Competency-Based Dynamic Curriculum for MD/ MS Unani
(PRESCRIBED BY NCISM)
Semester II
Applied Basics of Kulliyate Tib
(Basic Principles of Unani Medicine)
(SUBJECT CODE : UNIPG-AB-KUT)

(Applicable from 2024-25 batch, from the academic year 2024-25 onwards until further notification by NCISM)

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NEW DELHI-110026

Preface

The curriculum of Kulliyāt-i-Ṭibb is designed to provide a deep understanding of the core philosophy of the Unani system through a combination of practical and experiential learning. By engaging with foundational principles of Unani Medicine, students develop not only theoretical knowledge but also the ability to analyze, innovate, and integrate Unani principles with modern scientific advancements. This program emphasizes critical thinking, and interdisciplinary research, allowing students to explore the Unani system in a way that fosters innovation and contributes to its evolution. Through this structured approach, the curriculum prepares students to contribute meaningfully to research, policy development, and the integration of Unani Medicine with contemporary healthcare systems while preserving its rich intellectual heritage.

The foundation of this curriculum is built upon the Applied Concepts of Kulliyāt-i-Ṭibb, which serve as the intellectual backbone of Unani medicine. Emphasis is placed on Falsafiyāna Mafāhīm (Philosophical Concepts) to nurture critical thinking and intellectual reasoning, while Maṣādir wa Marāji' (Classical Sources) provide grounding in the textual and historical traditions of Unani thought. Scientific literacy is cultivated through interdisciplinary subjects such as Ṭibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics), Ḥayātī Kīmiyā (Medical Biochemistry), bridging biological functions with fundamental Unani perspectives. As students advance, the curriculum deepens into Kulliyāt Umūr-i-Ṭabī'iyya, focusing on core concepts such as Ṭabī'at, Ḥarārat Gharīziyya, Arkān, Mizāj, Akhlāṭ, A'ḍā, Arwāḥ, Quwā, and Af'āl. These ideas are explored through their internal coherence and traditional logic, with thoughtful reference to relevant insights from anatomy, physiology, embryology and pathology, not as direct alignments, but as opportunities for comparative understanding. This balanced approach allows students to appreciate the unique philosophical structure of Unani medicine while engaging meaningfully with contemporary biomedical discourse.

Disease causation and diagnostics are studied under Asbāb o Alāmāt wa Uṣūl-i-Tashkhīṣ, encompassing classical principles such as Sū'-i-Mizāj, Sū' al-Tarkīb, Tafarruq al-Ittiṣāl, and traditional diagnostic methods including Nabḍ, Bawl, and Barāz. The practical application of Unani principles is emphasized in Itlāqi Kulliyāt, which focuses on preventive healthcare, treatment strategies focussing on Usūl Ḥifẓān-i-Ṣiḥḥat, Tanqiya wa Istifrāgh, 'Ilāj bi'l-Ghidhā', and 'Ilāj bi'l-Dawā', all integrated within a coherent Unani framework. Rather than reducing classical knowledge to modern equivalence, the curriculum fosters intellectual dialogue across paradigms. Its holistic, evidence-informed design is aimed at nurturing reflective academicians, skilled physicians, innovative researchers, and pioneers who will advance the science and practice of Unani medicine with integrity and vision.

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NCISM
(NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE)

Competency-Based Dynamic Curriculum for MD/ MS Unani
Applied Basics of Kulliyate Tib (UNIPG-AB-KUT)

Summary & Credit Framework
Semester II

Module Number & Name	Credits	Notional Learning Hours	Maximum Marks of assessment of modules (Formative Assessment)
M 1. فلسفیانہ مفاہیم Falsafiyāna Mafāhīm (Philosophical Concepts)	1	30	25
M 2. طبی حیاتی طبیعیات Ṭibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics)	3	90	75
M 3. طبی حیاتی کیمیا: حیاتیاتی سالمات Ṭibbī Ḥayātī Kīmiyā: Ḥayātiyātī Sālamāt (Medical Biochemistry: Biomolecules)	3	90	75
M 4. حیاتی کیمیا: سالماتی حیاتیات Ḥayātī Kīmiyā: Sālamātī Ḥayātiyāt (Biochemistry: Molecular Biology)	3	90	75
M 5. خامرہ جات؛ حامل آکسیجن لحمیات؛ آکسیجن سے متحق فری ریڈیکلس Khāmirah Jāt; Ḥāmil-e-Āksījan Laḥmiyāt; Āksījan se Hāṣil Āzād Judhūr (Enzymes; Oxygen Transporting Proteins; Oxygen-derived Free Radicals)	3	90	75
M 6. کلیات طب: مصادر و مراجع Kulliyāt-i-Ṭibb: Maṣādir-o-Marāji' (Kulliyāt-i-Ṭibb: Classical Sources)	3	90	75
	16	480	400

Credit frame work

UNIPG-AB-KUT consists of 6 modules totaling 16 credits, which correspond to 480 Notional Learning Hours. Each credit comprises 30 hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Important Note: The User Manual MD/MS Unani is a valuable resource that provides comprehensive details about the curriculum file. It will help you understand and implement the curriculum. Please read the User Manual before reading this curriculum file. The curriculum file has been thoroughly reviewed and verified for accuracy. However, if you find any discrepancies, please note that the contents related to the MSE should be considered authentic. In case of difficulty and questions regarding the curriculum, write to syllabus24uni@ncismindia.org.

Course Code and Name of Course

Course code	Name of Course
UNIPG-AB-KUT	Applied Basics of Kulliyate Tib (Basic Principles of Unani Medicine)

Table 1 : Course learning outcomes and mapped Program learning outcomes

CO No	A1 Course learning Outcomes (CO) UNIPG-AB-KUT At the end of the course UNIPG-AB-KUT, the students should be able to	B1 Course learning Outcomes mapped with program learning outcomes.
CO 1	Demonstrate proficiency in the core philosophies and foundational principles of Unani medicine.	PO6,PO8
CO 2	Appraise and critically analyse the classical sources for deeper understanding of *Kulliyāt-i-Tibb.*	PO6,PO8
CO 3	Synthesize fundamental principles through an interdisciplinary approach to foster a holistic understanding.	PO4
CO 4	Integrate and apply the basic principles of etio-pathogenesis, diagnostic methods, and treatment modalities in clinical practice, ensuring ethical and patient-centered care.	PO1,PO3,PO6
CO 5	Apply preventive and promotive healthcare measures by incorporating Unani principles.	PO3,PO6
CO 6	Integrate basic Unani concepts with contemporary medical research and technology in order to enhance comprehensive approach in research, scientific exploration and develop innovations.	PO1,PO5
CO 7	Analyze Unani fundamentals to strengthen conceptual understanding and apply them effectively in research contexts	PO7,PO8
CO 8	Demonstrate effective communication skills to convey Unani concepts clearly with patients, peers and interdisciplinary streams.	PO6,PO8

Table 2 : Course contents (Modules- Credits and Notional Learning Hours)

2A Module Number	2B Module & units	2C Number of Credits	Notional Learning Hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-1 فلسفیانہ مفاہیم Falsafiyāna Mafāhīm (Philosophical Concepts) The module 'Philosophical Concepts' provides a comprehensive basis for *Kulliyāt-i-Ṭibb* focussing on interpreting the concepts and philosophical basis of the fundamental prprinciple The exploration of terminologies and allied sciences, including material and supra-material things have also been incorporated. It explores the significance of *Kulliyāt-i-Ṭibb* and its distinguished features that make Unani medicine distinct from other existing Indian systems of medicine. The module guides learners in identifying the relevant terms, and application of logic: inductive and deductive approaches and physical and metaphysical realities for better exploration of basic concepts of Unani medicine.					
1	• **M1.U1 اساسی اصطلاحات Asāsī Iṣṭilāḥāt** (Key Conceptual Terminologies) 1.1.1. کیفیت Kayfiyat 1.1.2. صورت نوعیہ Ṣūrat Naw'iyya 1.1.3. جوہر Jawhar 1.1.4. عدل فی القسمۃ 'Adl fil Qisma 1.1.5. ھیولی Huyūla 1.1.6. عنصر 'Unsur 1.1.7. عرض 'Arḍ نفس Nafs 1.1.8. نفس ناطقہ Nafs Nāṭiqa 1.1.9. نفس حیوانیہ Nafs Ḥaywāniyya 1.1.10. کون و فساد Kawn-o-Fasād 1.1.11. ریح Rīḥ, بخار Bukhār 1.1.12. عقل 'Aql, دلائل Dalā'il, براہین Barāhīn	1	5	10	15	30

	• **M1.U2** منطق Manṭiq (Logic) 1.2.1. استقرائی و استنتاجی طریقہ Istiqrā'ī wa Istintājī Ṭarīqa (Inductive and Deductive Approach) 1.2.2. قضیہ Qaḍiyya 1.2.3. جنس Jins, جنس الاجناس Jins al-Ajnās 1.2.4. اجناس الامراض Ajnās al-Amrāḍ 1.2.5. نوع Naw' (Species) 1.2.6. فصل Fasl 1.2.7. قیاس و تجربہ Qiyās wa Tajriba (Syllogistic Inference and Experiment) • **M1.U3** مفہوم وجود Mafhūm-i Wujūd (Concept of Existence) 1.3.1. اسباب وجود Asbāb Wujūd (Causes of Existence) 1.3.2. Concept of Physical and Metaphysical Realities 1.3.3. موالید ثلاثہ Mawālīd Thalātha					
2	**M-2 طبی حیاتی طبیعیات Ṭibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics)** The module 'Medical Biophysics' helps scholars to be acquainted with contemporary basic sciences and their integration with evidence-based Unani medicine. It helps illustrate the concept of *Kulliyāt-i-Ṭibb* more elaborately. This module helps to understand basic Unani principles applying the biophysical laws governing various dynamic processes of the human body. Moreover, the laws of thermodynamics and their relations with *Mizāj A'ḍa* are incorporated. • **M2.U1** Human Body and Physical Forces 2.1.1. Mechanical Force 2.1.2. Osmotic and Hydrostatic Force 2.1.3. Electrical Force • **M2.U2** Haemodynamics 2.2.1. Haemodynamics	3	15	30	45	90

