School/ Department:	Glocal College of Paramedical Science and Research Center
Programme:	B.Sc. Medical Lab Technology
Course Tile:	Clinical Biochemistry-1
Course Code:	MLT-201
Course Level (UG/PG)	UG
Credits	4 L ----- T 1 P .
Year/Semester	2nd year

Course Information:

Course Objectives: this course will demonstrate different instrumentation techniques used in biochemistry

Course Outcomes: 1. At the end of the course the student should know about chromatography
2. the student should know about electrophoresis
3.should have knowledge of immunochemistry
4. should know about ELISA and RIA
5. should know about PCR

Teaching Methodology:

Methodology	Mention Appropriate Methods (Yes/No)
Explanations by the Instructor	Yes
Group/Pair Work	Yes
Class Discussion	Yes
Assignment/s	Yes
Viva Voice	Yes
Audio/video Class	Yes
Practical/ Case Study/Diary	Yes
Presentations	Yes

Lab Posting	Yes

Course Content

COURSE CONTENT

No	Description	Weightage (%)
1	**Biomolecule separation and measuring instruments:** Chromatography: Thin layer chromatography, gas liquid chromatography. Electrophoresis-Paper and gel electrophoresis for hemoglobin, urinary proteins, serum CSF & LDH. Colorimetry, flame photometry, atomic absorption spectroscopy.	35
2	**Immuno chemistry and Automation:** Immunochemical, Immunoprecipitation, Immunofixation and radial immunidiffusion test Osmometry: Principle, procedure and applications. Semi auto-analyzer, diluters & dry chemistry analyzer: Principal Procedure and applications	45
3	**Principal procedure and application of:**Coulter counters. Enzyme Linked Immunobsorvent Assay (ELISA)Reader. Radio-Immunoassay. (RIA) Polymerase chain reaction (PCR).	30

Lecture Plan

Unit Number	Unit Title	Number of Lectures
1	Biomolecule separation and measuring instruments	
2	Immuno chemistry and Automation	
3	Principal Procedure And Application of	

Practical:

1. Demonstration of Colorimeter
2. Operational procedure of Spectrophotometer
3. Measurement of pH of Urine
4. Measurement of Sodium bicarbonate by Electronic Balance
5. Principle procedure and application of Ultra centrifuge
6. Separation of Plasma protein By Gel Electrophoresis
7. Detection of HbsAg Antibody By ELISA Method
8. Demonstration PCR Machine

Credit Hours: 2 hrs /week

Literature/Reference: Lab Manual

Evaluation Scheme

	External	Internal	Total

Assessment (theory)	70	30	100
Evaluation of Practical/Dissertations	35	15	50

Internal Evaluation of Theory	Class Test	Assignment	Attendance	Total
	20	5	5	30

Textbooks, Reference book, Supplementary Materials

Books :

1. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
2. U Satyanarayan, text book of Biochemistry, Elsevier Health Sciences, 2014 / Book & allied Kolkatta
3. M N chatergee, Medical biochemistry, Jaypee brothers medical publishers
4. Shivraja shankara, manual of practical biochemistry, jaypee
5. Sriniwas B Rao, Practical biochemistry for medical students, Academic publication
6. B. Raghu , Practical Biochemistry for medical students, jaypee
7. V K Malhotra, Practical Biochemistry for medical students, jaypee

Cos\ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											✓	
CO2									✓			
CO3				✓								
CO4				✓								

CO5				✓								

Departmental Quality Assurance Committee Approval			
No.	**Name**	**Digital Signature**	**Date**
1			
2			

Course Information:

Course Objectives: this course will demonstrate metabolism and estimation of various biomolecules of the human body

Course Outcomes: 1. Students should know the Carbohydrate, Protein, Lipid metabolism.

School/ Department:	Glocal College Of Paramedical Science and Research Center
Programme:	B.Sc. Medical Lab Technology
Course Tile:	CLINICAL BIOCHEMISTRY-II
Course Code:	MLT-202
Course Level (UG/PG)	UG
Credits	4 L ----- T 1 P .
Year/Semester	2nd year

2. Students should know the Glycolysis, urea cycle, and their biomedical significance.

3. Students should know the principal, assay procedure and clinical significance of different constituents.

4. Students should know about acid base balance.

5. Students should know organ function test.

Teaching Methodology:

