsaturated fatty acids *have higher melting points* which is *increased with an* increase in the chain length
- Unsaturated fatty acids *have low melting points* which are further *lowered by* an increase in the no. *of double bonds*
- [illegible] have lower melting points than [illegible]
- Low molecular saturated fatty acids are soluble in water while those with short chains (volatile) are soluble in water
- All hydroxyl fatty acids have higher solubility than all the other classes solubility of a fatty acid is increased with the introduction by additional hydroxyl groups
- Fatty acids with a single double bond can exist in two form i e the cis and trans isomers for instance with oleic acid

Cis: acyl chain is on the same side of the double bond

Trans: acyl chains are on diff sides of the double bond

14:0	myristic acid
16:0	palmitic acid
18:0	stearic acid
18:1cisA9	oleic acid
18:2cisA9,12	linoleic acid
18:3cisA9,12,15	linolenic acid
20:4cisA5,8,11,14	arachidonic acid
20:5cisA5,8,11,14,17	eicosapentaenoic acid (omega-3 fatty acid)

Why cellulose is not digestible in humans
enzyme to break down the beta acetal linkages
lacking.
Cellulose is made of glucose molecules arranged in a beta
linkage

SECTION C II: SHORT ANSWER QUESTIONS (SAQs) (10 minutes)

INSTRUCTIONS:

I) THERE IS ONE (I) QUESTION IN THIS SECTION

II) ANSWER THE QUESTION

III) START THE QUESTION ON A SEPARATE PIECE OF PAPER OF THE BOOKLET

SAQ 1. Describe the differences between starch and cellulose and explain why cellulose is not digestible in humans.

(10 min

Starch amylose & amylopectin

contain α 1,4 linkages

Contain α 1,4 linkages with α 1,6 branches that pose hindrance for enzymatic action

Cellulose

> has linear chain residues
> β (1→4) glyc
linear ch side by side
> Hydrogen adjacent s structure
> Found in like wood

Cellulose

β 1,4 linkages
every glucose is flipped over
inter & intrachain bonds
Have rigid structure

Starch

major amyl

24. When putting a sterile glove on, you should:
a)
b) Choose gloves that are a size smaller for a good fit. X
T c) Not touch the inside of the wrapper with his/her hand
T d) With one bare hand, pick up the sterile glove
e) Be aware of where the gloved hands
25. Recognize that gloving techni
T a) To observe aseptic te

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4. An intramuscular drug can be administered through:
(a) F Calf muscles
(b) T Gluteal muscles
(c) T Deltoid muscles
(d) F Gastroinemious muscles
(e) F Boleus

5. The following descriptions apply when defining ethics:
(a) T A branch of philosophy
(b) T Actual standards of conduct
(c) T A science that studies the morality of human acts
(d) T Concerned with analyzing judgements and choices
(e) F Consistent beliefs attitudes old values

The following statements are true about self esteem in a patient:

a) Disease cannot destroy patient's self esteem.
b) Self esteem consist of the patient's need to be well though of himself and others.
c) It can be boosted by health education.
d) It can be enhanced by complying with patient's demands.
e) Recognizing patient's unique needs and treating him/her as a human being can promote a sense of esteem.

Oral drugs:

a) Are the easiest and commonly used method of drug administration.
b) Are the most effective drugs in reaching the site of action.
c) Have a prolonged effect than parenteral medication.
d) Have a higher onset of action compared to parenteral medication.
e) Are generally convenient to give to children.

With parenteral methods of drug administration:

a) These routes provide means of administration when oral drugs are contraindicated.
b) They are preferred when rapid absorption of drug is undesirable.
c) Are preferred if the patient is vomiting.
d) Requires less observance of aseptic technique.
e) One not appropriate with unconscious patients.

To avoid drug administration errors, you should:

a) Read drug labels carefully.
b) Take cognizance of drugs with similar names and packages before using them.
c) Question or seek clarification on abrupt and excessive increase in dosge.
d) Try and decipher illegible writing.
e) Administer drugs that are ordered by nickname or unofficial abbreviations without seeking clarification.