	• **M2.U3** Thermodynamics 2.3.1. Thermoregulation 2.3.2. Heat exchange mechanism 2.3.3. Thermogenesis 2.3.4. Thermolysis					
3	**M-3 Ṭibbī Ḥayātī Kīmiyā: Ḥayātiyātī Sālamāt (Medical Biochemistry: Biomolecules)** This module provides a comprehensive study of biomolecule metabolism, focusing on carbohydrate, protein, and lipid pathways. Carbohydrate metabolism includes glycolysis, glycogenesis, gluconeogenesis, and the citric acid cycle, with an emphasis on energy production and glucose homeostasis. Protein metabolism examines amino acid catabolism, transamination, and the urea cycle, which are crucial for maintaining nitrogen balance. Lipid metabolism covers fatty acid oxidation, synthesis, and cholesterol metabolism, highlighting their role in energy storage and cellular function. The applied aspects of the module emphasize the clinical relevance of these pathways, including both congenital and acquired metabolic disorders. • **M3.U1** Carbohydrate 3.1.1. Introduction to Carbohydrate Metabolism 3.1.2. Structure 3.1.3. Metabolism 3.1.3.1. Glycolysis 3.1.3.2. Glycogenesis and Glycogenolysis 3.1.3.3. Gluconeogenesis 3.1.3.4. Pentose Phosphate Pathway 3.1.3.5. Citric Acid Cycle • **M3.U2** Protein 3.2.1. Introduction to Protein Metabolism 3.2.2. Amino Acid Metabolism 3.2.3. Urea Cycle	3	15	30	45	90

	3.2.4. Protein Metabolism Disorders 3.2.5. Carbohydrate Metabolism Disorders • **M3.U3** Lipid 3.3.1. Introduction to Lipid Metabolism 3.3.2. Fatty Acid Synthesis 3.3.3. Fatty Acid Transport and Storage 3.3.4. Beta-Oxidation of Fatty Acid 3.3.5. Triglyceride Metabolism 3.3.6. Ketogenesis 3.3.7. Cholesterol Metabolism 3.3.8. Lipid Metabolism Disorders • **M3.U4** Biomolecules: Applied Aspects 3.4.1. Physiological Roles of Biomolecules					
4	**M-4 حیاتی کیمیا: سالماتی حیاتیات Ḥayātī Kīmiyā: Sālamātī Ḥayātiyāt (Biochemistry: Molecular Biology)** This module explores the molecular basis of life, focusing on the structure, function, and regulation of biomolecules. It covers the structure and replication of DNA, emphasizing its role in genetic inheritance and molecular diagnostics. RNA biology includes transcription, RNA processing, and its regulatory functions. The module also explores protein synthesis, detailing translation, post-translational modifications, and the role of proteins in cellular processes. Additionally, it addresses cellular function and regulation, highlighting signaling pathways, gene expression control, and their impact on homeostasis and disease. The module also emphasizes the importance of ethical considerations and applied aspects. • **M4.U1** DNA Structure 4.1.1. DNA Double Helix and Chromatin Structure 4.1.2. DNA Replication Mechanisms 4.1.3. DNA Repair and Mutation	3	15	30	45	90

	• **M4.U2** RNA Biology 4.2.1. Types of RNA and their Functions 4.2.2. Transcription Process and Regulation 4.2.3. RNA Processing and Modifications • **M4.U3** Protein Synthesis and Function 4.3.1. Translation Process 4.3.2. post-Translational Modifications 4.3.3. Protein Folding and Function 4.3.4. Protein-Protein Interactions • **M4.U4** Cellular Function and Regulation 4.4.1. Cell Signalling Pathways 4.4.2. Gene Expression and Regulation 4.4.3. Cell Cycle and Apoptosis 4.4.4. Transcriptional Regulation 4.4.5. post-Translational Modifications 4.4.6. Epigenetic Mechanism					
5	**M-5 خامرہ جات؛ حامل آکسیجن لحمیات؛ آکسیجن سے مشتق فری ریڈیکلس Khāmirah Jāt; Ḥāmil-e-Āksījan Laḥmiyāt; Āksījan se Hāṣil Āzād Judhūr (Enzymes; Oxygen Transporting Proteins; Oxygen-derived Free Radicals)** This module explores the critical roles of enzymes and oxygen-related biochemistry. Enzymes are focused on their structure, function, kinetics, and regulation, highlighting their role as biological catalysts in metabolic pathways. Oxygen-transporting enzymes, such as haemoglobin and myoglobin, have been discussed, emphasizing their structure, function, and significance in oxygen delivery and cellular respiration. The module also explores oxygen-derived free radicals, their formation, physiological roles, and pathological effects, including oxidative stress and its link to diseases. Applied aspects with special focus on conditions such as enzymopathies, anaemia, and antioxidants are dealt. • **M5.U1** Enzymes	3	15	30	45	90

	5.1.1. Concept of Enzymes 5.1.2. Factors Affecting Enzyme Activity 5.1.3. Enzyme Kinetics 5.1.4. Enzyme Inhibition • **M5.U2** Oxygen Transporting Proteins 5.2.1. Heamoglobin and Myoglobin 5.2.2. Regulation of Heamoglobin Function 5.2.3. Bohr Effect 5.2.4. Hemoglobinopathies • **M5.U3** Oxygen-derived Free Radicals 5.3.1. Brief Concept about Free Radical Generation 5.3.2. Types of Radicals 5.3.3. Affiliation with Diseases 5.3.4. Role of ROS in Antimicrobial and Cytotoxic Activity					
6	**M-6 کلیاتِ طب: مصادر و مراجع Kulliyāt-i-Ṭibb: Maṣādir-o-Marāji‘ (Kulliyāt-i-Ṭibb: Classical Sources)** The module *Kulliyāt-i-Ṭibb*: Classical Sources, examines the literature spanning over Greek period till date. It includes information regarding early conceptions, prospects and limitations along with the current status of various classical literatures author-wise. It also explores the initial stages of numerous edited and unedited manuscripts that are available in different corners of the world. The module highlights the translated and supplemented discourse enriched by Arab scholars. Additions, deletions, footnotes, commentaries, abridgements and different philosophical views made by different scholars are also dealt with. The module also evaluates the contributions of Indian scholars, their level of understanding and their application in different disciplines of Unani medicine. It also evaluates the translations made in different National and International languages, along with the budding of new syllabi due to cultural influence and conventional medicine's impact then and there. • **M6.U1** یونانی و رومی عہد کی علمی خدمات (Greco-Roman Scholarship) 6.1.1. Greco-Roman Scholarly Contributions to the Foundations of *Kulliyāt-i-Ṭibb*	3	15	30	45	90

	• **M6.U2** قرونِ وسطیٰ کی عبقریت(500–1500 عیسوی)Medieval Scholarship (500–1500 AD) 6.2.1. Medieval Scholars and Their Lasting Contributions to *Kulliyāt-i-Ṭibb* • **M6.U3** ہندی عبقریت(Indian Scholarship) 6.3.1. Scholarly Heritage of India in the Development of *Kulliyāt-i-Ṭibb*					
		16	80	160	240	480

Table 3 : Modules - Unit - Module Learning Objectives and Session Learning Objective- Notional Learning Hours- Domain-Level- TL Methods

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical/experiential) learning session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/ Shows how/ Knows how/ Know)	3G Teaching Learning Methods
Module 1 : فلسفیانہ مفاہیم Falsafiyāna Mafāhīm (Philosophical Concepts)						
Module Learning Objectives (At the end of the module, the students should be able to) 1. Describe the importance of Philosophical Concepts, their levels, and application in an understanding of *Kulliyāt-i-Ṭibb* (Basic Principles of Unani Medicine). 2. Conduct a literature review and critical analysis of terminologies, logic and supra-material-based. 3. Identify these terms for proper elaboration and comprehension of philosophical concepts.						
Unit 1 اساسی اصطلاحات Asāsī Iṣṭilāḥāt (Key Conceptual Terminologies) 1.1.1. کیفیت Kayfiyat 1.1.2. صورت نوعیہ Ṣūrat Nawʻiyya 1.1.3. جوہر Jawhar 1.1.4. عدل فی القسمۃ ʻAdl fil Qisma 1.1.5. ھیولی Huyūla 1.1.6. عنصر ʻUnsur 1.1.7. عرض ʻArḍ نفس Nafs 1.1.8. نفس ناطقہ Nafs Nāṭiqa 1.1.9. نفس حیوانیہ Nafs Ḥaywāniyya 1.1.10. کون و فساد Kawn-o-Fasād 1.1.11. ریح Rīḥ, بخار Bukhār 1.1.12. عقل ʻAql, دلائل Dalā'il, براہین Barāhīn **References:** 1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,18,19,20,21,22,23,25,26,27,28,29,30,34,150,152,153,154,155,156						

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 2,CO 5,CO 7	Analyse the core philosophical terminologies of *Kulliyāt-i-Ṭibb* (Basic Principles of Unani Medicine)	1	Lecture	CAN	Knows-how	L,L&GD,L&PPT
CO 1,CO 2,CO 5,CO 7	Demonstrate the application of key conceptual terminologies in *Kulliyāt-i-Ṭibb*	2	Practical1.1	CE	Shows-how	D,DIS,LS,PL
CO 1,CO 2,CO 5,CO 7	Apply and reflect on the logical and contextual significance of key conceptual terminologies in Kulliyāt-i-Ṭibb	2	Experiential-Learning1.1	CAP	Shows-how	DIS,LS,PSM,TBL

Unit 2 منطق Manṭiq (Logic)

1.2.1. استقرائی و استنتاجی طریقہ Istiqrā'ī wa Istintājī Ṭarīqa (Inductive and Deductive Approach)
1.2.2. قضیہ Qaḍiyya
1.2.3. جنس Jins, جنس الاجناس Jins al-Ajnās
1.2.4. اجناس الامراض Ajnās al-Amrāḍ
1.2.5. نوع Naw' (Species)
1.2.6. فصل Fasl
1.2.7. قیاس و تجربہ Qiyās wa Tajriba (Syllogistic Inference and Experiment)

References: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,93,150,153,154,155,156