Methodology	Mention Appropriate Methods (Yes/No)
Explanations by the Instructor	Yes
Group/Pair Work	Yes
Class Discussion	Yes
Assignment/s	Yes
Viva Voice	Yes
Audio/video Class	Yes
Practical/ Case Study/Diary	Yes
Presentations	Yes
Lab Posting	Yes

Course Content

COURSE CONTENT

No	Description	Weightage (%)
1	**Macromolecules** Carbohydrate metabolism, glycolysis, TCA and their clinical importance, glucose tolerance test (GTT). Protein metabolism-urea cycle and its biomedical significance. Lipid metabolism, Beta-oxidation of fatty acids, ketonebodies, metabolic changes in liver and adipose tissues during starvation, lipid profile.	35
2	**Estimation of different constituents** Principle, assay procedures and clinical significance of following: Glucose, proteins, A.G, urea, BUN, uric acid, creatinin cholesterol, Bilirubin (Direct & Indirect) Electrolytes: Quantitative estimation of sodium, potassium, calcium, chloride, lithium, phosphorus, magnesium and their clinical significance.	45
3	**Acid base and Organ function test** Acid base balance test, Xylose Absorption test and insulin tolerance test, Urea and creatinin clearance tests and their significance. Renal function tests and their clinical interpretation. Glycosylated Hb & Liver function tests. Principle technique and clinical significance.	30

Lecture Plan

Unit Number	Unit Title	Number of Lectures
1	Macromolecules	
2	Estimation of different constituents	
3	Acid base and Organ function test	

Practical:

1. Estimation of uric acid.
2. Estimation of BUN.
3. Estimation of Bilirubin.
4. Estimation of sodium.
5. Estimation of potassium.
6. Estimation of calcium.
7. Estimation of HDL.
8. Estimation of cholesterol.
9. Estimation of total lipid.

Credit Hours: 2/week

Literature/Reference: Lab Manual

Evaluation scheme

	External	Internal	Total
Assessment (theory)	70	30	100
Evaluation of Practical/Dissertations	35	15	50

Internal Evaluation of Theory	Class Test	Assignment	Attendance	Total
	20	5	5	30

Textbooks, Reference book, Supplementary Materials

Books :

1. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
2. U Satyanarayan, text book of Biochemistry, Elsevier Health Sciences, 2014 / Book & allied Kolkatta
3. M N chatergee, Medical biochemistry, Jaypee brothers medical publishers
4. Shivraja shankara, manual of practical biochemistry, jaypee
5. Sriniwas B Rao, Practical biochemistry for medical students, Academic publication
6. B. Raghu , Practical Biochemistry for medical students, jaypee
7. V K Malhotra, Practical Biochemistry for medical students, jaypee
8. Donald voet, Judith G. Voet, Biochemistry, 4th edition, Willey

Cos\ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											✓	
CO2											✓	
CO3					✓							
CO4					✓							
CO5					✓							

Departmental Quality Assurance Committee Approval			
No.	Name	Digital Signature	Date
1			
2			

Course Information:

Course Objectives: this course will demonstrate about medically important bacterial diseases and lab diagnosis

School/ Department:	Glocal College of Paramedical Science and Research Center
Programme:	B.Sc. Medical Lab Technology
Course Tile:	MEDICAL MICROBIOLOGY-I
Course Code:	MLT-203
Course Level (UG/PG)	UG
Credits	4 L ----- T 1 P .
Year/Semester	2nd year

Course Outcomes 1. At the end of the course the student should know the normal flora.
2. the student should know pathology and ld of staph and strepto
3.should have knowledge of pathology and ld of MTB
4. should know pathology and ld of corynebacteria and brucella
5. should know pathology and ld of ecoli and others

Teaching Methodology:

Methodology	Mention Appropriate Methods (Yes/No)
Explanations by the Instructor	Yes
Group/Pair Work	Yes
Class Discussion	Yes
Assignment/s	Yes
Viva Voice	Yes
Audio/video Class	Yes
Practical/ Case Study/Diary	Yes
Presentations	Yes
Lab Posting	Yes

