

**UNIVERSITY OF MUMBAI**



**Syllabus for Sem V & VI**

**Program: B.Sc.**

**Course: BIOCHEMISTRY**

(Applied component)

(Credit Based Semester and Grading System with  
effect from the academic year 2013–2014)

**T.Y.B.Sc. Applied Component -BIOCHEMISTRY**  
**Credit Based Semester and Grading System**  
**To be implemented from the Academic year 2013-2014**

**SEMESTER V**

**Theory**

Course Code	Unit	Topics	Credits	L/week
	<b>FOOD NUTRITION, FOOD ADULTERATION AND FOOD PRESERVATION-I</b>			
<b>USACBCH501</b>	<b>I</b>	Food-chemistry	<b>2</b>	1
	<b>II</b>	Chemical Constituents of Food groups		1
	<b>III</b>	Microbial contaminants of foods		1
	<b>IV</b>	Food borne diseases and food poisoning & Contaminants		1

**Practicals**

<b>USACBCH5P1</b>	Practicals of Course USACBCH501	<b>2</b>	<b>4</b>
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**SEMESTER VI**

**Theory**

Course Code	Unit	Topics	Credits	L/week
	<b>FOOD NUTRITION, FOOD ADULTERATION AND FOOD PRESERVATION-II</b>			
<b>USACBCH601</b>	<b>I</b>	Nutrition	<b>2</b>	1
	<b>II</b>	Dietetics		1
	<b>III</b>	Food preservation		1
	<b>IV</b>	Adulterants & Food Safety		1

**Practicals**

<b>USACBCH6P1</b>	Practicals of Course USACBCH601	<b>2</b>	<b>4</b>
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**T.Y.B.Sc. Biochemistry Syllabus (6 units)**  
**Credit Based and Grading System**  
**To be implemented from the academic year 2013-2014**

<b>T.Y.B.Sc. – BIOCHEMISTRY</b>			
<b>USACBCH501</b>			
<b>FOOD NUTRITION, FOOD ADULTERATION AND FOOD PRESERVATION-I</b>			
<b>Unit No</b>	<b>Topic No</b>	<b>Topics</b>	<b>NOS</b>
<b>I</b>	<b>1.0</b>	<b>Food chemistry</b>	<b>15</b>
		Food chemistry: (Occurrence, chemistry, source, structure, and composition)	
	1.1.	Carbohydrates- mono, di, oligo, polysaccharides. Example-sugar, starch, glycogen, pectin, gums, cellulose, hemicellulose	
	1.2	Proteins- amino acids, essential and non-essential, classification of proteins, structure of protein	
	1.3	Lipids- properties, functions, sources, classification of fatty acids, triglycerides, steroid, phospholipids	
	1.4	Fat soluble vitamins (A, D, E, K) and water soluble vitamins (B complex, vitamin C): occurrence, chemistry, daily requirements	
	1.5	Inorganic ions: calcium, phosphorus, iron, sodium, potassium, magnesium and trace elements (dietary sources and biochemical importance)	
<b>II</b>	<b>2.0</b>	<b>Chemical constituents of Food groups</b>	<b>15</b>
		Chemical constituents- characteristics, biochemical importance and their metabolic aspects	
	2.1	Cereals	
	2.2	Pulses	
	2.3	Wheat	
	2.4	Rice	
	2.5	Corn	
	2.6	Fruits & Vegetables	
	2.7	Milk, milk products, Meat, fish and poultry	
	2.8	Oil seeds, spices	
<b>III</b>	<b>3.0</b>	<b>Microbial contaminants of foods</b>	<b>15</b>
		Microbial contaminants of foods with special reference to spoilage of:	
	3.1	Cereals- bread, flour, meals, cakes, other bakery products	
	3.2	Sugar and sugar products- honey, candy, maple syrup, sucrose	
	3.3	Fruits and vegetables- prepared and cooked	

	3.4 3.5 3.6 3.7 3.8	Meat and meat products- methods to detect spoilage Fish and sea foods- methods to detect spoilage Egg and poultry Milk and milk products- milk, cheese, butter, dried powder Canned food spoilage- types and causes.	
<b>IV</b>	<b>4.0</b>	<b>Food borne diseases and food poisoning &amp; Contaminants</b>	<b>15</b>
	4.1 4.2 4.3 4.4 4.5 4.6 4.7	Food borne diseases and food poisoning i. Bacterial ii. Viruses iii. Rickettsia iv. Mycotoxins v. Parasites Contaminants Pesticide, insecticide, herbicide, fungicide, rodenticide Antibiotic residue Toxic meal residue Hormonal residue Brief introduction to types of microbes responsible for the spoilage of foods i. Bacteria ii. Protozoa iii. Yeast iv. Fungi	

