

UNIVERSITY OF MUMBAI
No.UG/ 252 of 2008.

CIRCULAR:-

A reference is invited to the Ordinances, Regulations and syllabi relating to the B.Sc. degree course vide this office Circular No.UG/83 of 1999 dated 26th February, 1999 and the Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the Board of Studies in Bio-chemistry at its meeting held on 14th February, 2008 has been accepted by the Academic Council at its meeting held on 15th April, 2008 vide item No.4.2 and that, in accordance therewith, the syllabus in the subject of Biochemistry at the F.Y.B.Sc. (6 Units) (Theory and Practical) examination is revised as per Appendix and that the same has been brought into force with effect from the academic year 2008-2009.

MUMBAI-400 032
16th June, 2008.

for REGISTRAR

To,

The Principals of the affiliated colleges in Science.

A.C/4.2 /15.04.2008

No.UG/ 252-A of 2008, MUMBAI-400 032 16th June, 2008.

Copy forwarded with compliments for information to :-

The Dean, Faculty of Science,
The Chairperson, Board of Studies in Biochemistry
The Controller of Examinations,
The Co-ordinator, University Computerization Center.

for REGISTRAR

To :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Personal Assistant to the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that no separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT(1 copy), the Deputy Account, Unit V(1 copy), the In-charge Director, Centralize Computing Facility (1 copy), the Receptionist (1 copy), the Telephone Operator (1 copy), the Secretary, M.U.C.

UNIVERSITY OF MUMBAI



Revised Syllabus in the Subject
of Biochemistry

at the

F.Y.B.Sc. Examination

(6 Units) (Theory & Practicals)

(With effect from the academic year 2008-2009)

III	3.0	Carbohydrates	
	3.1	Definition, Classification, and functions of carbohydrates (mono, oligo, polysaccharides)	15
	3.2	<i>Monosaccharides</i>	
	3.2.1	Classification in terms of aldoses and ketoses	
	3.2.2	Structures of glucose, fructose, galactose, mannose, and ribose	
	3.2.3	Properties : a) Physical- isomerism D & L, optical ; epimers ; anomers b) Chemical reactions – i) oxidation to produce aldonic, aldonic and uronic acids (with respect to glucose); ii) reducing action in boiling alkali, enediol formation (with respect to glucose and fructose) iii) osazone formation (with respect to glucose and fructose) iv) orcinol (with respect to ribose)	
	3.3	<i>Disaccharides</i>	
	3.3.1	Occurrence and structure of maltose , lactose and sucrose	
	3.3.2	Formation of glycosidic bonds	
	3.4	<i>Polysaccharides</i>	
	3.4.1	Classification based on function, storage and structure a) composition: homo & hetero, with examples b) storage : starch and glycogen- action of amylase on starch c) structural : cellulose, chitin and components of peptidoglycan framework (structure of NAG & NAMA not necessary)	
		II nd Term	
IV	4.0	Lipids	15
	4.1	Definition , classification (Bloor's) and functions of lipids	
	4.2	<i>Fatty acids and Triacylglycerol</i>	
	4.2.1	Classification & Chemistry Saturated fatty acids - classification of C2 to C20 {even carbon} common and IUPAC names Unsaturated fatty acids MUFA, PUFA (2,3,4 double bonds) omega-3,6,9 fatty acids Triacylglycerol- simple and mixed- names and structure	
	4.2.2	Chemical Reactions of fats Saponification, Iodination, Ozonolysis, Auto-oxidation, Action of heat on glycerol and choline , Rancidity Definition & significance- Acid no., Saponification no., Iodine no., Reichert-Meissel no.	
	4.3	<i>Compound Lipids</i>	
		Structure & function of glycerophospholipids (PE, PC, PI) Phosphosphingolipids (ceramide, sphingomyelin) Glycolipids / Cerebrosides (gluco & galacto cerebrosides)	
	4.4	<i>Steroids</i> Cholesterol structure and biochemical significance	

