

One Year Diploma, Food Processing Examination 2014

Model Answer (I)

Subject:- Food Chemistry

Paper Code:-405103

Set (I)

Answer key

Group-A

Question No. 1 MCQ/Objective

- a-(i) a
- b-(ii) a
- c-(iii) c
- d-(iv) a
- e-(v) b
- f-(vi) a
- g-(vii) b
- h-(viii) c
- i-(ix) a
- j-(x) d

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Answer 2 (A)

Food Sources of minerals:-

Milk and milk products- Milk, butter, cheese, ice-cream, paneer etc,

Fish-

Eggs- Egg yolk, egg white

Pulses- rajmah etc.

leafy vegetables-peas, mushroom, potato etc

Fruits-Apple, orange, strawberry, grapes, plum etc

Cereal-Wheat (wheat germ, corn flakes, corn white, rice)

Importance:- Minerals are necessary for body-building, for building of bones, teeth, and structural parts of soft tissues. They also play a role in regulation of processes in the body, e.g. Muscle contraction, clotting of blood, nerve stimuli, etc.

Minerals have two distinct characteristics-

(i) Minerals elements do not provide energy.

(ii) Mineral elements are not destroyed during food preparation.

Minerals are constituents which remain as ash after the combustion of plants and animals tissues.

Mineral constituents are present relatively low concentration in food.

Mineral supply depends not only on the intake in food but primarily on the bioavailability, which is essentially to the composition of the food. They contribute to the food flavour and activate or inhibit enzyme-catalyzed and other reactions and they affect the texture of food.

Minerals classified as either major or trace, depending on their concentration in plants and animals.

Major mineral- Calcium, phosphorus, magnesium, sodium, potassium and chloride.

Trace mineral- Iron, zinc, iodine, selenium, chromium, copper, fluoride, lead and tin.

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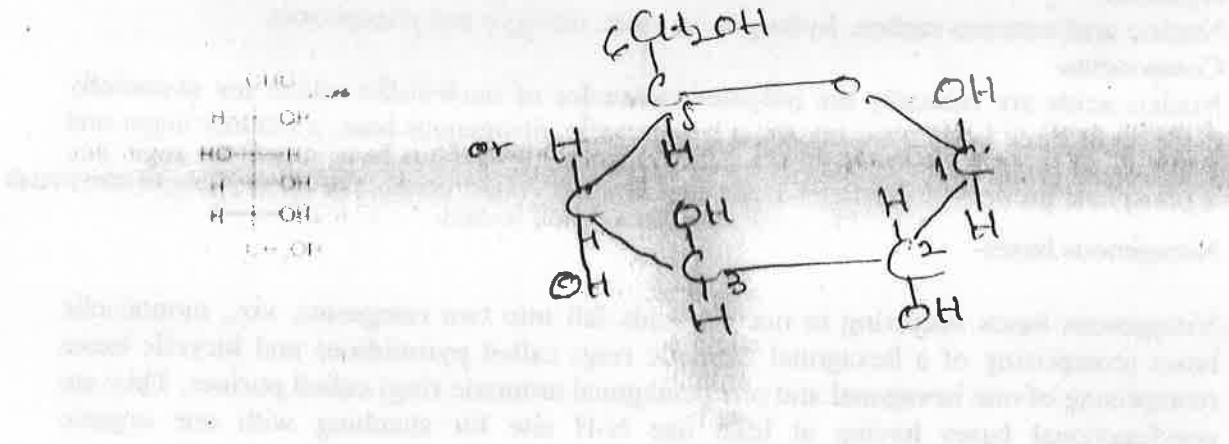
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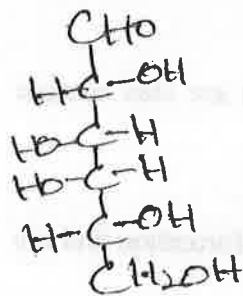
Set (I)

Answer 2 (B)

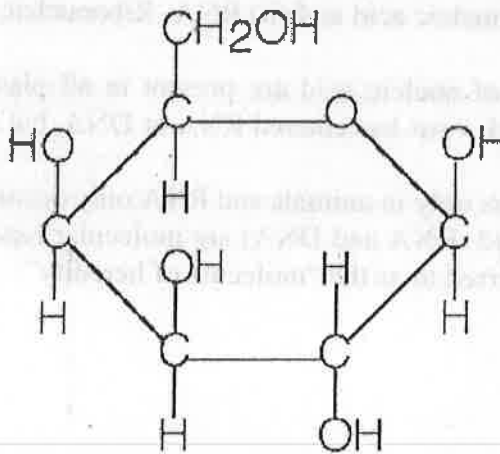
Structure of glucose-



Structure of galactose-



or



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Answer 2 (C)

Like protein, Nucleic acid are biopolymer of high molecular weight with mono nucleotide as their repeating units. Nucleic acid is hereditary determinants of living organism.

