

Biyani's Think Tank

Concept based notes

Practical Zoology

Animal Physiology

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Preface

I am glad to present this book, especially designed to serve the needs of the students. The book has been written keeping in mind the general weakness in understanding the fundamental concepts of the topics. The book is self-explanatory and adopts the “Teach Yourself” style. It is based on question-answer pattern. The language of book is quite easy and understandable based on scientific approach.

Any further improvement in the contents of the book by making corrections, omission and inclusion is keen to be achieved based on suggestions from the readers for which the author shall be obliged.

I acknowledge special thanks to Mr. Rajeev Biyani, *Chairman* & Dr. Sanjay Biyani, *Director (Acad.)* Biyani Group of Colleges, who are the backbones and main concept provider and also have been constant source of motivation throughout this endeavour. They played an active role in coordinating the various stages of this endeavour and spearheaded the publishing work.

I look forward to receiving valuable suggestions from professors of various educational institutions, other faculty members and students for improvement of the quality of the book. The reader may feel free to send in their comments and suggestions to the under mentioned address.

Author

Think – tank

Practical Zoology

Animal Physiology

Q.1 What is Blood ?

Ans. The blood consists of a fluid of complicated and variable composition , Plasma,in which are suspended erythrocytes , leukocytes and Platelets.

Q.2 What is serum?

Ans. When blood coagulates, the fluid that remains after separation of the clot is called serum.

Q.3 What is plasma?

Ans. The plasma are suspended erythrocytes (RBC's), leukocytes [WBC's] and platelets. By using an anticoagulant the formed elements can be separated from plasma.

Q.4 Name the type of cells present in human blood?

Ans. Human blood consists of three types of cell red blood cells or erythrocytes, white blood cells or leucocytes and blood platelets or thrombocytes.

Q.5 What is the function of blood platelets in blood?

Ans. Blood platelets helps in coagulation of blood. At the place of injury they break down and release an enzyme thromboplastin that initiates the mechanism of blood clotting.

Q,6 What is the function of hemoglobin ?

Ans. Hemoglobin is the main constituent of the RBC and carries out the important function of transportation of oxygen from lungs to various part of the body. To a lesser extent is transport back CO₂ from the body to the lungs

Q.7 What are anti coagulant's? Name them?

Ans. An anticoagulant the formed elements can be separated from plasma,

1. EDTA [Ethylene demine tetra acetic acid and]
2. Trisodium citrate
3. Heparin
4. ACD [Acid citrate Dextrose) --It is use in blood bank.

Q.8 Name the methods of hemoglobin estimation?

Ans. Methods of hemoglobin estimation-

1. Sahil's method
2. Cyanmethaemoglobin method
3. Sheared sanford oxyhaemoglobin method
4. Alkali haematin method
5. Gasometric method.

Q.9 What is haematocrit [PCV]?

Ans. PCV [packed cell volume]- it is the volume of RBC's expressed as a percentage of the volume of whole blood in the sample. The venous haematocrit is almost same as that obtained from a skin puncture.

Q.10 What are the difference between RBC's and WBC's?

Ans. RBC's are small, biconcave discs, they are most in number they do not have nucleus but are red in colour due to Hb. WBC's are large in size and nucleated. They are few in number and are not red in colour.

Q.11 Where are erythrocytes formed in the body ?

Ans. In the red bone marrow of the bones of pelvis, ribs, sternum, vertebrae, clavicle, scapula and skull. In infants all the bones contain the haemopoetic tissues.

Q.12 What is Anemia?

Ans. It is defined as reduction in the concentration of haemoglobin in the peripheral blood below the normal for the age and sex of the patient

Q.13 Name of disease where red blood cells are crescent or sickle-shaped?

Ans. Sickle cell anemia.

Q.14 What do you understand by the term haemolysis?

Ans. The bursting of red blood cells and release of hemoglobin is called haemolysis.

Q.15 Under which condition does haemolysis occur?

Ans. Haemolysis occurs when red blood cells are kept in a dilute or hypotonic solution.

Q.16 Why do not RBCs change their shape when kept in 0.9% NaCl solution?