The following are precaution for drug administration in children:

a) Be careful when selecting intravascular sites in children.
b) Give medication to children without awakening them if they are asleep.
c) Do not offer juice or soft drink after swallowing a drug.
d) Use force to administer medication should the child turn to be unco-operative.
e) Use a plastic calibrated syringe to measure or prepare liquid dosage.

During the denial phase of death:

a) The patient avoids the reality.
b) The patient may attempt activities which he/she is not physically able to perform.
c) May not look artificially happy.
d) May fail to comply with medical therapy.
e) May isolate himself from sources of accurate information.

SECTION B:- MULTIPLE CHOICE QUESTIONS (MCQs)

TYPE III

INSTRUCTIONS:-

(i) EACH OF THE QUESTIONS IN THIS SECTION CONSISTS OF A STATEMENT/QUESTION WHOSE MOST APPROPRIATE COMPLETION/ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBERED (a) - (e).

(II) FOR EACH QUESTION, SELECT THE MOST APPROPRIATE OPTION AND INDICATE BY PRINTING AN X IN THE APPROPRIATE BOX IN THE ANSWER SHEET PROVIDED. IF YOU DO NOT KNOW THE ANSWER, PRINT 'X' IN THE BOX IN THE 'DK' COLUMN.

(III) A CORRECT RESPONSE EARNS YOU PLUS ONE MARK.

1. A clean hand wash:
   (a) Is a two minute hand wash using liquid soap
   (b) Is a three minute scrub using a surgical scrub solution
   (c) Is performed to remove debris and transient microorganisms
   (d) Is use of clean water in hand washing
   (e) Is use of a hand sanitizer

2. Which of the following is NOT a purpose of wound dressing?
   (a) Absorb drainage or debride a wound
   (b) Protect wound from microbial contamination
   (c) Provide low humidity to the wound
   (d) Provide thermal insulation
   (e) Maintain skin integrity

3. Normal faeces:
   (a) Are made up of a bout 75% water and 25% solid mass
   (b) Are made up of about 25% water and 75% solid mass
   (c) Are narrow and pencil shaped
   (d) Are pungent
   (e) Are oduorless

4. Grief is defined as:
   (a) An actual or potential situation in which something values is changed
   (b) The total response to the emotional experience related to loss
   (c) The subjective response experienced by the surviving loved ones after the death of a person
   (d) A behavioural process often influenced by culture, spiritual beliefs and custom
   (e) A people's way of mourning their loved one

4. In Michaelis-Menten Equation what does the term Km signify

(a) Enzyme concentration
(b) Substrate concentration
(c) Product
(d) Rate constant
(e) Half maximal rate constant

5. In the Lineweaver-Burk plot, the equation $\frac{Km}{V\,max}$ denotes

(a) ½ maximal velocity
(b) Substrate concentration
(c) Slope of the inhibition
(d) Velocity
(e) Km

6. Irreversible inhibitors are also known as

(a) Enzyme promoters
(b) Competitive inhibitors
(c) Non-competitve inhibitors
(d) Enzyme inactivators
(e) Un-competitive inhibitors

7. Deficiency of vitamin A would normally lead to which one of the following conditions

(a) Xerophthalmia
(b) Osteomalacia
(c) Neurologic disorders
(d) Haemorrhage
(e) Scurvy

8. Which one of the following is not a water soluble vitamin

(a) Folate
(b) Biotin
(c) Pantothenic acid
(d) Pyrodoxine
(e) Ascorbate

29. Which of the following buffer systems functions as a major regulation of intracellular PH?

(a) NH_3/NH_4
(b) Carbon dioxide – bicarbonate
(c) Phosphate buffer
(d) Protein
(e) Acetic acid/Acetate

