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# NORTH MAHARASHTRA UNIVERSITY, Jalgaon 425 001

## Syllabus for S.Y. B.Sc.

# BIOCHEMISTRY.

**(W.E.F. JUNE, 2003)**

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# NORTH MAHARASHTRA UNIVERSITY, JALGAON.

## CORRECTIONS.

## S.Y.B.Sc. Biochemistry.

### Paper-III : Food & Nutrition.

| Unit | Number of periods alloted | Number of marks alloted |
|---|---|---|
| 1 | 17 | 16 |
| 2 | 17 | 16 |
| 3 | 17 | 16 |
| 4 | 18 | 18 |
| 5 | 18 | 18 |
| 6 | 17 | 16 |
| | **Total=104** | **Total=100** |

### Paper-IV : Human Physiology.

| Unit | Number of periods alloted | Number of marks alloted |
|---|---|---|
| 1 | 17 | 16 |
| 2 | 17 | 16 |
| 3 | 18 | 18 |
| 4 | 17 | 16 |
| 5 | 18 | 18 |
| 6 | 17 | 16 |
| | **Total=104** | **Total=100** |

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# NORTH MAHARASHTRA UNIVERSITY, JALGAON.

## SYLLABUS FOR S.Y.B.Sc. BIOCHEMISTRY.

## (With Effect from June, 2003)

### Syllabus Structure.

| | | |
|---|---|---|
| **Paper-III** | : | **Food & Nutrition** |
| **Paper-IV** | : | **Human Physiology** |
| **Practical Course-II** | : | **Laboratory course in Food Analysis and Physiology** |

**Each theory course has been divided in six units. Each unit is supposed to be taught in about 16 lectures, each of 45 min. duration.**

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# NORTH MAHARASHTRA UNIVERSITY, JALGAON.

## SYLLABUS FOR S.Y.B.Sc. BIOCHEMISTRY.
## (W. E. From June, 2003)

## Paper - III: Food and Nutrition

### Unit - I: Energy Value of Foods and Methods of Measurements

- Basic food groups.
- Fuel value of carbohydrates, fats and proteins, BMR, factors affecting BMR.
- Units of energy, direct and indirect calorimetry, respiratory quotient (RQ), specific dynamic action (SDA).
- Effect of cooking on various nutrients like, carbohydrates, proteins, fats and vitamins

### Unit - II: Protein Nutrition

- Protein foods, concept of essential and non-essential amino acid Nutritional significance of proteins from milk, legumes, egg, meat, fish.
- Protein efficiency ratio, biological value, digestibility coefficient.
- Biochemical changes and treatment of protein malnutrition (Kwashiorkar & marasmus).

### Unit - III: Lipid Nutrition

- Composition, sources of fats and oil, functions, utilization in the body, required daily allowances, deficiency and excess.
- Concept of essential fatty acids, biochemical and physiological functions of essential fatty acids.
- Obesity: definition, etiology, occurrence, and complications of obesity, prevention and treatment. Atherosclerosis, role of cholesterol.

### Unit -IV: Water and Mineral Metabolism

- Significance of water in metabolism, dehydration and oedema.
- Sources and significance of calcium and phosphate metabolism.
- Role of iron, Mg, and Zn in energy metabolism.
- Iodine metabolism.
- Significance, preservation of physiological pH and, anion and cation balance.
- Acid-base balance in body fluids.

### Unit - V: Food Analysis, Food Preservation & Processing

- Principles of food analysis for reducing sugars, protein, lipids, minerals and moisture.
- Contamination of food: various contaminants, microbial *(Clostridium botulinum, Staphylococcus aureus, Aspergillus)* and chemical (Hg, Cd, Pb).
- Antinutritional factors: afla-toxins, lathyrism and trypsin inhibitor.
- Aims of food processing.
- Food Preservation: methods and principles of chemical, physical and biological preservation, effect of antioxidants.

### Unit – VI: Therapeutic Diets

- Balanced diet
- Types of therapeutic diet, high and low calorie diets
- Representative diets in various ailments — diabetes, cardio vascular diseases, kidney diseases and gastrointestinal diseases, brief rationale for each type of diet.