Ans. 0.9% NaCl is an isotonic solution for RBCs. It means that it has the same concentration of water and solutes as is inside the cells, hence there is no change in their shape.

Q.17 What is crenation?

Ans. When RBC's are kept in a concentrated or a hypertonic solution, their plasma membranes collapse due to exomosis and show teeth like sharp edges, this is called crenation.

Q.18 What are main anticoagulants use estimation of PCV?

Ans. 1. Dried heparin, 2. EDTA or double oxalate are satisfactory anticoagulants.

Q.19 Name of the methods of PCV estimation?

Ans. There are two main method for estimation of PCV.

1. Wintrobe's tube
2. Micro haematocrit capillaries

Q.20 What is normal range of PCV?

Ans. In man – 43.52%, Average 47%

In Women – 38%to 47%, Average 42%

Q.21 How can we prepare WBC diluting fluid?

Ans. Turke's fluid is WBC diluting fluid

- Glacial acetic acid – 1.5 ml
- 1% aqueous solution of gentian violet – 1.0 ml
- D.W. -98.0ml

A pinch of thymol may be added to the diluting fluid to prevent growth of molds.

Q.22 Why do we use WBC. Diluting fluid?

Ans. It contains a weak acid to lyse the RBC's and a stain for staining the nucleus of white blood cells Eg turke's fluid.

Q.23 What is the composition of RBC diluting fluid?

Ans. Sodium citrate – sodium citrate – 3 gm

Formalin – 1 ml

D.W. – 100 ml

2. Hayen's fluid

Mercuric chloride – 0.5 gm

Sodium Chloride – 1.0 gm

Sodium Sulphate – 5.0 gm

D.W. - 200 ml Addition and filter and use

Q.24 Define the ESR [Erythrocyte sedimentation rate] ?

Ans. It is the rate at which erythrocytes sediment on their own weight when anti-coagulated blood is held in a vertical column. It is expressed as the fall of RBC's in mm at the end of first hour.

Q.25 How many methods are used in estimation of ESR?

Ans. There are mainly two methods

1. Westergren's method
2. Wintrobe method

Q.26 Write the full form of the following

1. MCV
2. MCH
3. MCHC

Ans. MCV – The mean cell volume

$$\text{MCV} = \frac{\text{Packed cell volume} \times 10^{15}}{\text{Red cell count/L}}$$

Red cell count/L

Normal range – Adults – 76 -96 fl

1 year children – 76- 87 fl

10-12 children – 76- 93 fl

2. MCH – the mean cell hemoglobin

$$\text{MCH} = \frac{\text{Hb in gm/l}}{\text{Red cell count}} \text{ pg}$$

Normal MCH in adults – 27 to 32 pg

3. MCHC – mean cell hemoglobin concentration

$$\text{MCHC} = \frac{\text{Hb in gm\%}}{\text{pcv}} \times 100$$

Q.27 What is bleeding time ?

Ans. The duration of bleeding from a standard puncture wound of skin is a measure of the function of platelets as well as the integrity of the vessel wall.

Q.28 What the normal range of bleeding time?

Ans. Six minute.

Q.29 what is clogulation system ?

Ans. Whole blood removed form the vascular system and exposed to a foreign surface will form a solid clot. Within limits the time required for the formation of the coagulation system.

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Stain's or dyes

Q.1 How can we prepare the following stains.

1. Leishman's stain
2. Giemsa Stain

Ans. Leishman's stain – Leishman's power – 0.15 gm

(Aceton free) methyl alcohol – 133 ml

All the powder dissolved, keep the stain in glass stoppered bottle do not filter.

2. Giemsa's stain:

Giemsa powder – 0.3 gms

Glycerine – 25 ml

Methyl alcohol – 25 ml

Q.2. Explain the Gram's Staining and difference between Gram's Positive & Gram's Negative?

Ans.: Gram's staining is most important differential technique used in bacteriology.

There are two groups - grams positive bacteria and gram negative bacteria.