Nucleic acid contains carbon, hydrogen, oxygen, nitrogen and phosphorus.

Components-

Nucleic acids are basically the polymer molecules of nucleotides which are essentially made up of three basic components, a heterocyclic nitrogenous base, a pentose sugar and a phosphate group

Nitrogenous bases-

Nitrogenous bases occurring in nucleic acids fall into two categories, viz., monocyclic bases (comprising of a hexagonal aromatic ring) called pyrimidines and bicyclic bases (comprising of one hexagonal and one pentagonal aromatic ring) called purines. They are polyfunctional bases having at least one N-H site for attaching with one organic substitute

Classification of nucleic acid:- There are two types of nucleic acid-(i) DNA- Deoxyribonucleic acid and (ii) RNA- Ribonucleic acid

Both type of nucleic acid are present in all plants and animals. Virus are also contain nucleic acid, virus has entered RNA or DNA, but not both.

DNA occurs only in animals and RNA only occurs in plant.

Nucleic acid (RNA and DNA) are molecular repositories for genetic information and are jointly referred to as the "molecule of heredity"

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Answer 3 (A)

Carbohydrate is a basic food, accounting for a large portion of total nutrients intake.

Carbohydrates molecules consist of carbon, hydrogen, and oxygen atoms. Carbohydrates range from simple monosaccharides (glucose, fructose, galactose) to complex polysaccharides (starch, pectin).

Carbohydrates is a major constituent in food

Functions of carbohydrate:-

- (i) It is importance in a balanced daily nutrition.
- (ii) It acts as sweetening agents.
- (iii) It acts as a gel or paste forming and thickening agents.
- (iv) It acts as stabilizers.
- (v) It is used as a precursor for aroma and colouring substances.
- (vi) It provides energy in our body.

Answer 3 (B)

Quality, quantity and availability of water are critical factor in supporting our human civilization and standard of living.

Water hardness is classified into two categories-(i) hard water and (ii) soft water

Water hardness is basically due to the presence of di-cations including Ca^{2+} and Mg^{2+} . These ions enter a water support by leading from minerals.

Water hardness is further classified in two types (i) Temporary hardness and (ii) Permanent hardness

Temporary hardness is caused by the carbonates and bicarbonates of calcium and magnesium. This can easily be removed by boiling of water.

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Permanent hardness –presence of sulfates and chloride of calcium and magnesium are responsibly for permanent hardness of water. This kind of hardness is not removed by simple boiling but requires some complex operations.

The combined effect of temporary and permanent hardness is called as total hardness of water.

Hardness of water is expressed in terms of ppm of calcium carbonate.

Answer 3 (C)

Pectin:-Pectin or pectin substances are found universally in the primary cell walls and intercellular layers in plants. They are most abundant in young tissue. They are characteristic constituents of fruits e.g. citrus fruits contain 30% pectin. The pectin substances are a family of very closely **associated polysaccharides** which are very difficult to separate.

Pectin is used in relation to water-insoluble polysaccharides.

Starch:- Starch occurs widely in vegetables kingdom. The importance of starch in food processing is based on the fact that it provides a very high proportion of the world's food energy intake, over **80% of all food crops are composed of cereals and starchy crop.**

Starch occurs in nature in the form of microscopically small, spherical particles or granules whose size and shape are characteristics for each species.

It is formed in plants by the condensation of a large number of glucose molecules into two types of polymers.

The important sources of starch are-

- (a) Cereals and millets examples- maize, wheat, rice and
- (b) Roots and tubes e.g. potato, tapioca

Starch is a natural polymer of the sugar D-glucose.

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Group-B

Answer 4

Food enzyme:-Enzymes are biological catalysts which are proteinous in nature having a specific catalytic active centre.

In some cases enzyme contain a non-protein part called "cofactor".

Classification of enzymes:- The basic classification is the division of enzymes into six major classes and sets of subclasses, according to the type of reaction catalyzed.

Six major classes of enzymes are:-

1. Oxido-reductase-are involved in oxidation-reduction reactions. They oxidize or reduce substrate by transfer of hydrogen or electron or by oxygen. Example- catalase
2. Transferase-are involved in transfer of functional group. Example-glucokinase
3. Hydrolyses-are involved in hydrolysis reaction. These enzyme catalyze hydrolysis of ester, thioester, peptide, glycosyl by the addition of water. Examples-alkaline phosphatase
4. Lyases- are enzyme that catalyzed the cleavage of C-C, C-O, C-N by elimination. Example-fumarate hydratase
5. Isomerases- are involved in the catalysis of isomerizations within one molecule. Example-mutase
6. Ligases-are involved in the formation of bonds with ATP cleavage. They are involved in the biosynthesis of a compound with the simultaneous hydrolysis of a pyrophosphate bond in ATP.