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 2,CO 5,CO 7	Discuss *Istiqrā'* (deduction of the state of universal concept from the state of divisive concepts) and *Qaḍiyya* (opined statement) in detail	1	Lecture	CC	Knows-how	BS,D,L,L&PPT,TUT
CO 1,CO 2,CO 5,CO 7	Demonstrate the application of *Istiqrā'* (deduction of the state of universal concept from the state of divisive concepts) and *Qaḍiyya* (opined statement) in an understanding of *Kulliyāt-i-Ṭibb*	2	Practical1.2	CE	Shows-how	D,DIS,IBL,TBL
CO 1,CO 2,CO 5,CO 7	Analyze the importance of *Istiqrā'* and *Qaḍiyya* through practical examples in Unani medicine	2	Experiential-Learning1.2	CAN	Does	BS,C_L,DIS,IBL,LS,PER

CO 1,CO 2,CO 5,CO 7	Identify the connotations of *Jins* (genus), *Jins al-Ajnās* (genus of genera), *Ajnās al-Amrāḍ* (categories of diseases), *Naw'* (species), and *Faṣl* (differentia)	1	Lecture	CC	Knows-how	BS,D,DIS,L,L&PPT
CO 1,CO 2,CO 5,CO 7	Apply the terminologies, *Jins, Jins al-Ajnās, Ajnas al Amrāḍ, Naw'*, and *Faṣl* with appropriate examples	2	Practical1.3	CAP	Shows-how	D,DIS,LS,PER
CO 1,CO 5,CO 7	Interpret the terminologies: *Jins, Jins al-Ajnās, Ajnās al Amrāḍ, Naw'*, *Faṣl,* and substantiate them in the conceptual exploration of *Kulliyāt-i-Ṭibb*	2	Experiential - Learning1.3	CE	Does	CBL,DIS,IBL,PER
CO 1,CO 2,CO 5,CO 7	Discuss about *Qiyās* (syllogistic inference) and *Tajriba* (experiment)	1	Lecture	CC	Knows-how	L,L&PPT
CO 1,CO 2,CO 5,CO 7	Demonstrate the interrelation between *Qiyās* and *Tajriba*	2	Practical1.4	CAP	Shows-how	D,DIS,LS,PER
CO 1,CO 2,CO 5,CO 7	Formulate a research module that demonstrates the application of Qiyās and Tajriba	3	Experiential - Learning1.4	CAP	Does	BS,CBL,DIS,IBL,LS,PER,TBL,TUT

Unit 3 مفہوم وجود Mafhūm-i Wujūd (Concept of Existence)

1.3.1. اسباب وجود Asbāb Wujūd (Causes of Existence)
1.3.2. Concept of Physical and Metaphysical Realities
1.3.3. موالید ثلاثہ Mawālīd Thalātha

References: 2,3,4,5,7,8,9,10,11,12,13,14,15,16,18,27,28,29,30,32,33,34,35,150,152,153,154,155,156

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 2,CO 5,CO 7	Describe Physical and Metaphysical concepts of existence	1	Lecture	CAN	Knows-how	L,L&PPT
CO 1,CO 2,CO 5,CO 7	Interpret the concepts of Physical and Metaphysical realities in understanding *Ṭibb*	2	Practical1.5	CAN	Shows-how	D,DIS,PER,REC

CO 1,CO 2,CO 5,CO 7	Analyze the challenges and potential solutions in understanding Physical and Metaphysical realities from the perspective of *Ṭibb*	2	Experiential - Learning1.5	CAN	Does	BS,DIS,LS,PER,PBL,TBL
CO 1,CO 2,CO 5,CO 7	Appraise the concept of *Asbāb Wujūd* and *Mawalīd Thalatha* (three kingdoms of nature) in relation to *Ajsām Badan*	2	Experiential - Learning1.6	AFT-VAL	Does	BS,DIS,PL,PER

Practical Training Activity

Practical 1.1 : Key Conceptual Terminologies in *Kulliyāt-i-Ṭibb*

Total Duration (2 Hours)

1. **Introduction (30 min)** – The teacher will demonstrate key terminologies, their logical foundations, and implications in *Kulliyāt-i-Ṭibb* with practical examples.

2. **Textual Analysis (50 min)** – Students will visit the library to explore the etymology, meaning, and application of selected terminologies from classical texts. They will analyze the context and relevance of these terms, with the teacher providing guidance to ensure alignment with classical perspectives.

3. **Presentations, Discussion & Reflection (40 min)** – Students will present their findings, followed by a class-wide discussion. The teacher will facilitate critical appraisal, connect insights to broader frameworks, and summarize key takeaways, emphasizing logical reasoning.

Note: Students should document their textual analysis, research findings, and reflections on the selected terminologies, including their etymology, meaning, application, and logical significance in *Kulliyāt-i-Ṭibb*, in their logbooks.

Practical 1.2 : *Istiqrā'* and *Qaḍiyya* in *Kulliyat-i-Ṭibb*

Total Duration (2 Hours)

1. **Demonstration of *Istiqrā'* and *Qaḍiyya* (30 min)** – The teacher will explain their application in understanding and interpreting *Kulliyāt-i-Ṭibb*, using practical examples from classical Unani texts to illustrate how Istiqrā' leads to universal principles and how *Qaḍiyya* contributes to medical theory.

2. **Library Research, Group Activity & Analysis (60 min)** – Students will visit the library, explore assigned classical Unani texts, and identify instances where *Istiqrā'* and *Qaḍiyya* are applied. Each group will analyze their role in medical reasoning and present their findings to the class. The teacher will provide guidance to ensure accurate interpretation and relevance.

3. **Discussion & Critical Assessment (30 min)** – The teacher will facilitate discussions, guiding students to critically assess the impact of *Istiqrā'* and *Qaḍiyya* in *Kulliyāt-i-Ṭibb*.

Note: Students should document their observations, analyses, and findings on *Istiqrā'* and *Qaḍiyya* from the practical activity in their logbooks.

Practical 1.3 : *Jins, Jins al-Ajnās, Ajnas al Amrāḍ, Naw'*, and *Faṣl* in *Kulliyāt-i- Ṭibb*

Total Duration (2 Hours)

1. **Demonstration (40 min)** – The teacher will explain and demonstrate the application of *Jins, Jins al-Ajnās, Ajnās al-Amrāḍ, Naw',* and *Faṣl* using selected excerpts from classical Unani texts. Practical examples will be provided to illustrate their relevance in disease classification and medical reasoning.

2. **Library Session (50 min)** – Students will explore classical Unani texts in the library to identify and analyze the use of these terminologies. They will document examples and structure their findings for presentation. The teacher will provide guidance to ensure accuracy and coherence.

3. **Presentations & Discussion (30 min)** – Students will present their findings, demonstrating the application of the terminologies with examples. The teacher will facilitate discussion, provide feedback, and clarify conceptual ambiguities.

Note: Students should document their analysis, classification charts, and reflections on the application of *Jins, Jins al-Ajnās, Ajnās al-Amrāḍ, Naw',* and *Faṣl* in their logbooks.

Practical 1.4 : Interrelation between *Qiyās* and *Tajriba*

Total Duration (2 Hours)

1. **Introduction & Demonstration (40 min)** – The teacher will introduce *Qiyās* and *Tajriba* as fundamental epistemological tools in *Kulliyāt-i-Ṭibb*. A step-by-step demonstration will illustrate how classical Unani scholars formulated research frameworks, explaining the role of *Qiyās* in logical inference and *Tajriba* in empirical validation, with references to classical texts.

2. **Library Research & Analysis (40 min)** – Students will visit the library to explore assigned classical texts describing conditions for valid research. In groups, they will analyze the interrelation between *Qiyās* and *Tajriba* in Unani research, discussing how *Qiyās* guides medical reasoning while *Tajriba* verifies its conclusions.

3. **Class Discussion & Reflection (40 min)** – Students will engage in a class-wide discussion, sharing insights from their group analysis. The teacher will guide the discussion, linking Unani research principles to modern scientific methods. Students will reflect on how this understanding prepares them for the upcoming experiential research module.

Note: Students should document their analysis of *Qiyās* and *Tajriba*, including their roles in Unani research, key insights from group discussions, and reflections on their relevance to modern scientific methods in their logbooks.

Practical 1.5 : Physical and Metaphysical Realities

Total Duration (2 Hours)

1. **Introduction & Explanation (30 min)** – The teacher will introduce the concept of physical and metaphysical realities in Ṭibb, demonstrating their significance in classical Unani thought. The teacher will assign classical sources, provide context for the readings, and highlight key themes to focus on.

2. **Guided Reading & Note-Taking (30 min)** – Students will read the assigned portions while the teacher supervises, offering clarifications and prompting critical engagement with the text. Students will note key concepts and authorial perspectives.

3. **Presentations & Teacher-Led Discussion (40 min)** – Each student will present (5-7 minutes), summarizing the author's views and key insights. The teacher will interject with clarifications, correct misinterpretations, and draw connections between different perspectives.

4. **Conclusion & Reflection (20 min)** – The teacher will synthesize key takeaways, facilitate a reflective discussion, and relate the concepts to broader Unani medical philosophy.

Note: Students should document key concepts, author's views, and reflections on physical and metaphysical realities in Ṭibb in their logbooks.

Experiential learning Activity

Experiential-Learning 1.1 : Application of Conceptual Terminologies in *Kulliyāt-i-Ṭibb*

Total Duration (2 Hours)

1. **Resource Allocation (15 min)** – Students will be assigned key terminologies from *Kulliyāt-i-Ṭibb*.

2. **Library Research & Argument Development (1 hour)** – Students will visit the library to explore classical texts to analyze the meaning, origin, and conceptual relevance of their terms. They gather textual evidence and develop arguments connecting each term to theoretical and clinical aspects of *Kulliyāt-i-Ṭibb*.

3. **Presentations & Discussion (30 min)** – Students will present their findings, emphasizing textual evidence, logical reasoning, and practical applications. This will be followed by an interactive discussion where students critically analyze the relevance of these terminologies in modern medical contexts.

4. **Teacher's Insights & Conclusion (15 min)** – The teacher will provide key insights, address misconceptions, and highlight the role of these terminologies in shaping Unani medical thought.

Note: Students will document their analysis, justifications, and reflections on the assigned terminologies in their logbooks.

Experiential-Learning 1.2 : *Istiqrā'* and *Qaḍiyya* in *Kulliyāt-i-Ṭibb*

Total Duration (2 Hours)

1. **Library Session & Text Exploration (40 min)** – Students will conduct independent research in the library, exploring classical and contemporary sources on *Istiqrā'* (inductive reasoning) and *Qaḍiyya* (propositional logic) in *Kulliyāt-i-Ṭibb*. They will analyze how these reasoning methods are applied in Unani medical theory and diagnostics.

