Semester III
Name of the Programme : M.Sc. Part-II (Biochemistry)
Course Code : CHB-600
Title of the Course : Practical Course in Biochemistry-IV
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:	1. To acquaint the students with various methods of analyses of clinical samples for metabolic diseases/ disorders essential in pathological laboratories. 2. To develop skills in the analysis of water samples according to critical parameters. 3. To impart an understanding of various statistical operations needed to process biological data and improve technical writing skills. 4. To develop techniques for handling, identification, and culturing of microorganisms.	
Content:		**No of hours**
	A. Medical Biochemistry Introduction to use of autoanalyzer and Rapid test for various clinical samples **1. Analysis of blood sample: (ANY THREE)** a. Examination of Haemoglobin (Hb) content of blood by copper sulphate method or Sahli's method; determination of erythrocyte sedimentation rate (ESR) of blood by Westergren method and ABO Blood grouping for determination of blood group. b. Examination of clotting time of blood by capillary tube method and examination of total cell and differential cell (TC/DC) counts of blood sample. c. Examination of blood glucose by glucose oxidase method or Folin-Wu method or HbA1c rapid test d. Examination of blood cholesterol level by Zak's method. e. Rapid test for drug abuse f. Rapid test for pregnancy **2. Liver function tests: (ANY ONE)** a. Estimation of serum alanine transaminase (SGPT) and aspartate transaminase (SGOT) by Reitman and Frankel method. b. Estimation of serum bilirubin level by Malloy and Evelyn method **3. Renal function tests:** a. Physical examination of urine: assessment of volume, appearance, odour, color, pH and specific gravity and microscopic examination of urine: assessment of crystals, casts, cells in urine sample.	**30**

	b. Chemical examination of urine: **(ANY ONE)** i. Estimation of glucose in urine sample by Benedict's method and estimation of albumin content in urine sample by Sulfosalicylic acid method. ii. Estimation of blood urea by Diacetyl-monoxime method.	
	B. Bioprospecting and Bioremediation (ANY FIVE) 1. Estimation of Dissolved oxygen (DO) and Biochemical Oxygen Demands (BOD) of given water sample using Winkler method. 2. Estimation of Chemical Oxygen Demands (COD) of water sample and assessment of water quality using observed BOD and COD values. 3. Detection of sewage pollution by screening for indicator organisms such as *E. coli*. 4. Biotransformation of xenobiotics. 5. Bioassay: Antibiotic assays 6. Techniques of strain improvement: a. Using UV radiations b. Using a Chemical mutagen 7. Production of protoplast: a. Using lytic enzymes b. Using antibiotics. 8. Immobilization of enzymes and determination of its activity. 9. Separation and purification of secondary metabolites from microbial extracts using preparative HPLC.	**25**
	C. Biostatistics and technical writing (ANY FIVE) 1. Use of graphical modes to represent biological data 2. Developing understanding for linear equation analysis (regression analysis). 3. To study normal distribution curve 4. To carry out Hypothesis testing using Z-test and t-test 5. To develop scientific abstract writing skills. 6. To develop scientific reports writing skill 7. Formation of frequency distribution and calculation of descriptive measures-mean, median, mode, variance, standard deviation and standard error	**25**
	D. Clinical Microbiology and food biochemistry (ANY FIVE) 1. Study of the bacterial growth curve. 2. Microscopic examination of blood films for identification of malarial parasites/ Rapid test for malaria. 3. Study and identification of bacterial pathogens. 4. Antibiotic susceptibility testing for bacterial pathogens. 5. Study and identification of fungi. 6. Examination of foods and determination of food spoilage microorganisms 7. Study of Enzymatic browning of fruits	**25**

	8. Study of Auto Oxidation and Rancidity of fats.	
	E. QA and QC in pharmaceuticals (ANY THREE) 1. Qualitative and Quantitative tests of Paracetamol/Aspirin as per IP Monograph 2. To study the dissolution rate of sustained release Diclofenac/Theophylline tablets IP. 3. To develop and validate the analytical method of any one drug using high performance liquid chromatography. 4. To identify the given drug amongst paracetamol, aspirin, and caffeine citrate with the help of thin layer chromatography and calculate its Rf value. 5. Titrimetric Assay of the following bulk drugs: Chloramphenicol capsules IP /Furosemide injection IP/Ketoprofen/ Phenytoin (Any 1) 6. UV Spectrophotometric Assay of the following drugs (in different dosage forms): Mefenamic acid/ Furosemide/ Chloramphenicol (Any 1)	**15**
Pedagogy:	Prelab exercises / assignments / presentations / lab hand-out or a combination of some of these. Sessions shall be interactive in nature to enable peer group learning.	
References/ Readings:	1. G. Damodaran, Practical Biochemistry. Jaypee Brothers Medical Publishers, 2011. 2. S. Mohanty, Practical clinical Biochemistry. Jaypee Brothers Medical Publishers, 2013. 3. H. Glasman-Deal, Science Research Writing. Imperial College Press, 2010. 4. Vogel's Text book of Quantitative Inorganic Analysis, Pearson Education, Asia, 2000. 5. K. Wilson and J. Walker, Principles and Techniques of Practical Biochemistry. Cambridge University Press, 2010. 6. S. K. Sawhney, R. Singh, Introductory Practical Biochemistry. Narosa Publishing House, 2005. 7. B. Poornima, Food Science & Quality Control. Centrum Press First, 2014. 8. A.Y. Sathe, A first course in Food Analysis. New Age International,1999. 9. H. Prescott, Laboratory exercise in Microbiology. MacGraw-Hill Companies, 2002. 10. K. A. Connors, Text book of Pharmaceutical analysis, Wiley Interscience Publication, 1990. 11. J. Moini, Pharmaceutical Laboratory Procedures, New Delhi: Cengage Learning India, 2010.	
Course Outcomes:	1. Students will be able to analyse clinical samples for metabolic diseases/ disorders essential in pathological laboratories and further will be able to design various techniques in clinical biochemistry research. 2. Students will be able to evaluate water samples and assess its	

	suitability 3. Students will be able to apply various statistical operations needed to process any biological data and have good technical writing skills. 4. Students will be in a position to handle, culture, and identify microorganisms

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