Course Content

COURSE CONTENT

No	Description	Weightage (%)
1	**Normal flora** Normal micro flora of human body: Skin, Respiratory system and Genitourinary tracts. Source of infection, mode of spread and portals of entry. Description, Pathogenicity, mode of infection, incubation period and toxigenecity of:- *Staphylococcus* *Neisseria* *Streptococcus* *Bordetella* *Pneumococcus* *Haemophilus*	35
2	**pathogenic properties of bacteria** Host Parasite interaction in bacterial infections. Pathogenic properties of bacteria (colonization of surfaces, invasion of tissue, production of exo and indo toxins). Anti bacterial defence of the host. Description, Pathogenecity, mode of infection, incubation period and toxigenecity of:- 1. *Corynebacteria, Erysipelothrix, listeria* 2. *Mycobacteria* 3. *Atypical Mycobacteria* 4. *Anthrax bacillus* 5. *Brucella* 6. *Yersenia, pasteurella & francisella*	45
3	**Physiology & Biochemistry of bacteria:** Protein, Carbohydrate, lipids and nucleic acid as antigens.	30

	Description, Pathogenicity, mode of infection, incubation period and toxigenecity of: 1. *Salmonella* 4.*Pseudomonas, Loefflerall* 2. *Shigella* 5.*vibrio* 6.*Clostridia* 3. *Proteus*	
4		

Lecture Plan

Unit Number	Unit Title	Number of Lectures
1	(Normal flora)	
2	(pathogenic properties of bacteria)	
3	Physiology & Biochemistry of bacteria	

Practical:

1. Sample collection for Bacteriology Study
2. Identification of bacterial Morphology
3. Identification of Bacteria by color production
4. Identification of bacteria by odor
5. Perform the Catalase test
6. Perform the coagulase test
7. Perform the Methyl Red Test
8. Perform the Optochin test
9. Perform the Bile solubility test for Pneumococcus
10. Any other practical's based on theory paper

Credit Hours: 2/ week

Literature/Reference: Lab Manual

Evaluation scheme

	External	Internal	Total
Assessment (theory)	70	30	100
Evaluation of Practical/Dissertations	35	15	50

Internal Evaluation of Theory	Class Test	Assignment	Attendance	Total
	20	5	5	30

Text books, Reference books,Supplementary Materials

Books :

1. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. Textbook of Microbiology by Ananthanarayan and Panikar; Orient Longman, Hyderabad
3. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
4. Text Book of Medical Microbilogy by Satish Gupta; JP Brothers, New Delhi
5. Medical Laboratory Science Theory and Practice by J Ochei and A Kolhatkar
6. A Textbook of Microbiology New Central Book Agency (P) Ltd By P Chakraborty

School/ Department:	Glocal College of Paramedical Science and Research Center
Programme:	B.Sc. Medical Lab Technology
Course Tile:	MEDICAL MICROBIOLOGY-II
Course Code:	MLT-204
Course Level (UG/PG)	UG
Credits	4 L ----- T 1 P .
Year/Semester	2nd year

Cos\ POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		✓										
CO2												✓
CO3												✓
CO4												✓
CO5												✓

Departmental Quality Assurance Committee Approval			
No.	**Name**	**Digital Signature**	**Date**
1			
2			

Course Information:

Course Objectives: this course will demonstrate about sample handling and processing with accuracy and precision

Course Outcomes: 1. At the end of the course the student should know the qc.
2. the student should know pathology and ld of staph and strepto
3.should have knowledge of pathology and ld of MTB
4. should know culture and preservation of different bacteria
5. should know diffrent biochemical reaction

Teaching Methodology:

Methodology	Mention Appropriate Methods (Yes/No)
Explanations by the Instructor	Yes
Group/Pair Work	Yes
Class Discussion	Yes
Assignment/s	Yes
Viva Voice	Yes
Audio/video Class	Yes
Practical/ Case Study/Diary	Yes
Presentations	Yes
Lab Posting	Yes

Course Content

COURSE CONTENT

No	Description	Weightage (%)
1	**Identification of Bacteria**	35

	The role of laboratory in the diagnosis and control of infection: Management and quality control of medical microbiology laboratory. a) Specimen collection from patients, clinics and hospitals. b) Specimen collection for epidemiological investigations. c) Training of medical microbiologist to handle epidemics. Morphology, Staining, Cultural Character of Bacteria. Selective cultural media, identification by special tests, biochemical reactions and sero-typing of: a) Grams positive Cocci:- Cluster forming, chain forming and diplo cocci. b) Neisseria, Bordetella and haemophilus. Pathogenesis and Pathology of infections caused by 2 (a) and 2 (b).	
2	**Culture and preservation** Isolation of pure culture and its preservation. Morphology, Staining Cultural Character, Selective cultural media, identification by special tests, biochemical reactions and serotyping of:- 1. Corynebacterium 4. Anthrax bacillus 2. Mycobacterium 5. Brucella 3. Atypical Mycobacterium 6. Yersenia and Pasteurella Pathogenesis and Pathology of infections caused by 2 (1 to 6)	45
3	**Biochemical Reaction**	30

	Microbial drug sensitivity test's and its clinical interpretation: Morphology, Staining, Cultural Character, Selective cultural media, identification by special tests, biochemical reactions and serotyping of:- 1. Salmonella 2. Shigella 3. Proteus 4. Pseudomonas 5. Vibrio 6. Escherichia coli. 7. Clostridia Pathogenesis and Pathology of infections caused by 2 (1 to 7).	