2. **Brainstorming & Concept Mapping (20 min)** – Students will engage in a brainstorming session to discuss their findings, identifying key examples from classical texts and mapping their relevance to medical reasoning and clinical applications.

3. **Presentations & Discussion (50 min)** – Students will present their analyses, demonstrating how *Istiqrā'* and *Qaḍiyya* shape medical theories and practices in Unani Ṭibb. The session will include interactive discussions to critically evaluate their role in diagnosis, treatment, and research methodologies.

4. **Reflection & Summary (10 min)** – The session will conclude with a reflection and key insights recap.

Note: Students should document their analysis, examples, and reflections on *Istiqrā'* and *Qaḍiyya* in their logbooks.

Experiential-Learning 1.3 : Distinction of Terminologies in *Kulliyāt-i-Ṭibb*

Total Duration (2 Hours)

1. **Case Study Analysis (40 min)** – Students will be given hypothetical patient cases and tasked with classifying diseases using *Jins, Jins al-Ajnās, Ajnās al-Amrāḍ, Naw',* and *Faṣl.*

2. **Group Discussion & Justification (30 min)** – Students will debate their classifications, justifying their reasoning based on Unani principles.

3. **Peer Review & Feedback (30 min)** – Students will critique each other's classifications, refining their understanding through discussion.

4. **Reflection (20 min)** – Students will document insights and assess how these classifications impact diagnosis and treatment.

Note: Students should document their analysis, comparisons, and reflections on *Jins*, *Jins al-Ajnās*, *Ajnās al-Amrāḍ*, *Naw'*, and *Faṣl* in their logbooks.

Experiential-Learning 1.4 : Research Module Based on *Qiyās* and *Tajriba*

Total Duration (3 Hours)

1. **Conceptual Overview & Brainstorming (45 min)** – Students will explore *Qiyās* and *Tajriba* in Unani medicine. Through brainstorming, they will discuss their significance in hypothesis formation, diagnosis, and treatment validation.

2. **Module Framework Development (45 min)** – Students will outline a research module integrating *Qiyās* and *Tajriba*, defining objectives, methodologies, and validation techniques based on classical and contemporary research principles.

3. **Case Study Analysis & Application (40 min)** – Using historical and modern examples, students will analyze how *Qiyās* and *Tajriba* have shaped medical advancements, refining their module framework accordingly.

4. **Group Discussion & Justification (30 min)** – Students will present their module structure, justifying the role of analogical reasoning and experimentation in their research approach. Peer and teacher feedback will guide refinements.

5. **Finalization & Documentation (20 min)** – Students will finalize their research module, ensuring coherence in methodology and alignment with Unani epistemology. They will document their findings and submit a summary report.

Note: Students will document the activity details, including their research module framework, justifications, and key insights, in their logbooks.

Experiential-Learning 1.5 : Challenges and Solutions in Understanding Physical and Metaphysical Realities in *Ṭibb*

Total Duration (2 Hours)

1. **Brainstorming & Concept Exploration (30 min)** – Students will engage in a guided discussion to differentiate between physical and metaphysical realities in *Ṭibb*, identifying key challenges in their interpretation and application.

2. **Library Research & Comparative Analysis (40 min)** – Students will visit the library to explore classical Unani texts and modern philosophical perspectives, investigating how Ṭibb addresses both tangible (physical) and intangible (metaphysical) aspects of health and disease.

3. **Group Discussion: Challenges & Solutions (30 min)** – Students will present their findings, debating epistemological and methodological difficulties in integrating physical and metaphysical concepts, while proposing potential solutions.

4. **Synthesis & Reflection (20 min)** – The session will conclude with students summarizing insights, refining their understanding, and discussing the holistic approach of *Ṭibb*.

Note: Students will document key details of their research, discussions, and reflections in their logbooks.

Experiential-Learning 1.6 : Appraisal of *Asbāb Wujūd* and *Mawālīd Thalatha* in Relation to *Ajsām Badan*

Total Duration (2 Hours)

1. **Conceptual Overview & Brainstorming (30 min)** – Students will explore the principles of *Asbāb Wujūd* and *Mawālīd Thalātha* in relation to *Ajsām Badan*. Through guided brainstorming, they will discuss how these concepts shape the understanding of bodily structures and functions in Ṭibb.

2. **Library Research & Comparative Analysis (30 min)** – Students will visit the library to examine classical Unani texts and modern interpretations of *Mawālīd Thalātha* (mineral, plant, and animal kingdoms) and their role in human physiology and pathology.

3. **Discussion & Critical Appraisal (30 min)** – Students will assess the interrelation of *Asbāb Wujūd* and *Mawālīd Thalātha*, evaluating their impact on the classification of *Ajsām Badan* and therapeutic approaches in Unani medicine.

4. **Presentation of Key Insights (20 min)** – Students will present their analyses, highlighting textual references and conceptual applications. Peer feedback and teacher insights will refine their understanding.

5. **Reflection & Documentation (10 min)** – Students will summarize their findings, discuss real-world implications, and document their insights in their logbooks.

Note: Students must record key discussions, references, and critical reflections in their logbooks for future reference.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular Assessment. Assessment will be 25 marks for this module. Keep structure making pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the modular grade point as per table 6 C. Scholarly Presentation & Glossary Compilation (25 Marks) Each student will: 1. Compile a Glossary (10 Marks): Identify 10 key terms from a classical text with meanings, etymology, and relevance. 2. Create a Visual Aid (5 Marks): Design an infographic or poster showing the context and interrelation of selected terms. 3. Present a Critical Review (10 Marks): Deliver a 5–7 minute presentation highlighting the significance of terms, contextual insights, and gaps in interpretation. Assessment Focus: Accuracy and depth of term analysis Creativity and clarity in visual presentation Critical thinking and articulation during review Or Any practical in converted form can be taken for assessment (25 marks) Or Any of the experientials as portfolio/reflection/presentation/group discussion can be taken as an assessment (25 Marks)	2

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical/experiential) learning session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/ Shows how/ Knows how/ Know)	3G Teaching Learning Methods
Module 2 : طبی حیاتی طبیعیات Ṭibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics)						
Module Learning Objectives **(At the end of the module, the students should be able to)** 1. Illustrate the basic principles and mechanism of Medical Biophysics. 2. Describe the roles of Medical Biophysics in better comprehension of *Kulliyāt-i-Ṭibb* (Basic Principles of Unani Medicine). 3. Describe various physical forces and their correlation with Unani medicine philosophy.						
Unit 1 Human Body and Physical Forces 2.1.1. Mechanical Force 2.1.2. Osmotic and Hydrostatic Force 2.1.3. Electrical Force **References:** 37,38,39,40						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 1,CO 3,CO 5,CO 8	Describe the contribution of mechanical forces to human physiology, with a focus on heart mechanics and musculoskeletal motion	2	Lecture	CC	Knows-how	L&PPT ,L_VC
CO 3,CO 4,CO 6,CO 8	Demonstrate the effects of mechanical forces on blood pressure	4	Practical2.1	PSY-GUD	Shows-how	D,DIS,IBL,L_VC,PBL,SIM

CO 3,CO 4,CO 6,CO 8	Analyze the mechanical forces in joint biomechanics through movement analysis and real-world observations	4	Experiential-Learning2.1	PSY-MEC	Shows-how	DIS,ML,PSM,RLE,SDL
CO 1,CO 3,CO 6,CO 8	Discuss the Osmotic force and its role in fluid balance with suitable examples	2	Lecture	CC	Knows-how	CBL,L,L&GD,L&PPT
CO 3,CO 6,CO 8	Demonstrate osmotic forces through osmotic phenomena using seeds, tubers, or raisins	4	Practical2.2	PSY-MEC	Shows-how	DL,DIS,PT,PBL
CO 3,CO 6,CO 8	Analyze the selective permeability in reference to solute content with suitable examples	5	Experiential-Learning2.2	PSY-GUD	Does	CBL,DIS,IBL,L&GD,PL,PER,SIM
CO 3,CO 6,CO 8	Illustrate electrical forces, action potential and process of excitability	2	Lecture	CC	Knows-how	L,L&PPT ,L_VC
CO 3,CO 6,CO 8	Demonstrate nerve impulses in different nerve diseases and muscular disorders	4	Practical2.3	PSY-MEC	Shows-how	CBL,D,DIS,IBL,PT,SIM
CO 3,CO 6,CO 8	Demonstrate the physical forces involved in different body movements	5	Experiential-Learning2.3	PSY-GUD	Does	CBL,C_L,DIS,EDU,FC,PAL,RP

Unit 2 Haemodynamics

2.2.1. Haemodynamics

References: 37,38,39,40,41,42,43,44,50

3A	3B	3C	3D	3E	3F	3G
CO 3,CO 6,CO 8	Describe the laws of Haemodynamics	2	Lecture	CAN	Knows-how	D,L&GD,PBL

CO 3,CO 6,CO 8	Demonstrate the elasticity of blood vessels	4	Practical2.4	PSY-MEC	Shows-how	CBL,D,DIS,PT
CO 3,CO 6,CO 8	Apply the biomechanical principles in understanding blood flow and vascular health	5	Experiential-Learning2.4	PSY-GUD	Does	CBL,C_L,D-M,DIS,PSM,SIM
CO 3,CO 6,CO 8	Identify the properties of fluids	2	Lecture	CC	Knows-how	L&PPT
CO 3,CO 6,CO 8	Demonstrate the viscosity of the sample liquid	4	Practical2.5	PSY-GUD	Shows-how	D,DIS,EDU,PT
CO 3,CO 6,CO 8	Evaluate the concepts of fluid dynamics through real-world applications	5	Experiential-Learning2.5	CE	Does	CBL,D,DIS,IBL,PL,PSM,SIM

Unit 3 Thermodynamics

2.3.1. Thermoregulation
2.3.2. Heat exchange mechanism
2.3.3. Thermogenesis
2.3.4. Thermolysis

References: 26,38,39,40,46,47,48,99

3A	3B	3C	3D	3E	3F	3G
CO 3,CO 6,CO 8	Discuss the laws of thermodynamics in living systems and heat exchange	3	Lecture	CC	Knows-how	L&PPT
CO 3,CO 6,CO 8	Conduct calorimetric analysis to measure the energy content of various foods	5	Practical2.6	PSY-SET	Shows-how	D,DIS,PT,PBL

CO 3,CO 6,CO 8	Analyze the impact of thermo-chemistry on food and energy reserves	5	Experiential-Learning2.6	CAN	Does	BS,CBL,DIS,LS
CO 3,CO 6,CO 8	Interpret the relationship between thermodynamics and *Mizāj Aʿḍa*	5	Experiential-Learning2.7	CE	Does	BS,CBL,DL,DIS,LS
CO 3,CO 6,CO 8	Illustrate thermoregulation and its applied aspects	2	Lecture	CAP	Knows-how	CBL,L&PPT ,RLE
CO 3,CO 6,CO 8	Assess the effects of *Ḥammām* (steam bath) on thermoregulation	5	Experiential-Learning2.8	CAN	Does	CBL,C_L,DIS,FV,IBL,PBL
CO 1,CO 3,CO 6,CO 8	Demonstrate the correlation between thermoregulation and *Ḥarārat Gharīziyya*	5	Practical2.7	PSY-ADT	Shows-how	CBL,D,DIS,PT

Practical Training Activity

Practical 2.1 : Impact of Mechanical Forces on Blood Pressure

Total Duration (4 Hours)

1. **Introduction & Advanced Theory (40 min)** – The teacher will explain the physiological effects of mechanical forces on blood pressure using AV aids (animations, recorded demonstrations, or simulations).