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**Recommended Books:**


1. Nutrition & Dietetics - Shubhangi Joshi
2. Human Nutrition and dietics - S. Davidson
3. Principles of Nutrition - E.D. Wilson
4. Handbook of Food and Nutrition - M. Swaminathan.
5. Applied Nutrition - R. Rajlaxmi


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## Paper -IV : Human Physiology

**Unit - I: Biochemistry of Blood**

- Chemical composition of blood.
- Morphological structures and functions of blood elements.
- Blood groups, A, B, AB, 0 & Rh system, significance in blood transfusion.
- Blood clotting factors and mechanism of coagulation.
- Composition and functions of Lymph.

**Unit -II: Respiratory System**

- Structure and function of lungs.
- Mechanism of inspiration and role of oxygen transport.
- Mechanism and role of expiration / $CO_2$ transport.
- Significance of respiratory system.
- Bohr Effect and its mechanism
- Acid-base balance and its maintenance.

**Unit - III: Digestive and Endocrine System**

- Constitution of alimentary canal and auxiliary organs: structure & function of stomach, liver, intestine, pancreas and rectum.
- Digestion, absorption, transport & excretion of nutrients during digestive process.
- Concept of endocrine system.
- Physiological role of pancreas, thyroid, adrenal & pituitary glands.
- Hormonal disorders: diabetes mellitus, hypo- and hyper thyroidism, gigantism and dwarfism.

**Unit - IV: Nervous System**

- Brain: different parts & functions, structure of a typical neuron.
- Genesis, transport & conduction of nerve impulse.
- Concept of synapse, synaptic fluid & synaptic transmission.
- Acetylcholine & acetylcholine-esterase in transmission of nerve impulse.
- Structure and function of neuromuscular junction.

**Unit - V: Reproductive & Excretory System**

- Structure and physiological role of ovary and testis.
- Sex hormones & its effect on ovulation & spermatization.
- Kidney as an excretory organ, structure of a typical nephron.
- Mechanism of blood filtration, urine formation and acidification of urine.
- Role of kidney in acid-base balance.
- Blood dialysis.

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**Unit - VI: Biochemistry of specilised tissue**

- Eye: Rod and cone cells, visual cycle & its mechanism.
- Muscular Contraction: Structure of striated muscle, role of actin and myosin, mechanism of contraction.
- Taste: Structure of taste bud, mechanism of taste perception.

**Recommended Books:**

1. Human Physiology Vol. I & II. - C.C. Chatterjee,
2. Text Book of Medical Physiology - Guyton
3. Principles of Anatomy & Physiology Gerard, Tortora & Sandra Reynolds Grobowski
4. Text Book of Human Biochemistry - G.P. Talwar
5. Harper's Biochemistry - edited by - Murray & Grainner

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## Practical Course- II : Laboratory Course in Food Analysis and Physiology

1 Quantitative isolation of casin from milk and its characterization.
2. Quantitative isolation of starch from potato and its significance.
3. Estimation of vitamin-C using dye by titrimetry.
4 Determination of acid value of given fat/oil.
5. Determination of calcium by titration method.
6. Demonstration of starch digestion by salivary amylase.
7. Estimation of protein by Lowry's method in egg sample.
8. Isolation of Albumin from egg white.
9 Milk analysis - total solids, lactose estimation by Lane-Eynon volumetric method (specific gravity by lactometer).
10. Preparation of blood smear and DLC (importance in various disease conditions).
11. Enumeration of RBC & WBC for determining health status.
12. Bleeding time, clotting time & ESR.
13. Determination of blood groups (A,B,AB,O & Rh)
14. Estimation of phosphorus and cholesterol in blood.
15. Identification of histological specimen — liver, adrenal, pancreas, thyroid, testis & ovary.

**Recommended Books:**

1. General Analytical Techniques in Nutritional Biochemistry - Dr. Gopal Krishna, Dr. S.K. Ranjhan
2. An Introduction to Practical Biochemistry - David T. Plummer
3. A Manual of Laboratory Technique - National Institute of Nutrition (ICMR) Hyderabad.
4. Biochemical Methods - S Sadasivam & A. Manickam.
5. Practical Clinical Biochemistry - IV$^{th}$ Edition - Varley, H.

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