Lecture Plan

Unit Number	Unit Title	Number of Lectures
1	Identification of Bacteria	
2	Culture and preservation	
3	Biochemical Reaction	

Practical:

1.

Credit Hours: 2/ week

Literature/Reference: Lab Manual

Evaluation scheme

	External	Internal	Total
Assessment (theory)	70	30	100
Evaluation of Practical/Dissertations	35	15	50

Internal Evaluation of Theory	Class Test	Assignment	Attendance	Total
	20	5	5	30

Textbooks, Reference books, Supplementary Materials

Books :

Cos\ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												✓
CO2												✓
CO3												✓
CO4												✓
CO5												✓

School/ Department:	Glocal College of Paramedical Science and Research Center
Programme:	B.Sc. Medical Lab Technology
Course Tile:	PATHOLOGY AND ALLIED SUBJECTS-I
Course Code:	MLT-205
Course Level (UG/PG)	UG
Credits	4 L ----- T 1 P .
Year/Semester	2nd year

Departmental Quality Assurance Committee Approval			
No.	**Name**	**Digital Signature**	**Date**
1			
2			

Course Information:

Course Objectives: this course will demonstrate about blood clotting mechanism and malignancy

Course Outcomes: 1. Students should know about the coagulation and coagulation disorders.
2. Students should know anemia and their various types.
3. Students should know about malignancies and their types.
4. At the end of course students should know hematologic changes in systemic disorders.
5. At the end of course students should know organization and planning, management of blood bank.
.

Teaching Methodology:

Methodology	Mention Appropriate Methods (Yes/No)
Explanations by the Instructor	Yes
Group/Pair Work	Yes
Class Discussion	Yes
Assignment/s	Yes
Viva Voice	Yes
Audio/video Class	Yes
Practical/ Case Study/Diary	Yes
Presentations	Yes
Lab Posting	Yes

Course Content

COURSE CONTENT

No	Description	Weightage (%)
1	**(coagulation and bleeding disorder)** Coagulation: Mechanism of coagulation, coagulation regulation hyper coagulable states, coagulation disorders.	35

	Bleeding disorders: Various types, vascular abnormalities, role of platelets in haemostasis, Platelet disorders, thrombosis and thrombohaemorrhagic disorders. Anaemias: Definition, various types of anaemia, causes of anaemia, changes in the blood morphology due to anaemia.	
2	**(Malignancies)** Leucocytosis, neutropenia & pancytopania their causes & significance, Infectious mononucleosis. Hematological malignancies: Various types of malignancies such as leukemia Lymphomas including multiple myeloma. Their identification & clinical features. Lab investigations in haematological malignancies.	45
3	**(Haematological changes)** Haematological Changes in systematic disorders. Their microscopic picture with identification and clinical features. Hematological aspects of pediatric and Geriatric age groups. Hematological disorders in pregnancy and their blood picture. Hematological changes in AIDS. Various parasites in blood and their clinical significance. Lab Investigations and methods of identification. Organization, Planning and management of blood bank. Donor selection and its various aspects. Selection of blood and the guidelines for transfusion practice. Quality control and safety and basic management of blood bank.	30

Lecture Plan

Unit Number	Unit Title	Number of Lectures
1	coagulation and bleeding disorder	
2	Malignancies	

3	Haematological changes	

Practical:

1. Preparation of Anticoagulation Vials.
2. Determination of bleeding time and clotting time (Various Method).
3. Determination of Prothrombin Time and Activated Partial Thromboplastin time
4. Determination of thrombin Time
5. Determination of Fibrin Degradation product
6. Heinz Body preparation
7. Demonstration of Various Disorder of Anemia
8. Demonstration of Various Disorder of Leukemia

Credit Hours: 2/ week

Literature/Reference: Lab Manual

Evaluation Scheme

	External	Internal	Total
Assessment (theory)	70	30	100
Evaluation of Practical/Dissertations	35	15	50