2. **Teacher-Led Demonstration (40 min)** – The teacher will measure a volunteer's BP at rest, after a brief isometric exercise (e.g., handgrip test), and during recovery, explaining the observed changes. If a live demonstration is not possible, a pre-recorded video or simulation will be used.

3. **Student Practical (1.5 hours)** – Students will be divided into two groups:

Group 1: Dynamic resistance exercises (e.g., weightlifting).

Group 2: Isometric exercises (e.g., planks, wall sits). BP will be recorded at baseline, immediately post-exercise, and during recovery.

4. **Data Analysis & Interpretation (40 min)** – Students will compare BP readings, analyze trends, and discuss physiological responses using statistical or graphical methods.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, discuss clinical implications (e.g., hypertension, cardiovascular adaptations), address limitations, and conduct a Q&A session.

SOPs Reference: This practical will follow American Heart Association (AHA) Guidelines and European Society of Cardiology (ESC) Recommendations for blood pressure research and exercise physiology protocols.

Note: Students must document methodology, observations, and results in their logbooks for evaluation.

Practical 2.2 : Osmotic Forces through Osmotic Phenomena

Total Duration (4 Hours)

1. **Introduction & Theory (45 min)** – The teacher will explain osmosis, osmotic pressure, and water potential using AV aids and real-life examples. The biological significance of osmosis in plant and animal cells will also be discussed.

2. **Demonstration (45 min)** – The teacher will demonstrate osmotic effects using seeds in different solutions (hypotonic, isotonic, hypertonic), potato tubers in varying salt concentrations, and raisins in water to observe water absorption.

3. **Student Practical (1.5 hours)** – Students will prepare samples and immerse them in different solutions. Measure initial and final mass/size. Record and analyze osmotic changes over time.

4. **Data Analysis & Interpretation (30 min)** – Students will compare results, calculate water potential effects, and relate findings to osmotic principles.

5. **Discussion & Conclusion (30 min)** – The teacher will review results, discuss the biological significance of osmosis, address experimental limitations, and conduct a Q&A session.

SOPs Reference: This practical will follow the American Society of Plant Biologists (ASPB) and WHO Good Laboratory Practices (GLP) for handling plant materials and solution preparation.

Note: Students must document their methodology, observations, and results in logbooks for evaluation and future reference.

Practical 2.3 : Nerve Impulses in Neuromuscular Disorders

Total Duration (4 Hours)

1. **Introduction & Theory (40 min)** – The teacher will explain the physiology of nerve impulses, neuromuscular transmission, and the impact of nerve diseases (e.g., multiple sclerosis, Guillain-Barré syndrome) and muscular disorders (e.g., myasthenia gravis, muscular dystrophy) using AV aids.

2. **Demonstration (40 min)** – Using models, simulations, or live nerve conduction studies, the teacher will show normal vs. impaired nerve conduction, demyelination effects, and reflex variations.

3. **Student Practical (1.5 hours)** – Students will conduct basic nerve conduction tests using reflex hammers or EMG simulations and analyze responses in simulated patients or case studies.

4. **Data Analysis & Interpretation (40 min)** – Students will compare normal and pathological nerve conduction, discussing key physiological mechanisms.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, discuss clinical implications, address limitations, and conduct a Q&A session.

SOPs Reference: This practical will follow American Association of Neuromuscular & Electrodiagnostic Medicine (AANEM) Guidelines and WHO Good Clinical Practice (GCP) Standards for nerve conduction studies

Note: Students must document methodology, observations, and results in their logbooks for evaluation.

Practical 2.4 : Blood Vessel Elasticity and Compliance

Total Duration (4 Hours)

1. **Introduction & Theory (40 min)** – The teacher will explain vascular elasticity, compliance, and their role in blood pressure regulation using AV aids and real-life clinical examples.

2. **Demonstration (40 min)** – The teacher will show arterial elasticity using pulse wave analysis, blood pressure measurements with variations in posture and limb positioning, and Doppler ultrasound (if available) to assess arterial distensibility.

3. **Student Practical (1.5 hours)** – Students will measure blood pressure under different conditions (e.g., before and after exercise, cold exposure), assess pulse wave characteristics using a sphygmomanometer or digital tools, and observe external compression effects on vessels.

4. **Data Analysis & Interpretation (40 min)** – Students will compare vascular response patterns and discuss influencing factors like exercise and aging.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, discuss clinical relevance, and conduct a Q&A session.

This practical will follow American Heart Association (AHA) Guidelines and European Society of Cardiology (ESC) Recommendations for vascular health assessment.

Note: Students must document methodology, observations, and results in their logbooks for evaluation and future reference.

Practical 2.5 : Viscosity Analysis of Liquid Samples

Total Duration (4 Hours)

1. **Introduction & Theory (40 min)** – The teacher will explain viscosity, its role in fluid dynamics, and its physiological relevance using AV aids.

2. **Demonstration (40 min)** – The teacher will demonstrate viscosity measurement using: A viscometer (e.g., Ostwald or rotational viscometer). Observe capillary flow and liquid movement through narrow tubes. Stokes' Law by comparing the descent rate of spheres in liquids of varying viscosities.

3. **Student Practical (1.5 hours)** – Students will measure the viscosity of various liquid samples. Analyze the effects of temperature and solute concentration on viscosity. Record viscosity values and compare flow resistance across different conditions.

4. **Data Analysis & Interpretation (40 min)** – Students will calculate viscosity, compare results, and discuss factors influencing fluid resistance.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, discuss real-life applications (e.g., blood flow, pharmaceutical formulations), address experimental limitations, and conduct a Q&A session.

SOPs Reference: This practical will adhere to ASTM and ISO standards for viscosity measurement.

Note: Students will be required to document methodology, observations, and results in their logbooks.

Practical 2.6 : Calorimetric Analysis of Food Energy Content

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – The teacher will explain calorimetry principles, energy measurement in food, and its physiological relevance using AV aids.

2. **Demonstration (45 min)** – A step-by-step demonstration of a bomb calorimeter (or a simple calorimeter), covering setup, calibration, and sample handling.

3. **Student Practical (2 hours)** – Students will select food samples and conduct calorimetric measurements, record temperature changes and calculate energy content, and compare their findings with standard food energy values.

4. **Data Analysis & Interpretation (1 hour)** – Students will analyze results, discuss sources of error, and perform basic statistical assessments.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, discuss real-life applications in nutrition, metabolism, and the food industry, and address student questions.

SOPs Reference: This practical will follow Association of Official Analytical Collaboration (AOAC) and ISO standards for food energy analysis using calorimetry.

Note: Students must document methodology, observations, and results in their logbooks for evaluation and future reference.

Practical 2.7 : Correlation between Thermoregulation and *Ḥarārat Gharīziyya*

Total Duration (5 Hours)

1. **Introduction & Theory (1 hour)** – The teacher will explain thermoregulation, its physiological mechanisms, and its correlation with *Ḥarārat Gharīziyya* using AV aids and Unani medicine perspectives.

2. **Demonstration (1 hour)** – The teacher will demonstrate thermoregulatory responses such as skin temperature variations, pulse rate changes, and metabolic heat production under different conditions.

3. **Student Practical (2 hours)** – Students will measure body temperature at different sites, observe heat dissipation mechanisms (e.g., sweating, vasodilation), and compare pre- and post-exercise temperature changes.

4. **Data Analysis & Interpretation (30 min)** – Students will analyze their findings, compare them with classical Unani perspectives, and discuss factors affecting thermoregulation.

5. **Discussion & Conclusion (30 min)** – The teacher will summarize key observations, discuss clinical relevance, and address student queries.

SOPs Reference: Follows Unani principles of *Ḥarārat Gharīziyya* and modern physiological guidelines on thermoregulation.

Note: Students must document methodology, observations, and results in their logbooks.

Experiential learning Activity

Experiential-Learning 2.1 : Mechanical Forces in Joint Biomechanics: Real-world Analysis

Total Duration (4 Hours)

1. **Introduction & Concept Overview (30 min)** – Students will explore mechanical forces in joint biomechanics and understand the significance of movement analysis in daily activities through guided discussions.

2. **Observational Activity (1.5 hours)** – In a non-clinical setting, students will observe and analyze movements such as walking, running, and lifting. They will identify joint forces like compression, tension, and shear.

3. **Group Discussion & Comparative Analysis (45 min)** – Students will share their observations, compare movement mechanics, and discuss force distribution, biomechanics, and injury prevention strategies.

4. **Application & Problem-Solving (45 min)** – Students will assess their own movement patterns and posture, identifying potential joint stress risks. They will suggest movement modifications to reduce injury risks.

5. **Reflection & Conclusion (30 min)** – Students will reflect on key insights and explore practical applications in sports, ergonomics, and rehabilitation.

Note: Students should document their observations, identified mechanical forces, comparative insights, and reflections in their logbooks.

Experiential-Learning 2.2 : Selective Permeability and Solute Content: Key Examples

Total Duration (5 Hours)

1. **Introduction & Concept Exploration (45 min)** – Students will explore the concepts of selective permeability, solute movement, and variations in *Akhlāṭ* diffusion across different organs through guided discussions.