S.No.	Characteristics	Negative Bacteria	Positive Bacteria
1-	Grams reaction	Dark-violator purple	Red or brown
2-	Cell wall composition	Low in lipids 1-4%	High in lipids (11-22%)
3-	Susceptibility to penicillin	More susceptible	Less susceptible
4-	Effect of basic dyes	Marked inhibition	Less inhibition
5-	Resistance to physical disruption	More resistant	Less resistant

Ex.:		Streptococci Mycobacterium leprae	Salmonella typhus Neisseria meningitides
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Q. 3 Write components of following Stains :

- Ans.:** (i) Gram's Stain
(ii) Fungal Stain
(iii) Acid Fast Stain
(iv) Haemaphysalin
(v) Negative stain

Ans.: (i) **Gram's Stain**

- (a) Crystal Violet (Hucker's)

Solution A

Crystal Violet (90% dye) - 3 gm.

Ethanol (95%) - 20 ml.

Solution B

Apmoi, Pxaate - 0.8 gms.

Distilled Water - 80 ml.

Prepare solution A & B separately, then mix & keep in a brown colour bottle.

- (b) Gram's Iodine

Iodine - 1.0 gm.

Potassium Iodide - 2.0 gm.

Distilled Water - 300 ml.

(c) Ethanol (95%)

Ethand (100%) - 95 ml.

Distilled Water - 5 ml.

(d) Safrarin

Safranine (2.5% solution prepared in 95% ethanol) - 10ml.

Distilled Water - 100 ml.

(ii) Fungal Stain

(a) Latophenol + Cotton blue

Lactic Acid - 20 ml.

Phenol Cry Stables - 20 gm.

Glycerol (Glycerin) - 40 ml.

Distilled Water - 20 ml.

Cotton Blue - 2 ml.

(iii) Acid Fast Stain

Carbol functisin (Ziehl's)

Solution A

Basic Fuchsia (90% dye content) - 3 gm.

Ethylalcohd (95%) - 10.0 ml.

Solution B

Phenol Crystals (CP) - 5.0 gm.

Distilled Water - 95.0 ml.

Acid Alcohol -

Ethyl Alcohol 95% - 97.0 ml.

HCl 37% - 3.0 ml.

Ethylene Blue

Methylene Blue

Methylene Blue (90% dye content) - 0.3 gm.

Distilled Water -100.0 ml.

(iv) Haematoxyline

Haematoxyline - 2.0 gm.

Glacial Acetic Acid - 10.0 ml.

Absolute Alcohol 100.0 ml.

Glycerol - 100.0 ml.

Potassium Alum - In excess

Distilled Water - 100.0 ml.

(i) Negative Stain (Nigrosin)

Nigrosin (water solude) - 10.0 gm.

Distilled Water - 100 ml.

Formation - 0.5 ml.

Bio Chemistry

Q.1 What are carbohydrates?

Ans. Carbohydrates are compound of carbon, hydrogen and O_2 with a general formula $C_n H_{2n} O_n$. the composition of hydrogen and oxygen is same as is present in water and hence carbohydrates are known as hydrates of carbon.

Q.2 What do you understand by the term sugar? Give two example?

Ans. Sugar are carbohydrates that are sweet in test
Exam – Cane sugar and glucose .

Q.3 Name one non reducing sugar?

Ans. Sucrose or cane sugar is a non reducing sugar.

Q.4 What are reducing sugar? Name them

Ans. A sugar with a free aldehyde or a ketone group is called reducing sugar exp – glucose

Reducing sugar can reduce cupric [Cu^{++}] to the cuprous form.

Q.5 Name the forms in which carbohydrates are stored in plant and animals?

Ans. Carbohydrates are stored as starch in plants and as glycogen in animals.

Q.6 What is the need to perform benedict's test?

Ans. To confirm the presence of reducing sugar in the reaction mixture. As the starch is hydrolysed or digested by salivary amylase, the starch converted into simple sugar.

Q.7 Name of the sugar which is converted into starch by salivary amylase?

Ans. Maltose, a disaccharide. It contains two molecules of glucose.

Q. 8 Which form of carbohydrate is soluble in water?

Ans. Sugar

Q. 9 Name the reagents used for testing of the presence of reducing sugar in food sample?

Ans. Fehling's solution and benedict's reagent.

Q. 10 Name the sugar found in blood?

Ans. Glucose

Q.11 Name two food stuffs rich in starch?