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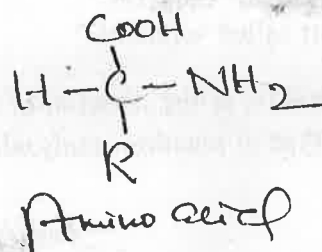
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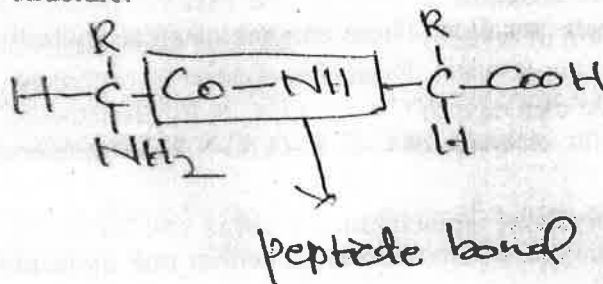
Answer 5 Definition:- Proteins are common constituents of all biological materials, which life is not possible. They are essential constituents of all living cells.

Proteins are large organic compounds, which contain carbon, hydrogen, oxygen and nitrogen. Some also contains sulphur, phosphorus, iron and other minerals.

Proteins are polymers of amino acid, which are linked together of peptide bond.



Proteins are polymers of 20 different amino acid joined together by peptide bond i.e. primary structure.



Classification of protein:- Proteins have been classified in many ways. Generally they are classified on the basis of composition, shape of molecules and solubility.

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(A) On the basis of composition-

On the basis of composition proteins are classified into three groups viz. simple protein, conjugated proteins and derived proteins.

1. Simple proteins-are the proteins which of only amino acids- they do not contain other class of compound.
2. Conjugated proteins- are proteins which consist of amino acids as well as other class of compound.

They are further classified into six subgroups:-

- i. Chromoprotein-Protein + colour pigment
 - ii. Glycoprotein-Protein + carbohydrate
 - iii. Phosphoprotein-Protein + Phosphorus
 - iv. Lipoprotein-Protein + lipid
 - v. Nucleoproteins- Protein + nucleic acid
 - vi. Metalloprotein- Protein + metal
3. Derived proteins:-They represent various stages of hydrolytic cleavage of simple or conjugated proteins e.g. proteoses, peptones etc.

(B) On the basis of shape of the molecules:-Proteins are classified into two main groups viz. fibrous protein and globular protein.

1. Fibrous protein- Fibrous protein are protein are long and thread or ribbon like structure. They are generally insoluble in water.

Examples- keratin, collagen etc.

2. Globular protein- Globular protein are spherical shape. They are generally soluble in water.

Examples- Hormones, haemoglobin etc.

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(C) On the basis of solubility:- Albumin, globulin, Glutelin, prolamins etc

Importance of proteins:-

- (i) It is essential constituents of all living cells.
- (ii) It is contribute to the flavour of food.
- (iii) It is precursor aroma compound and colour formed during thermal and enzymatic reactions in production, processing and storage of food.
- (iv) It is constituents significantly to the physical properties of food.
- (v) The most food supply sufficient amino acid for the purpose of building proteins.
- (vi) It provides energy.

Major food sources of proteins:- Casein from milk and milk products (paneer, ice-cream, cheese), meat, fish, eggs, fruits, beans, peas, cereals (wheat, millets, pulses), globulin in legumes.

Answer 6

Vitamins are organic substances, which occurs in small amounts in foods. They are necessary for life and growth.

Classification of vitamins:- Vitamins are classified into two groups on the basis of their solubility viz. fat soluble and water soluble vitamins.

Fat soluble vitamins includes- A, D, E and K

Water soluble vitamin-Vitamin includes the B-groups like B1, B2, B6, B12, niacin, pantothenic acid, folic acid and vitamin C.

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Fat soluble vitamins can be stored in the body and hence occasionally intake of very high sources may help the body. Not much of fat soluble vitamins are lost in normal cooking procedures.

Importance: Many food products are enriched or fortified with vitamins to adjust for processing losses or to increase the nutritive value.

Such enriched is important, particularly for fruit juices, canned vegetables, flour and bread, milk, margarine and infant food formulation...

Several vitamins have some desirable additional effects-Ascorbic acid is a dough improver but can play a role similar to Tocopherol as an antioxidant. Carotenoids and riboflavin are used as colouring pigments.

Examples of vitamins fortified food products-

Vitamins	Food products
B1	Cocoa powder, beverages
B2	Baked products, beverages
B6	Baked products
B12	Beverages
Pantothenic acid	Baked products
Folic acid	Cereals
Vit. C	Fruit drinks, desserts, flour
Vit. A	Skim milk powder, cereals, beverage
Vit. D	Milk and milk products