2. **Experimental Activity: Osmosis & Diffusion (1 hour)** – Students will conduct hands-on experiments using red blood cells or dialysis tubing to observe permeability in action, analyzing factors affecting diffusion.

3. **Comparative Analysis: *Akhlāṭ* Diffusion in Organs (1 hour)** – Students will discuss how variations in tissue structure and metabolism influence *Akhlāṭ* permeability, comparing diffusion patterns across different organs.

4. **Simulation & Application (45 min)** – Using pre-recorded data or simulations, students will analyze models related to kidney filtration, hepatic metabolism, and selective permeability to reinforce conceptual understanding.

5. **Group Discussion & Presentation (1 hour)** – Groups will present their experimental findings, linking results to physiological and pathological conditions, with discussions on the relevance of Unani concepts.

6. **Reflection & Conclusion (30 min)** – Students will participate in a reflective discussion on their insights and applications of Unani principles.

Note: Students should document their experimental observations, comparative analyses, and reflections in their logbooks.

Experiential-Learning 2.3 : Physical Forces Involved in Different Body Movements

Total Duration (5 Hours)

1. **Introduction & Conceptual Exploration (45 min)** – Students will explore physical forces in body movements through pre-class readings or videos. In class, they will engage in guided discussions and create concept maps to consolidate their understanding.

2. **Observational Activity: Identifying Forces in Movement (1 hour)** – Students will observe various body movements to identify the forces involved. A quiz or interactive challenge will reinforce learning, encouraging participation through a points-based system.

3. **Collaborative Learning: Peer Teaching & Problem-Solving (1 hour)** – In small groups, students will analyze a specific movement, explain the forces at play to their peers, and discuss strategies to optimize movement efficiency and prevent injuries.

4. **Applied Evaluation: Force Impact Assessment (45 min)** – Students will role-play as therapists, athletes, or trainers to simulate real-world scenarios. They will assess the forces influencing body movements and suggest evidence-based injury prevention strategies.

5. **Simulation & Visualization (1 hour)** – Using motion analysis software, students will visualize and analyze force dynamics. Concept maps will be developed to illustrate the relationship between forces, movement efficiency, and injury risks.

6. **Reflection (30 min)** – Students will participate in a reflective discussion to connect their learning to practical applications in movement assessment and injury prevention.

Note: Students should document their concept maps, observations, assessments, and reflections in their logbooks.

Experiential-Learning 2.4 : Mechanical Properties of Blood Vessels and Blood Flow

Total Duration (5 Hours)

1. **Introduction & Conceptual Exploration (45 min)** – Inquiry-based exploration of blood vessel mechanics (elasticity, compliance, stiffness) and their influence on blood flow. Students will create concept maps to visualize key concepts.

2. **Hands-On Exploration: Blood Vessel Mechanics (45 min)** – Students will simulate blood flow using rubber tubes, exploring how changes in vessel properties impact flow rate and pressure.

3. **Case-Based Discussion: Vascular Compliance & Stiffness (40 min)** – Through case study analysis on hypertension and arteriosclerosis, students will investigate the effects of vascular compliance and stiffness on blood flow.

4. **Experimental Activity: Blood Pressure & Flow Resistance (1 hour)** – Students will measure blood pressure and simulate resistance to understand flow mechanics. Discuss clinical relevance.

5. **Simulation Exploration: Hemodynamics & Blood Flow (40 min)** – Students will use simulation tools to manipulate vessel properties and observe the resulting changes in hemodynamics.

6. **Problem-Solving Discussion: Pathophysiology of Blood Flow (40 min)** – Working in groups, students will solve clinical problems related to blood flow disorders, applying theoretical knowledge to propose evidence-based solutions.

7. **Reflection (30 min)** – Students will participate in a guided reflection to consolidate learning and explore the clinical relevance of blood vessel mechanics.

Note: Students should document their concept maps, observations, experimental data, case study analyses, and reflections in their logbooks.

Experiential-Learning 2.5 : Fluid Dynamics in Real-World Physiology

Total Duration (5 Hours)

1. **Introduction & Conceptual Exploration (45 min)** – Discussion on fluid dynamics principles (e.g., flow rate, viscosity, turbulence) with applications in various physiological systems such as respiration, cerebrospinal fluid flow, and lymphatic circulation.

2. **Observational Analysis (1 hour)** – Inquiry-based exploration using demonstrations or videos to observe fluid flow in different biological contexts (e.g., airway resistance, peristalsis, synovial fluid movement).

3. **Experimental Activity (1 hour)** – Hands-on simulation to investigate non-vascular fluid flow. Students will analyze factors like viscosity, pressure, and resistance in physiological fluids.

4. **Peer Learning (45 min)** – Through interactive peer teaching, students will identify and justify key factors influencing fluid dynamics across different organ systems.

5. **Case-Based Learning (45 min)** – Problem-solving discussions using clinical cases related to fluid movement in non-cardiovascular systems (e.g., asthma, hydrocephalus, pleural effusion).

6. **Reflection & Discussion (45 min)** – Students will summarize insights and discuss the relevance of fluid dynamics in understanding disease mechanisms and treatment approaches.

Note: Students are required to document their observations, experimental findings, case study interpretations, and reflections in their logbooks.

Experiential-Learning 2.6 : Impact of Thermo-Chemistry on Food and Energy Reserves

Total Duration (5 Hours)

1. **Problem Introduction & Conceptual Discussion (45 min)** – The teacher will present a real-world problem related to food thermodynamics (e.g., diet-induced thermogenesis in metabolic disorders). Principles of thermo-chemistry and *Ḥarārat Gharīziyya* will be discussed.

2. **Hypothesis Formation, Library Research & Experimental Design (1 hour)** – Students will propose hypotheses on how different foods affect energy reserves. They will conduct library research to explore relevant classical and modern literature on food energy metabolism and thermo-chemistry. Based on their findings, they will refine their hypotheses and design small-scale experiments.

3. **Experimental Investigation (1 hour)** – Students will conduct experiments (e.g., calorimetry, thermogenic response assessments) to measure energy content and metabolic heat production.

4. **Data Analysis & Physiological Interpretation (45 min)** – Students will interpret their findings, linking results with metabolic pathways, thermoregulation, and energy storage mechanisms.

5. **Case Study Review & Clinical Relevance (45 min)** – Students will review and analyze classical and modern case studies on food and energy metabolism. Discussions will focus on practical applications in nutrition and medicine.

6. **Reflection & Discussion (45 min)** – Students will summarize key insights and discuss real-life implications of their findings.

Note: Students are required to document their hypotheses, research findings, experimental data, interpretations, and reflections in their logbooks.

Experiential-Learning 2.7 : Thermodynamics and Its Influence on *Mizāj A'ḍa*

Total Duration (5 Hours)

1. **Introduction & Conceptual Overview (45 minutes)** – Students will brainstorm the principles of thermodynamics in biological systems and their correlation with *Mizāj A'ḍa*, focusing on heat-related aspects.

2. **Case-Based Analysis & Hypothesis Development (1 hour)** – Students will visit the library to review literature on organ-specific thermal behaviour. They will analyze case studies, discuss key findings, and develop hypotheses on the relationship between *Mizāj* and heat regulation.

3. **Practical Demonstrations & Data Interpretation (1.5 hours)** – Students will conduct hands-on experiments using thermal imaging or temperature sensors to study heat distribution across different anatomical regions. They will collect and analyze data in relation to *Mizāj*.

4. **Comparative Analysis & Integration (1 hour)** – Students will compare their findings with both Unani and modern thermodynamic principles, identifying consistencies and discrepancies.

5. **Synthesis & Conclusion (45 minutes)** – Students will present their findings, discuss potential applications in Unani medicine, and propose future research directions.

Note: Students are required to document their observations, analyses, and key insights from the activity in their logbooks.

Experiential-Learning 2.8 : Effects of *Ḥammām* (Steam Bath) on Thermoregulation

Total Duration (5 Hours)

1. **Introduction & Ethical Guidelines (1 hour)** – Students will receive instructions on the physiological aspects of thermoregulation, the effects of steam baths, and ethical considerations for patient interaction.

2. **Patient Interaction & Data Collection (2 hours)** – Students will visit the *Ḥammām*, observe patients before and after the steam bath, and interact with them to document their experiences. They will note changes in sweating, skin temperature, relaxation, and any discomfort.

3. **Group Discussion & Preliminary Analysis (1 hours)** – Under the teacher's supervision, students will share observations, compare patient responses, and discuss individual variations based on *Mizāj*, age, and health status.

4. **Report Writing, Documentation & Reflection (1 hour)** – Students will systematically document their observations, analyses, and reflections. They will prepare a structured report under the teacher's guidance, summarizing their findings and discussing the therapeutic implications of *Ḥammām* on thermoregulation.

Note: Students must ensure detailed documentation of patient interactions, observed physiological changes, and key insights in their logbooks for future reference.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular Assessment. Assessment will be 75 marks for this module. Keep structure making pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the modular grade point as per table 6 C. Part A: Project Work (50 Marks) Students will complete a pre-assigned 4-hour project, applying biophysical concepts through small-scale experiments or data analysis. Examples: • Blood Flow & Resistance – Poiseuille's Law demonstration. • Mechanical Forces & Blood Pressure – BP variation with posture/grip. • Heat Transfer in the Body – Thermal sensor observations. • Bioelectricity in Muscles – Simple EMG recording.	6

Assessment Criteria (10 Marks Each): 1. Concept understanding & application 2. Research, methodology, execution 3. Data analysis & interpretation 4. Clarity of findings & presentation 5. Time management & self-organization Part B: Problem-Based Learning (PBL) (25 Marks) Students will analyze real-world biophysics scenarios, apply theoretical concepts to problem-solving, and present their findings through discussion and reports. Assessment Criteria (5 Marks Each): 1. Problem Understanding 2. Application of Concepts 3. Critical Thinking 4. Data Interpretation 5. Presentation & Engagement Or Any practical in converted form can be taken for assessment (35 Marks) and Any of the experientials as portfolio/ reflection/ presentation/ group discussion can be taken as an assessment (40 Marks)	