30. Two sugars that differ from one another in the configuration around a single carbon atom are called

(a) Epimers
(b) Anomers
(c) Optical isomers
(d) Stereoisomers
(e) Aldoses

31. The number of isomers of α-D-glucose are

(a) 2
(b) 4
(c) 8
(d) 16
(e) 12

32. Monosaccharide units linked by α(1 ⟶ 4) glycosidic linkage are found in

(a) Maltose
(b) Sucrose
(c) Cellulose
(d) Cellobiose
(e) Chitin

33. A polysaccharide that is important in the storage of glucose units in plants is called

(a) Cellubiose
(b) Cellulose
(c) Starch
(d) Glycogen
(e) Chitin

(e) Valine

Dissociation constant Ka for AH can be represented by which of the following expression?

(a) $\frac{[H^+][A^-]}{[AH]}$

(b) $\frac{[H+][AH]}{[A^-]}$

(c) $\frac{[AH][A^-]}{[H^+]}$

(d) $[H^+][A^-]$

(e) $[H^+][AH]$

The number of chiral centres in glucopyranose is

glucose → 4

(a) 2

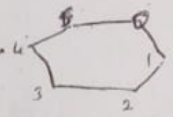
(b) 3

(c) 4

(d) 5

(e) 6

Which one of the two are anomers?



(a) D-glucose and L-glucose

(b) D-fructose and L-fructose

(c) α-D-glucose and β-D-glucose

(d) α-D-glucose and β-L-glucose

(e) α-D-fructose and β-L-fructose

Which is the main buffer in the extracellular fluid?

(a) Haemoglobin

(b) Bicarbonate

(c) Proteinate

(d) Phosphate intracellular

(e) Water

Which of the following amino acid contains sulphur?

(a) Lysine

(b) Isoleucine

(c) Aspartate

(d) Serine

(e) Cysteine

To which of the following levels of protein structure does myoglobin belong?

(a) Quaternary structure — haemoglobin

(b) Secondary structure

(c) Tertiary structure — Myoglobin

(d) Primary structure

(e) β-pleateal sheet

What is the normal pH range of human blood?

(a) 6.80 – 7.80

(b) 5.50 – 6.50

(c) 7.36 – 7.42

(d) 8.36 – 8.42

(e) 6.36 – 6.42

Sucrose – α(1-2) α(1-6) – bra... sig...
Starch – α(1-4)
Glycogen – α(1-4)
Maltose – α(1-4)
Lactose – β(1-4)
Cellulose – β(1-4)
Chitin – β(1-4)
Cellobiose – β(1-4)

The glycosidic bond between the two glucose residues in cellobiose is

(a) α(1 → 4) amylopectin, amylose

(b) α(1 → 2) sucrose

(c) α(1 → 6) Glycogen branches

(d) β(1 → 4) cellulose, cellobiose/ cellulose

(e) β(1 → 2) Sucrose

The main difference between a phosphatide and a glycosphingolipid is the following except

(a) A phosphatide has a glycerol moiety while glycosphingolipid does not

(b) A phosphatide lacks sphingosine moiety while glycosphingolipid has it

(c) A phosphatide has two fatty acids while a glycosphingolipid has one

(d) A phosphatide has a phosphate moiety while a glycosphingolipid lack it

(e) Ceramide is a moiety in glycosphingolipid and not in phosphatide

If the enzyme commission number is 2.7.1.1, what does the digit 7 represent?

(a) Subclass of phosphoryl group transfer

(b) Subclass of isomerases

(c) Subclass where alcohol is phosphoryl acceptor — 1

(d) Class or transferases — 2

Classification of lipids.

Simple lipids
- Triglycerides (neutral fats).
- Waxes.

Compound lipids.
1. Phospholipids.
2. Sphingolipids.
3. Glycolipids.

Phospholipids.
- Lecithin.
- Cephalin.
- plasmalogen.
- lipositol.
- Sphingomyelin.
- Phosphatidyl Choline / Phosphatidyl serine.
- phosphatidyl glycerol.

Glycolipids.
- Cerebroside.
- Gangliosides.
- Sulfolipid.
- Proteolipids.