Ans. Potato and rice

Q. 12 What are lipids?

Ans. Lipids are the esters of fatty acids and glycerol

Q. 13 What is the basic unit of a protein?

Ans. Amino acids

Q.14 Why are proteins necessary in our diet?

Ans. Proteins are essential for the growth of the body and for the repair of the damaged tissues.

Q.15 Why milk is called a complete food?

Ans. It contains three basic components of food i.e. carbohydrate, fat and protein in sufficient amount.

Q.16 What is buffer water?

Ans. It is a solution which tends to keep its original PH even on addition of small amount of alkali or acid [buffer powders ready for use, to be dissolved in D.W.]

Q.17. How can we made buffer solution?

Ans. Solution no. 1.-

NaOH [Sodium Hydroxide] – 8 gm

D.W. 1000 C.C.

Solution No.2 -

[KH₂ PO₄ (Ranbosy)]-----27.2gm

D.W. -----1000cc

Take 237 cc of solution E, add to it 50 cc of solution II add 20 cc of the above mixed solution to 1000 CC of D.W. this has a ph of 6.8

Q.18 What is a hypotonic solution?

Ans. A hypotonic solution has a lower solute concentration than inside a cell. It is also called a dilute solution. Solution having a concentration of less than 0.9 % NaCl is a hypotonic solution.

Q.19 What is hypertonic solution?

Ans. A hypertonic solution, has higher concentration of solute than inside the cells. It is also called as concentrated solution. The solution having a concentration of more than 0.9% NaCl is hypertonic solution for RBC's.

Enzymology

Q.1 What are enzymes?

Ans. Enzymes are biocatalysts, required for almost every reaction in the body.

Q.2 How are enzymes similar to catalysts?

Ans. Enzymes similar to catalysts-

1. Both remain unchanged at the end of the reaction.
2. Both are required in minute quantities.
3. Both make short lived complexes
4. Both do not alter the equilibrium of a reversible.

Q.3 What is the effect of temperature or the activity of enzymes?

Ans. Enzymes work best at an optimum temperature or about 37°C they get inactivated at low temperature and denatured at high temperature.

Q.4 Define optimum temperature?

Ans. At an optimum there is maximum activity of the enzyme.

Q.5 What is denaturation?

Ans. Enzymes are made up of proteins. Denaturation is the loss of the specific three dimensional structure of a protein molecule. A denatured enzyme can not perform normal biological functions.

Q.6 What is the optimum PH of salivary amylase?

Ans. PH of 6.8

Q.7 What is the effect of PH enzyme?

Ans. The enzymes work efficiently over a narrow PH They work best of their optimum PH. When PH is altered above or below this value, their activity gets reduced.

Q.8 Name of the glands that produce saliva into body?

Ans. These are paratid glands, submaxillary glands, and sublingual glands.

Q.9 Name of the sugar which is converted into stasch by salivary amylase?

Ans. Maltose, a disaccharide. It contains two molecules of glucose.

Q.10 What is the function of saliva?

Ans. The mucous in soliva moistens and lubricates the food and makes its easier to swallow while salivary amylase digests starch first to dextrans and then to diasaccharide maltose. The lyso enzymes of saliva help to break down the pathogenic micro organism, of the buccal cavity.

Q.11 What is the effect of alcohol on salivary amylase?

Ans. Alohol causes denaturation of the enzyme salivary amylase. This denatured enzyme losse its three dimensional configuration hence is unable to carry out its normal function.

Q.12 Name some enzymes, involved in digestion of protein is human?

Ans. Pepsin, trypsin, erepsin and chymotrypsin

Q.13 What is an achromic point?

Ans. It is a time when starch has been complete digested by salivary amylase.

Q.14 How is the presence of starch tested in the reaction mixture?

Ans. If iodine gives a blue colour with the reaction mixture, it shows the presence of starch in it.

Q.15 Name of common available preservative?

Ans. Formalin is common available preservative. Formalin is 40% aqueous solution of formaldehyde.

Q.16 Common narcotizing and killing agents used for various types of animals are:

Ans. Chloroform, Ether and Alcohol.