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical/experiential) learning session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/ Shows how/ Knows how/ Know)	3G Teaching Learning Methods
Module 3 : طبی حیاتی کیمیا: حیاتیاتی سالمات Ṭibbī Ḥayātī Kīmiyā: Ḥayātiyātī Sālamāt (Medical Biochemistry: Biomolecules)						
Module Learning Objectives **(At the end of the module, the students should be able to)** 1. Describe the key metabolic pathways of the biomolecules. 2. Conduct practical tests to understand various biochemical processes. 3. Identify the concepts that align with Unani principles.						
Unit 1 Carbohydrate 3.1.1. Introduction to Carbohydrate Metabolism 3.1.2. Structure 3.1.3. Metabolism 3.1.3.1. Glycolysis 3.1.3.2. Glycogenesis and Glycogenolysis 3.1.3.3. Gluconeogenesis 3.1.3.4. Pentose Phosphate Pathway 3.1.3.5. Citric Acid Cycle **References:** 49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 3,CO 6,CO 8	Discuss the structural components, and significance of carbohydrate in energy production	1	Lecture	CAN	Knows-how	L,L&PPT

CO 1,CO 3,CO 6	Describe the processes of glycolysis, glycogenolysis, citric acid cycle, glycogenesis, gluconeogenesis, and electron transport chain (ETC)	2	Lecture	CC	Knows-how	L&PPT ,L_VC
CO 1,CO 3,CO 5,CO 6	Analyze the roles of insulin, glucagon, and other hormones in glucose homeostasis	1	Lecture	CAN	Knows-how	L&PPT ,L_VC
CO 1,CO 3,CO 5,CO 6	Assess metabolic disorders (e.g., diabetes, galactosemia, and fructose/lactose intolerance) and review laboratory tests used for evaluating carbohydrate metabolism	1	Lecture	CE	Knows-how	L,L&PPT
CO 1,CO 3,CO 4,CO 6	Measure serum glucose levels to assess metabolic status	5	Practical3.1	PSY-SET	Shows-how	DL,LRI,PT
CO 1,CO 3,CO 4,CO 6	Perform glycosylated haemoglobin (HbA1c) test to assess metabolic status	5	Practical3.2	PSY-SET	Shows-how	DL,LRI,PT

Unit 2 Protein

3.2.1. Introduction to Protein Metabolism
3.2.2. Amino Acid Metabolism
3.2.3. Urea Cycle
3.2.4. Protein Metabolism Disorders
3.2.5. Carbohydrate Metabolism Disorders

References: 50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 3,CO 4,CO 6	Discuss the fundamental concepts of protein metabolism, including synthesis, degradation, and the roles of amino acids	2	Lecture	CAN	Knows-how	L&PPT ,L_VC

CO 1,CO 3,CO 4,CO 6	Describe the urea cycle's role in nitrogen metabolism and its clinical significance	1	Lecture	CC	Knows-how	L&PPT ,L_VC
CO 1,CO 3,CO 4,CO 6	Identify the processes and mechanisms involved in protein degradation.	1	Lecture	CC	Knows-how	L,L&PPT
CO 1,CO 3,CO 4,CO 6	Analyze the metabolic disorders associated with protein metabolism	1	Lecture	CAN	Knows-how	L,L&GD,L&PPT
CO 1,CO 3,CO 4,CO 6	Evaluate uric acid levels using colorimetric or spectrophotometric methods and analyze results	5	Practical3.3	PSY-SET	Shows-how	DL,PT
CO 1,CO 3,CO 4,CO 6	Perform the serum albumin test using appropriate reagents and methods	5	Practical3.4	PSY-SET	Shows-how	DL,LRI,PT

Unit 3 Lipid

3.3.1. Introduction to Lipid Metabolism
3.3.2. Fatty Acid Synthesis
3.3.3. Fatty Acid Transport and Storage
3.3.4. Beta-Oxidation of Fatty Acid
3.3.5. Triglyceride Metabolism
3.3.6. Ketogenesis
3.3.7. Cholesterol Metabolism
3.3.8. Lipid Metabolism Disorders

References: 50,51,52,53,54,55,56,57,58,59,61,62,63,64,65,68,69,70,71,72

3A	3B	3C	3D	3E	3F	3G

CO 1,CO 3,CO 4,CO 6	Discuss the fundamental concepts and significance of lipid metabolism in cellular functions	1	Lecture	CAN	Knows-how	L,L&PPT
CO 1,CO 3,CO 4,CO 6	Describe anabolic and catabolic pathways of fatty acid metabolism.	1	Lecture	CC	Knows-how	L,L&PPT
CO 1,CO 3,CO 4,CO 6	Identify the mechanisms of fatty acid transport and storage in various tissues	1	Lecture	CC	Knows-how	L&PPT
CO 1,CO 3,CO 4,CO 6	Discuss cholesterol metabolism and its clinical significance	1	Lecture	CAP	Knows-how	L&GD,L&PPT
CO 1,CO 3,CO 4,CO 6	Analyze triglyceride metabolism and its clinical significance	1	Lecture	CAN	Knows-how	DIS,L&PPT
CO 1,CO 3,CO 4,CO 6	Conduct quantitative estimation of cholesterol in serum	5	Practical3.5	PSY-GUD	Shows-how	DL,LRI,PT,PBL
CO 1,CO 3,CO 4,CO 6	Perform quantitative estimation of HDL, LDL, and VLDL in serum	5	Practical3.6	PSY-GUD	Shows-how	DL,LRI,PT,PBL

Unit 4 Biomolecules: Applied Aspects

3.4.1. Physiological Roles of Biomolecules

References: 73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,101,118,122

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 3,CO 4,CO 6	Appraise congenital disorders disrupting metabolic pathways and explain their effects	5	Experiential-Learning3.1	CE	Does	BS,CBL,LRI,PSM,RP,SIM,TBL
CO 1,CO 3,CO 4,CO 6	Analyze metabolic pathways and Unani perspectives on acquired disorders	5	Experiential-Learning3.2	CAN	Does	BS,CBL,DIS,LRI,LS,PSM,TBL
CO 1,CO 3,CO 4,CO 6	Identify the significance of seasonal variations affecting biomolecule metabolism	5	Experiential-Learning3.3	CC	Does	BS,CBL,DIS,LRI,PBL,PSM,TBL
CO 1,CO 3,CO 4,CO 6	Analyze case studies on different dietary habits affecting biomolecule metabolism	4	Experiential-Learning3.4	CAN	Does	BS,CBL,C_L,DIS,LRI,PSM,TBL
CO 1,CO 3,CO 4,CO 6	Analyze various forms of physical activity influencing biomolecule metabolism	4	Experiential-Learning3.5	CAN	Does	BS,CBL,DIS,LRI,LS,PER,RLE,SIM
CO 1,CO 3,CO 4,CO 6	Investigate the effects of various psychological factors on eating behaviour and metabolism	4	Experiential-Learning3.6	CE	Does	BS,CBL,DIS,LRI,PBL,PSM,RLE,RP,SIM
CO 1,CO 3,CO 4,CO 6	Assess the implications of sleep in the regulation of metabolism	4	Experiential-Learning3.7	CE	Does	BS,CBL,DIS,LRI,PBL,RLE,RP,SDL,SIM
CO 1,CO 3,CO	Analyze the effect of waste evacuation on homeostasis and metabolic health	4	Experiential-Learning3.8	AFT-VAL	Does	BS,CD,CBL,DIS,IBL,LRI,PBL,SDL,SIM,SY

4,CO 6,CO 8						
CO 1,CO 3,CO 5,CO 6	Investigate how fluid retention affects metabolism, homeostasis, and overall health	4	Experiential-Learning3.9	CE	Does	BS,CBL,LS,PER,PBL,PSM,RP,SIM

Practical Training Activity

Practical 3.1 : Serum Glucose Test for Metabolic Assessment

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – The teacher will explain glucose metabolism, assay principles, and relevant SOP guidelines.

2. **Demonstration (45 min)** – The teacher will demonstrate the procedure, including reagent preparation, sample handling, and test execution.

3. **Student Practical (2 hours)** – Students will perform the assay under supervision, collect data, and record results.

4. **Data Analysis (1 hour)** – The teacher will guide students in calculating and interpreting glucose levels based on their results.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, address troubleshooting, discuss clinical relevance, and conduct a Q&A session.

SOPs Reference: The procedure will follow the WHO Laboratory Manual or the Clinical and Laboratory Standards Institute (CLSI) C30-A guidelines for Serum Glucose Estimation using the Glucose Oxidase Assay.

Note: All students are required to record their practical activity, including methodology, observations, and results, in their logbook for evaluation and future reference.

Practical 3.2 : HbA1c Test for Metabolic Assessment

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – The teacher will explain the significance of HbA1c, its role in glycemic control, and the principles of different testing methods.

2. **Demonstration (45 min)** – The teacher will demonstrate the step-by-step procedure, including sample collection, reagent preparation, and test execution.

3. **Student Practical (2 hours)** – Students will perform the HbA1c test under supervision, collect data, and record their results.

4. **Data Analysis (1 hour)** – The teacher will guide students in calculating and interpreting HbA1c levels concerning glycemic control and metabolic status.

5. **Discussion & Conclusion (30 min)** – The teacher will lead a review of findings, discuss clinical implications, troubleshoot common errors, and conduct a Q&A session.

SOPs Reference: The procedure will follow CLSI C56-A guidelines for HbA1c Estimation using standardized laboratory methods (e.g., HPLC, immunoassay, or point-of-care testing).

Note: All students are required to record their practical activity, including methodology, observations, and results, in their logbook for evaluation and future reference.

Practical 3.3 : Uric Acid Level Estimation and Analysis

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – The teacher will explain uric acid metabolism, clinical significance, and testing principles.

2. **Demonstration (45 min)** – The teacher will demonstrate sample preparation and the testing procedure.

3. **Student Practical (2 hours)** – Students will estimate uric acid levels using a colorimeter or spectrophotometer under supervision.

4. **Data Analysis (1 hour)** – The teacher will guide students in analyzing and interpreting the results.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, discuss errors, and conduct a Q&A session.

SOPs Reference: The procedure will follow CLSI C25-A guidelines for Uric Acid Estimation using enzymatic or colorimetric methods in clinical laboratories.

Note: All students are required to record their practical activity, including methodology, observations, and results, in their logbook for evaluation and future reference.

Practical 3.4 : Serum Albumin Estimation and Interpretation

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – The teacher will explain the role of albumin in the body, clinical significance, assay principles, and SOP guidelines.

2. **Demonstration (45 min)** – The teacher will demonstrate the procedure, including reagent preparation, sample handling, and test execution using the BCG/BCP method.