Essential amino acids -
- Essential amino acids cannot be made by the body. As a result, they must come from food.
- The 9 essential amino acids are: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan & Valine.

Nonessential amino acids.
- Nonessential means that our bodies produce an amino acid, even if we do not get it from the food we eat.
- Nonessential amino acids include: Alanine, asparagine, aspartic acid & glutamic acid.

Conditional amino acids.
- Conditional amino acids are usually not essential, except in times of illness and stress.
- Conditional amino acids include: arginine, cystein, glutamine, tyrosine, glycine, ornithine, proline & serine.

Amino acids
1. Aliphatic R groups
   - Glycine.
   - Alanine.
   - valine.
   - Leucine.
   - Proline.
2. Aromatic R-groups.
   - Phenylalanine
   - Tyrosine.
   - Tryptophan.
3. Sulphur containing R groups
   - Cysteine.
   - Methione.
4. Hydroxyl or Alcohol containing R groups.
   - serine.
   - Threonine.

Negatively Charged / Acidic R grp.
- Aspartate.
- Glutamate.

Positively Charged / Basic R grp
- Arginine.
- Glycine.
- Histidine.

Concerning waves:

(a) Mechanicval wave requires medium for propagation
(b) Electromagnetic wave can travel through medium or vacuum
(c) Sound is an electromagnetic wave
(d) Ultrasound is a longitudinal wave
(e) Guitar string produces a longitudinal wave

The following electromagnetic waves are ionizing:

(b) X-rays
(c) Ultraviolet rays
(d) Microwaves
(e) Infrared

5. In Moi Teaching and Referral Hospital (MTRH) the following equipment are found:

(a) Ultrasound machines
(b) MRI
(c) Xrays
(d) Cyclotron
(e) CT scan

Radiation
Used to detect smoke
Treat cancer
Guide paperhangers
Sterilize medical equipment

Type of radiation:
alpha
beta
gamma
Lead stopper

SUBSECTION C (ii) – SHORT ANSWER QUESTION (SAQ) (5 mi

INSTRUCTIONS:

I) THERE IS ONE (1) QUESTION IN THIS SECTION
II) ANSWER THE QUESTION

SAQ 1: Find the frequency of blue light with a wavelength of 400nm. speed of light is 3.0×10^8 m/s.

$C = \lambda f \Rightarrow v = \lambda f$

$f = \frac{3.0 \times 10^8 \text{ m/s}}{0.4 \times 10^{-6}}$

$= f$

SECTION B: MICROBIOLOGY AND PARASITOLOGY (1[illegible] minutes)
SHORT ANSWER QUESTIONS (SAQs)

NSTRUCTIONS:

) THERE ARE FIVE (5) QUESTIONS IN THIS SECTION
I) ANSWER ALL THE FIVE (5) QUESTIONS
II) START EACH QUESTION ON A FRESH PAGE OF THE BOOKLET

AQ 1. Define the following terms:

(a) Parasite – organism adapted to live in/on an organism & derive benefits like food/transport & shel
(b) Ectoparasite – lives on surface of host organism but can lead
(c) Facultative parasite – can live freely but can lead
(d) Cominensal – coexist – one derive benefit
(e) Proglotid – segment in cestodes

(5 minutes)

AQ 2. Briefly describe general characteristics of human intestinal protozoa.

Flagella – for moement Anaerobic
Trophozite – attachment cuticle

(5 minutes)

AQ 3. Describe characteristics used for bacteriae classification.

(10 minutes)

AQ 4. Describe the morphological classification of fungi

(5 minutes)

AQ 5. Describe the fundamental differences between viruses and other living organisms.

(5 minutes)

ed
Unicellular – cryptococcus
d-like fungi
termediate btwn moulds & yeast
include candida
morphic fung
ust as mycelia in rtp and as
yeasts at 37°C; *candida albicans
olds

Viruses
Acellular
morphologically

other organs
Have cells
metabolically active
Have organelle