Internal Evaluation of Theory	Class Test	Assignment	Attendance	Total
	20	5	5	30

Textbooks, Reference books, Supplementary Materials

Books :

1.Harsh Mohan, Text Book of Pathology, 6 th Edition, Jaypee Publication.
2. Robbins, Text Book of Pathology-, Latest edition, Elsevier Health Sciences
3. J V Deice & Lewis, Practical Hematology- 11 th edition, Churchill Livingstone,
4. Hematology- William J William, Ernest Butter, McGraw-Hill Education / Medical; 8edition
5. Altus of Hematology – George, A McDonald, T C Codde
6.Lippincott Wiliams & Wilkins, Wintrobe's clinical hematology 13th edition

Cos\ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										✓		
CO2											✓	
CO3										✓		
CO4											✓	
CO5											✓	

Departmental Quality Assurance Committee Approval

School/ Department:	Glocal College of Paramedical Science and Research Center
Programme:	B.Sc. Medical Lab Technology
Course Tile:	PATHOLOGY AND ALLIED SUBJECTS-II
Course Code:	MLT-206
Course Level (UG/PG)	UG
Credits	4 L ----- T 1 P .
Year/Semester	2nd year

No.	Name	Digital Signature	Date
1			
2			

Course Information:

Course Objectives: this course will demonstrate about histopathology and cytology

Course Outcomes: 1. Students should know recording, fixation, processing of tissues
2. Students should know about the Microtome and various types their principle and maintenance.
3. Students should know section cutting and staining.
4. At the end of course student should know the staining procedures H and E stain.
5. At the end of course students should know the special staining procedures.

Teaching Methodology:

Methodology	Mention Appropriate Methods (Yes/No)
Explanations by the Instructor	Yes
Group/Pair Work	Yes
Class Discussion	Yes

Assignment/s	Yes
Viva Voice	Yes
Audio/video Class	Yes
Practical/ Case Study/Diary	Yes
Presentations	Yes
Lab Posting	Yes

Course Content

COURSE CONTENT

No	Description	Weightage (%)
1	**Recording,labeling,fixation and processing of tissue** Reception recording and labeling of histology specimens. Fixation and various fixatives. Processing of histological tissues for Paraffin embedding. Embedding and embedding media. Decalcification – various methods. Microtomes – various types their working principle and maintenance	35
2	**Section cutting and staining** Section cutting- faults and remedies. Microtome knives and knife sharpening Dye chemistry theory and practice of staining. Routine Staining procedures H and E mounting and mounting media.	45

	Solvents mordents accelerators and accentuators	
3	**special staining procedures** Uses of controls in various staining procedures. Special staining procedures for Connective tissues Carbohydrates Amyloids and pigments Meta Chromasia and Meta chromatic dyes. Museum techniques.	30

Lecture Plan

Unit Number	Unit Title	Number of Lectures
1	Recording,labeling,fixation and processing of tissue	
2	Section cutting and staining	
3	special staining procedures	

Practical:

1. Collection and labeling of histopathology and cytology specimen types
2. Preparation of different types of histopathology fixative

3. Preparation of different types of cytology fixative
4. Demonstration of Microtome
5. Demonstration of Tissue floating bath
6. Demonstration of Paraffin Oven
7. Any other practical's based on theory paper

Credit Hours: 2/ week

Literature/Reference: Lab Manual

Evaluation Scheme

	External	Internal	Total
Assessment (theory)	70	30	100
Evaluation of Practical/Dissertations	35	15	50

Internal Evaluation of Theory	Class Test	Assignment	Attendance	Total
	20	5	5	30

Textbooks, Reference books,Supplementary Materials

Reference Books :

1. Cellular Pathology Techniques by CFA Culling, Butterworths Co., London
2. Theory of Practice of Histopathological Techniques by Bancroft and Stevens
3. Histological Techniques by Carleton, Harry, Oxford
4. An Introduction to Medical Laboratory Technology by FJ Baker et. al., Butterworths Co., London
5. Laboratory Methods of Histotechnology by Armed Forces Institute of Pathology, Washington DC
6. Histotechnologic Basis of Diagnostic Cytology by Koss LG
7. Cytopathology by Naib's
8. Cytology Technical Manual by et.al. Luthra
9.

Cos\ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											✓	
CO2											✓	
CO3											✓	
CO4											✓	
CO5											✓	

10.

Departmental Quality Assurance Committee Approval			
No.	**Name**	**Digital Signature**	**Date**
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2			