

Name of the Programme : M.Sc. Part-II (Biochemistry)

Course Code : CHB-602

Title of the Course : Medical Biochemistry

Number of Credits : 4

Effective from AY : 2022-23

Pre-requisites for the Course:	Students should have studied biochemistry courses at MSc. part I level.	
Course Objectives:	<ol style="list-style-type: none">1. To understand the biochemistry of metabolic diseases/disorders of the human body.2. To introduce knowledge on clinical investigations and analyses of clinical samples.3. To provide insights on biochemistry of cancer and ageing.	
Content:		No of hours
	1. Analysis of Clinical sample a. Blood sample <ol style="list-style-type: none">i. Collection and safety measures involved.ii. Composition and function: Composition of blood, RBCs, Erythropoiesis, Hemoglobin, gas transport by hemoglobin, Blood buffer system: acid-base balance and imbalance.iii. Analysis: Haemoglobin, total cell and differential cell (TC/DC) counts, Erythrocyte sedimentation Rate (ESR); Bleeding time and Clotting time, glucose; lipid profile; urea; gases: oxygen and carbon dioxide levels; pH.iv. Immunohaematology: Blood group systems – MN, Rh, ABO; hemolytic disease of newborn.	8
	b. Serum sample <ol style="list-style-type: none">i. Collection and safety measures involved.ii. Analysis: Proteins, albumin/globulin ratio; bilirubin; creatinine; uric acid; electrolytes; Thyroid function tests (serum free and total T3 & T4 and serum TSH)iii. Enzymes of clinical and diagnostic importance: Enzymes as markers in the diagnosis of diseases; clinical significance of cholinesterase, alkaline and acid phosphatase, lactate dehydrogenase (LDH), creatine phosphokinase (CPK), aspartate aminotransferase (AST/SGOT), alanine aminotransferase (ALT/SGPT).	7
	c. Liver function tests (LFTs) <ol style="list-style-type: none">i. Functions of the liver and liver profile in health and diseaseii. Bilirubin metabolism and clinical significanceiii. Classification of LFTs and their clinical significance in the diagnosis of liver diseases.	5
	d. Renal function test (RFTs) <ol style="list-style-type: none">i. Urine: Composition of urine, collection and safety measures,ii. Kidney functions: Urine formation, glomerular and tubular functions, water electrolyte balance.iii. Analysis of urine/RFTs: Physical, chemical and microscopic	4

	examination.	
	e. Gastric and Pancreatic Function tests Gastric function tests (gastric analysis), hypo (achlorhydria) and hyper acidity, tests to confirm pancreatic involvement in disease.	2
	2. Metabolic disorders a. Disorders in metabolism <ol style="list-style-type: none"> Carbohydrates: Regulation of blood glucose, insulin and diabetes mellitus (classification, stages and diagnosis); Hypoglycaemia; Diabetic ketoacidosis. Lipids: Hyperlipidaemias, clinical significance of cholesterol, hypercholesteremia, Heart: Cardiovascular disease (Atherosclerosis and Coronary artery disease), hypertension Proteins: Kwashiorkor, Marasmus Protein misfolding, Creutzfeldt-Jakob disease, mad cow disease, encephalopathy Blood Anaemia: Iron deficiency anemia, Megaloblastic anemia, Pernicious anemia, Sickle cell disease, hemolytic anemia Liver: Jaundice, cirrhosis Kidney: Diabetes insipidus, Renal calculi. 	15
	b. Inborn errors of metabolism <ol style="list-style-type: none"> Prenatal diagnosis, newborn screening, laboratory investigations to diagnose metabolic disorders. Carbohydrate: Lactose intolerance, galactosemia, Glycogen storage disease. Lipids: Lysosomal storage disorders: Tay-Sach's disease; Gaucher's disease; Niemann Pick disease; Fabry's disease. Amino acids: Phenylketonuria, Albinism Purine/pyrimidine: Lesch-Nyhan Syndrome, Gout. Blood: Thalassemia Thyroid hormone: hyperthyroidism and hypothyroidism Skin: Xeroderma Pigmentosum 	7
	3. Biochemistry of cancer <ol style="list-style-type: none"> Properties of cancer cells Biochemistry of cancerous growth Etiology of cancer cells Apoptosis in carcinogenesis Metastasis Mutagens and carcinogens Oncogenic viruses: DNA viruses (Hepatitis B virus and Epstein-Barr virus) RNA viruses (Rous sarcoma virus and Human T-cell lymphotropic virus-1) Tumor markers 	8

	x. Anticancer drugs	
	4. Biochemistry of ageing i. Definition and symptoms ii. Ageing theories: Programmed theories and Error theories	4
Pedagogy:	Mainly lectures and tutorials. Seminars / term papers / assignments / presentations / self-study or a combination of some of these can also be used. ICT mode should be preferred. Sessions should be interactive in nature to enable peer group learning.	
References/ Readings:	1. Vasudevan, D. M.; Sreekumari, S., Vaidyanathan, K., Textbook of Biochemistry for Medical students, Jaypee brothers Medical publishers; 2011, 6 th Edition. 2. Chatterjee, M. N; Shinde, R.; Textbook of Medical Biochemistry, Jaypee brothers Medical publishers Ltd., 2012, 8 th Edition. 3. Smith, C.; Mark, A. D; Lieberman, M.; Marks' Basic Medical Biochemistry: A Clinical Approach; Lippincott's William and Wilkins; 2004, 2 nd Edition. 4. Gaw, A.; Cowan, R. A.; Murphy, M. J.; O'Reilly, D. S. J.; Srivastava, R.; Clinical Biochemistry, Elsevier; 2013, 5 th Edition.	
Course Outcomes:	1. Students will be able to explain the biochemistry of metabolic disorders/diseases caused due to imbalances and metabolic errors. 2. Students will be able to illustrate the mechanisms of cancer and aging in the human body. 3. Students will be able to employ technical knowledge for assessment of various clinical samples. 4. The students will be able to devise strategies in designing experiments based on their understanding about physiological processes.	

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