V	5.0	Nucleic Acids	15
	5.1	Structure – Purine & Pyrimidine bases, ribose, deoxyribose, nucleosides and nucleotides (ATP, CTP, GTP, TTP, UTP) Formation of polynucleotide strand with its shorthand representation.	
	5.2	<i>RNAs</i> (various types in prokaryotes and eukaryotes) mRNA & rRNA - general account, tRNA –clover leaf model	
	5.3	<i>DNA</i>	
	5.3.1	Physical evidence of DNA helical structure. Chargaff's rules (chemical evidence). Watson-Crick model of DNA & its features	
	5.3.2	Physical properties of DNA – Effect of heat on physical properties of DNA (viscosity, buoyant density, UV absorption), hypochroism, hyperchroism, denaturation of DNA, T_m	
VI	6.0	Nutrition	15
	6.1	Definition : Calorie, Joule ; Food calorimetry- calorific value determination by Bomb calorimeter, calorific values of proximate principles, concept of BMI, BV . and PER	
	6.2	BMR – definition, factors affecting BMR. Significance of BMR in clinical diagnosis	
	6.3	SDA/DIT – General concept and significance, energy requirement of individuals for various activities- sedentary, moderate and heavy	
	6.4	Nutritional significance of carbohydrates, protein, lipids, vitamins, minerals and water	
	6.5	Numerical problems based on above concepts	

F.Y.B.Sc. Paper II			
Introduction to Cell biology, Physiology and Microbiology			
Term			
Unit No	Topic No.	Contents	NOL
I	1.0	Origin of Life & Formation of cells	15
	1.1	Big bang theory, Theories on the origin of life : Abiogenesis, Heterotroph hypothesis, RNA world , Miller's expt, Formation of the first cell, endosymbiont theory	
	1.2	Structural organization of cells	
	1.2.1	Prokaryotic, Eukaryotic (plant & animal) and yeast cells — a comparative overview	
II	2.0	Cell wall , cell membrane and transport processes across cell membrane, cytoskeleton	15
	2.1	Cell wall structure (plant & microbial), cell membrane (fluid mosaic model)	
	2.2	Transport across cell membranes : Diffusion (simple & facilitated), Active transport (primary & secondary), Endo & Exo cytosis	
	2.3	Cytoskeleton : microtubules & microfilaments	
III	3.0	Cell Organelles	15
	3.1	<i>Mitochondrion</i> : Organisation & function of the mitochondria, Genetic system of mitochondria	
	3.2	<i>Chloroplast</i> : Structure and function of the chloroplast, the chloroplast genome, other plastids	
	3.3	<i>Ribosome; ER ; Golgi</i> Structure & Function of :Ribosome, ER, Golgi apparatus ,	
		<i>Peroxisome & Lysosome</i> : Peroxisome function & assembly (in brief) and Lysosome structure and function	
IIInd Term			
IV	4.0	Nucleus	15
	4.1	Structure & function of the nucleus, nuclear envelope, nuclear pores, nuclear matrix and Nucleolus	
	4.2	Mitosis and Meiosis	
	4.3	Cell cycle	
V	5.0	Physiology	15
	5.1	<i>Digestion of Carbohydrates, Proteins and Lipids –</i>	
	5.1.1	Chemical digestion: enzymes involved and their activation, site of	

		enzyme production and action, substrate & product of each enzyme catalysed reaction; Mechanical digestions: movements in the GI tract. Secretin, Gastrin and CCK-P2	
	5.1.2	Absorption of glucose, amino acids and fatty acids in the intestine	
	5.2	<i>Excretion</i>	
	5.2.1	Structure of the nephron : Bowman's capsule & glomerulus – structure & function, (ultrafiltration, pressures involved, GFR, regulation of GFR); Renal tubule – structure & function (proximal and distal convoluted tubules and Henle's loop)	
	5.2.2	Urine formation : Reabsorption / Secretion of glucose, Na^+ , K^+ , HCO_3^- , Cl^- and H^+ ; renal threshold	
	6.0	Introduction to Microbiology	15
	6.1	Historical background (contributions of Leeuwenhoek, Pasteur etc) and General characteristics (size , shape, and structure) of Bacteria	
	6.2	Microbial Taxonomy : Microbial species and strains, classification of bacteria based on morphology (shape and flagella), staining reaction, nutrition and extreme environment	
	6.4	Staining methods (principles of staining & types of stains)and microscopic identification of bacteria	
	6.3	Microbial growth : definition of growth, mathematical nature and expression of growth, measurement of growth, growth curve, synchronous growth, growth yields and efficiency	