## **PRACTICALS - USACBCH5P1**

### **I) PROXIMATE ANALYSIS OF SOYABEAN SEEDS**

- a) Estimation of moisture content
- b) Estimation of protein by Biuret method
- c) Iron by KCNS method (Wong's method)

### **II) EGG CHEMISTRY :**

- a) Isolation of cholesterol and lecithin
- b) Estimation of Cholesterol by Zak-Zlatsky method

### **III) CHARACTERISATION OF FATS**

- a) Determination of iodine number of groundnut oil
- b) Determination of saponification value of groundnut oil

**IV) ESTIMATION OF VITAMIN C** from lemon juice by 2,6 dichlorophenol indo phenol blue (volumetric method)

**V) DETERMINATION OF COMMON FOOD ADULTERANTS** by simple tests

**VI) QUALITATIVE ANALYSIS OF TEA AND COFFEE EXTRACTS** (Alkaloids from Datura leaves)

**VII) DEMONSTRATION OF SEPARATION OF CAROTENOIDS FROM CARROTS** (by TLC)

**T.Y.B.Sc. – BIOCHEMISTRY**  
**USACBCH601**  
**FOOD NUTRITION, FOOD ADULTERATION AND FOOD**  
**PRESERVATION-II**

<b>I</b>	<b>1.0</b>	<b>Nutrition</b>	<b>15</b>
	1.1	Nutritional role of water, carbohydrates, proteins, fats, fibre, vitamins and minerals	
	1.2	Concept of calorie and energy requirements of normal men and women of different age groups with reference to height, Weight, physical activity, job status etc.	
	1.3	Anti-nutritional factors of natural origin, effects of processing on these factors (kesari dal- lathyrism)	
	1.4	Effect of processing on major nutrients and vitamin content of food	
	1.5	Natural pigments- chlorophylls, anthocyanin, carotenoids and curcumin (structural composition and application in food industry)	
<b>II</b>	<b>2.0</b>	<b>Dietetics</b>	<b>15</b>
	2.1	Concept of balanced diet and its distribution- composition, requirements for different age groups of healthy subjects	
	2.2	Biological value and PER of protein, specific dynamic action (SDA), amino acid imbalance	
	2.3	Diet management in Diabetes mellitus, Ischemic heart diseases, kidney failure, Gastro intestinal disturbance and obesity	
<b>III</b>	<b>3.0</b>	<b>Food Preservation</b>	<b>15</b>
	3.1	Basic principles of food preservation- Asepsis, removal of micro-organisms and antibiotic conditions	
	3.2	Preservation using high temperature, canning, TDT, heat resistance of micro-organisms and spores, heat resistance TDT curves.	
	3.3	Low temperature freezing: Growth of microorganisms at low temperature and effect of sub- freezing and freezing temperature on microorganisms.	
	3.4	Drying (dehydration)- Methods, factors in control of drying treatment of food before and after. Microbiology of dried and intermediate moisture foods.	
	3.5	Chemical preservations	
	3.6	Seminars on related/ current food related issues (not from the syllabus)	
<b>IV</b>	<b>4.0</b>	<b>Adulterants &amp; Food Safety</b>	<b>15</b>
	4.1	Detection of common food adulterants in (theoretical aspects) Spices ii. Grains iii. Coffee iv. Tea v. Oil fats vi. Food colours vii. Milk	

4.2	Aspects of food safety- HACCP, GMP, role of FDA, Agmark, ISI
4.3	Concept of sanitation and hygienic production of food <b>ADDITIVES:</b> (i) Organic acids, propionate, benzoates, sorbates, acetates (ii) Ethylene and propylene oxide (iii) Sugar and salt (iv) Alcohol (v) Wood smoke (vi) Esters (vii) Legal aspects

## **PRACTICALS- USACBCH6P1**

### **I) PROXIMATE ANALYSIS OF SOYABEAN SEEDS**

Estimation of carbohydrate by Iodometric method (Willstatter method)

### **II) PREPARATION OF SOYABEAN ASH AND ESTIMATION OF MINERALS**

- a) Preparation of Ash
- b) Calcium by EDTA method
- c) Phosphorus by Fiske Subbarow method

### **III) EGG CHEMISTRY**

- a) Colour reactions of amino acids

### **IV) CHARACTERISATION OF FATS**

- a) Determination of peroxide value of rancid coconut oil
- b) Determination of acid value of fat

### **V) ESTIMATION OF VITAMIN C from lemon juice by Iodimetry**

### **VI) ESTIMATION OF GLUCOSE OR LACTOSE by Cole's ferricyanide method**

### **VII) QUALITATIVE TESTS FOR FRUIT AND VEGETABLE FIBRE**

### **VIII) QUALITY CRITERIA FOR MILK – a) MBRT      b) Clot on boiling**

## References for Theory and Practicals

- 1) Food Microbiology, Frazier and Westhoff, Tata McGraw Hill Publishers, New Delhi
- 2) Clinical Dietetics and Nutrition, Antia F P, 4<sup>th</sup> edition, 1997, Oxford university press, New Delhi
- 3) Nutrition science, B. Srilaxmi, New age international (P) Ltd
- 4) Dietetics, B. Srilaxmi, 4<sup>th</sup> edition, New age international (P) Ltd
- 5) Laboratory manual in Biochemistry, J. Jayaraman, New age international (P) Ltd
- 6) Biochemical Methods, S. Sadasivan and A. Manickam, 2<sup>nd</sup> edition, New age international (P) Ltd, Tamilnadu Agricultural University, Coimbatore
- 7) Fundamentals of Biochemistry, Dr.A.C.Deb, New central book agency (P) Ltd
- 8) Textbook of Biochemistry, Edward Staunton West, Wilbert R. Todd, Howard S. Mason, John vanBruggen, 4<sup>th</sup> edition, Oxford and IBH Publishing Co. Pvt. Ltd
- 9) Fundamentals of Analytical chemistry, Douglas A. skoog, Donald M. West, F. James Hollar, 6<sup>th</sup> Edition, Saunders College Publishing
- 10) Introductory Practical Biochemistry, S. K. Sawhney, Randhir Singh, Narosa Publishing House
- 11) An introduction to Practical Biochemistry, David T. Plummer, 3<sup>rd</sup> edition, Tata McGraw Hill Publishers, New Delhi
- 12) Principles of Biochemistry, Albert Lehninger, David Nelson, Michael Cox, CBS publishers and distributors
- 13) A handbook of Practical Immunology, Talwar G. P, Viaks Publishing House Pvt Ltd.
- 14) Biochemistry, Satyanarayan U, Books and Allied Ltd
- 15) Textbook of Microbiology, Pelczar, Michael J, Tata McGraw Hill Publishing Co. Ltd
- 16) General Biochemistry, Weil J. H, New Age International (P) Ltd

### SCHEME OF EXAMINATION

Biochemistry, as an interdisciplinary subject, consists of 06 (Six) Units of T.Y.B.Sc. has Applied Component carrying 100 marks in **Fifth Semester**, as follows :

<b>THEORY</b>				
<b>Course code</b>	<b>Title of Paper</b>	<b>Internal Assessment marks</b>	<b>Semester end Examination marks</b>	<b>Total Marks</b>
<b>USACBCH501</b>	<b>FOOD NUTRITION, FOOD ADULTERATION AND FOOD PRESERVATION-I</b>	40	60	100
	<b>TOTAL</b>			<b>100</b>
<b>PRACTICALS</b>				
<b>COURSE CODE</b>	<b>Marks per course</b>	<b>Total per semester</b>		
<b>USBCHAC501</b>	100			
<b>TOTAL</b>		<b>100</b>		

Biochemistry, as an interdisciplinary subject, consists of 06 (Six) Units of T.Y.B.Sc. Has Applied Component carrying 100 marks in **Sixth Semester**, as follows :

<b>THEORY</b>				
<b>Course Code</b>	<b>Title of Paper</b>	<b>Internal Assessment marks</b>	<b>Semester end Examination marks</b>	<b>Total Marks</b>
<b>USACBCH501</b>	<b>FOOD NUTRITION, FOOD ADULTERATION AND FOOD PRESERVATION-I</b>	40	60	100
	<b>TOTAL</b>			<b>100</b>

<b>PRACTICALS :</b>		
<b>COURSE CODE</b>	<b>Marks per course</b>	<b>Total per semester</b>
<b>USBCHAC6P1</b>	100	
<b>TOTAL</b>		<b>100</b>