Sr. No.	Practical I
1.	Qualitative analyses of Carbohydrates : (<i>glucose, fructose, maltose, lactose, sucrose, starch, dextrin</i>) Tests: Molisch's, Anthrone, Iodine, Benedict's, Fehling's, Barford's, Seliwanoff's, Osazone formation, Nylander's
2.	Qualitative analyses of Amino acids : Tests : Xanthoproteic, Millon's, Sakaguchi, Hopkin-Cole, Lead acetate, Ninhydrin
3.	Qualitative analyses of Proteins : (<i>Casein, Albumin, Gelatin, Peptone</i>) Tests : Biuret, Folin-Ciocalteu, Coagulation (heat), Precipitation(acid, heavy metals, organic solvent, salt) , SDS treatment, Neuman's test, C.T. for Proteins
4.	Quantitative analyses of Nucleic acids : Tests : Orcinol, Diphenylamine.
5.	Qualitative analyses of Lipids : • Tests : Bromine water, Saponification, Precipitation of soap, Acrolein, Salkowsky, Zlatzky, Neuman • Estimation of saponification value • Estimation of Acid value
6.	Qualitative tests for Functional Groups : Aldehydes, Ketones, Carboxylic acid, Alcohol, Phenol, Ester, Ether, Amine, Nitro, Sulphonyl, Sulphydryl, Phosphates
7.	Tests for minerals • Quantitative : Calcium & Magnesium (volumetric estimation) • Qualitative : Na^+, K^+, P, Fe, Cl^-, NO_3^-
8.	Staining techniques : • Lipids by Nigrosine/ Sudan Black ; Nucleic acid (from Onion peel) with Methylgreen- pyronine.
9.	Preparation of starch from potato
10.	Permanent slides- Mitosis & Meiosis
	Practical II
1.	Use of Balance , Microscope, pH meter (demo) , Calibration of glassware
2.	<i>Preparation of Dilute acids and Alkalis</i> , Determination of their Normality by titration (HCl, acetic acid ,sulphuric acid, succinic acid / oxalic acid, sodium hydroxide, potassium dichromate, sodium thiosulphate, KH_2PO_4
3.	Preparation of Acetate and Phosphate buffer and determination of their pKa.
4.	Adsorption of acetic acid / oxalic acid / alanine on activated charcoal
5.	Oxidation – Reduction test : • qualitative test -methylene blue reduction (with milk)

	quantitative titration - Potassium dichromate and ferrous ammonium sulphate with diphenylamine as indicator
6.	Effect of isotonic, hypotonic and hypertonic solutions on RBCs
7.	<i>Staining techniques :</i> - Gram stain - Capsule staining (Azotobacter species), Spore staining
8.	<i>Permanent slides-</i> bacilli, cocci, vibrio, spirilla, fungi, BGA, Actinomycetes, Sections of the digestive system & excretory system
9.	Motility test (demonstration)

F.Y.B.Sc PRACTICAL EXAMINATION (Total 80 marks)

Practical/Paper	Journal	Viva Voce	Experiments	Total
I	5	5	30	40
II	5	5	30	40

F.Y.B.Sc THEORY EXAMINATION (Total 120 marks)

Question Paper Pattern per Term				
Question No.	Unit No.		Marks to be attempted per unit	Marks to be set per unit
	Term I	Term II		
1	1,2,3	4,5,6	15	22 – 23
2	1	4	15	22 – 23
3	2	5	15	22 – 23
4	3	6	15	22 - 23

Note : 1. Each theory paper should have between 20% to 30% objective questions.
 2. Marks for a single undivided question should not exceed 06

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