3. **Student Practical (2 hours)** – Students will perform the serum albumin test under supervision, collect data, and record results.

4. **Data Analysis (1 hour)** – The teacher will guide students in calculating and interpreting serum albumin levels concerning clinical conditions such as liver disease and malnutrition.

5. **Discussion & Conclusion (30 min)** – The teacher will review findings, troubleshoot common errors, discuss clinical relevance, and conduct a Q&A session.

SOPs Reference: The procedure will follow CLSI C38-A guidelines or the WHO Laboratory Manual for Serum Albumin Estimation using the Bromocresol Green (BCG) or Bromocresol Purple (BCP) method.

Note: All students are required to record their practical activity, including methodology, observations, and results, in their logbook for evaluation and future reference.

Practical 3.5 : Quantitative Estimation of Cholesterol Levels

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – Explanation of cholesterol metabolism, clinical significance, and principles of the CHOD-PAP method.

2. **Demonstration (45 min)** – Step-by-step procedure, including reagent preparation, sample handling, and assay execution.

3. **Student Practical (2 hours)** – Students perform the cholesterol assay under supervision, collect data, and record results.

4. **Data Analysis (1 hour)** – Calculation and interpretation of cholesterol levels concerning lipid profile and cardiovascular risk.

5. **Discussion & Conclusion (30 min)** – Review findings, troubleshoot errors, discuss clinical relevance, and Q&A session.

SOPs Reference: The procedure will follow CLSI C40-A guidelines or the WHO Laboratory Manual for Quantitative Estimation of Serum Cholesterol using the Cholesterol Oxidase-Peroxidase (CHOD-PAP) Method.

Note: All students are required to record their practical activity, including methodology, observations, and results, in their logbook for evaluation and future reference.

Practical 3.6 : Quantitative Estimation of HDL, LDL, and VLDL Cholesterol Levels in Serum

Total Duration (5 Hours)

1. **Introduction & Theory (45 min)** – Explanation of lipoproteins (HDL, LDL, VLDL), their clinical significance, and principles of the estimation methods.

2. **Demonstration (45 min)** – Step-by-step procedure, including reagent preparation, sample handling, HDL precipitation, and cholesterol measurement.

3. **Student Practical (2 hours)** – Students perform the lipid profile test under supervision, measure cholesterol levels, and record data.

4. **Data Analysis (1 hour)** – Calculation of LDL and VLDL using the Friedewald equation and interpretation of lipid profile results.

5. **Discussion & Conclusion (30 min)** – Review findings, troubleshoot errors, discuss clinical relevance in cardiovascular risk assessment, and Q&A session.

SOPs Reference: The procedure will follow CLSI C40-A guidelines or the WHO Laboratory Manual for the Quantitative Estimation of HDL, LDL, and VLDL Cholesterol in Serum using enzymatic methods such as precipitation methods for HDL, and the Friedewald equation for LDL and VLDL calculation.

Note: All students are required to record their practical activity, including methodology, observations, and results, in their logbook for evaluation and future reference.

Experiential learning Activity

Experiential-Learning 3.1 : Congenital Metabolic Disorders and their Impact on Metabolic Pathways

Total Duration (5 Hours)

1. **Concept Mapping & Case Triggers (45 min)** – Students will brainstorm, map metabolic pathways, and discuss case scenarios related to metabolic imbalances in biomolecules.

2. **Case-Based Role-Playing (45 min)** – Students will act as healthcare professionals, diagnosing and managing metabolic disorders related to biomolecule dysfunction (e.g., hyperlipidaemia, amino acid disorders, glycogen storage diseases).

3. **Simulated Data Analysis (2 hours)** – Students will interpret biochemical reports and propose diagnoses based on genetic screening results.

4. **Group Problem-Solving (1 hour)** – Students will refine diagnoses through case discussions, linking biomolecule dysfunction to metabolic consequences and proposing management strategies.

5. **Debriefing & Reflection (30 min)** – Discussion on key takeaways, the role of biomolecules in health and disease, and implications for genetic screening and counselling.

Note: Students will document concept maps, case analyses, diagnostic reasoning, and reflections on metabolic disorders, genetic screening, and counselling in their logbooks.

Experiential-Learning 3.2 : Metabolic Pathways and Unani Insights into Acquired Disorders

Total Duration (5 Hours)
1. **Concept Mapping & Case Introduction (1 hour)** – Students will brainstorm, map metabolic pathways, and discuss disorders such as diabetes and metabolic syndrome,

integrating Unani concepts.
2. **Debate on Management Strategies (30 min)** – Students will debate lifestyle modifications versus medication for managing metabolic disorders, presenting evidence-based arguments.
3. **Group-Based Problem-Solving (1 hour)** – Students will analyze clinical studies, apply biochemical and Unani diagnostic principles, and develop treatment strategies.
4. **Community/Public Health Project (2 hours)** – Students will visit the library to design and present educational materials on metabolic disorder prevention, linking biochemical and Unani perspectives to real-world health issues.
5. **Debriefing & Reflection (30 min)** – A class discussion on key insights, diagnostic challenges, and the role of Unani principles in public health strategies for metabolic disorders.
Note: Students will document concept maps, case analyses, debate arguments, problem-solving approaches, and reflections in their logbooks.

Experiential-Learning 3.3 : Impact of Seasonal Variations on Biomolecule Metabolism

Total Duration (5 Hours)

1. **Concept Mapping (45 min)** – Students will brainstorm, map how seasonal variations impact glucose, lipid, and vitamin metabolism, using real-world examples.

2. **Data Analysis (45 min)** – Students will analyze provided datasets on seasonal fluctuations in metabolic markers and identify key trends.

3. **Case Study Analysis (2 hours)** – Students will evaluate cases from different climates, comparing the effects of diet, temperature, and seasonal changes on metabolism.

4. **Public Health Strategies (1 hour)** – Students will develop recommendations for optimizing metabolism through seasonal dietary and lifestyle adaptations.

5. **Debriefing & Reflection (30 min)** – Discussion on key takeaways, health implications, and evolutionary perspectives on metabolic adaptation.

Note: Students should document their concept maps, data analysis findings, case study evaluations, public health recommendations, and reflections on seasonal metabolic adaptations in their logbooks.

Experiential-Learning 3.4 : Dietary Habits and their Impact on Biomolecule Metabolism - Case Studies

Total Duration (4 Hours)

1. **Concept Mapping (1 hour)** – Students will brainstorm how various diets (e.g., high-carb, keto, vegetarian) influence metabolism.

2. **Case Study Analysis (1.5 Hours)** – Students will assess real-world cases, examining biochemical markers and metabolic effects.

3. **Problem-Solving (1 hour)** – Students will propose dietary modifications to optimize metabolic health, integrating Unani principles.

4. **Debriefing & Reflection (30 min**) – Discussion on key takeaways, health risks, and research trends.

Note: Students should document their concept maps, case study analyses, proposed dietary modifications, and reflections on metabolism and diet in their logbooks.

Experiential-Learning 3.5 : Impact of Physical Activity on Biomolecule Metabolism

Total Duration (4 Hours)

1. **Concept Mapping & Discussion (45 min)** – Students will brainstorm and map the metabolic effects of aerobic vs. anaerobic exercise, linking key biochemical pathways such as glycolysis, β-oxidation, and ATP production.

2. **Case Study & Data Interpretation (1 hour)** – Students will visit the library and analyze case studies, interpret biochemical markers (e.g., blood glucose, lactate, lipid profile), and evaluate metabolic responses to different physical activities.

3. **Activity-Based Simulation (1.5 hours)** – Students will participate in controlled light physical activities (e.g., walking, jumping), monitor heart rate, and correlate biomolecule utilization (carbohydrates vs. fats) with intensity levels.They will discuss metabolic flexibility and exercise adaptation.

4. **Debriefing & Reflection (45 min)** – A discussion will be held on the impact of exercise on insulin sensitivity, lipid metabolism, and protein turnover, along with long-term metabolic health benefits.

Note: Students should document their concept maps, case study analyses, observed metabolic changes from the simulation, and reflections on exercise metabolism in their logbooks.

Experiential-Learning 3.6 : Psychological Factors Influencing Eating Behaviour and Metabolism

Total Duration (4 Hours)

1. **Concept Mapping & Discussion (1 hour)** – Students will brainstorm the psychological influences on eating and their biochemical effects, focusing on macronutrient metabolism and hormonal regulation (insulin, ghrelin, leptin, cortisol).

2. **Case Study Analysis (1 hour)** – Students will analyze simulated or documented real-life cases of emotional eating, interpreting biochemical markers (glucose levels, lipid profile, stress hormones) to understand its metabolic consequences. Ethical considerations and patient confidentiality will be emphasized.

3. **Self-Assessment & Role-Playing (1.5 hours)** – Students will assess their eating behaviors and role-play scenarios involving stress eating (cortisol-driven gluconeogenesis), mindful eating (insulin response), and external food cues (dopamine and appetite regulation).

4. **Debriefing & Reflection (30 min)** – A discussion on hormonal regulation, metabolic health risks (insulin resistance, obesity), and evidence-based dietary strategies for psychological well-being.

Note: Students should document their concept maps, case study findings, self-assessment reflections, and insights on the biomolecular basis of eating behaviour in their logbooks.

Experiential-Learning 3.7 : Role of Sleep in Metabolic Regulation

Total Duration (4 Hours)

1. **Concept Mapping & Discussion (1 hour)** – Students will brainstorm the role of sleep in metabolism, focusing on glucose homeostasis (insulin function), lipid metabolism, protein synthesis, and appetite-regulating hormones (ghrelin, leptin, cortisol).

2. **Case Study Analysis (1 hour)** – Students will analyze real-world cases of sleep deprivation, interpreting biochemical markers (glucose levels, cortisol, lipid profile) and their metabolic implications (insulin resistance, fat storage, muscle breakdown).

3. **Self-Assessment & Simulation (1 hour)** – Students will assess their own sleep habits and participate in role-play scenarios simulating sleep deprivation effects, discussing its impact on hormonal balance (melatonin suppression, cortisol elevation) and energy metabolism.

4. **Debriefing & Reflection (1 hour)** – A discussion on biomolecular mechanisms of sleep regulation, long-term metabolic risks (obesity, diabetes, metabolic syndrome), and evidence-based strategies for optimizing sleep to enhance metabolic health.

Note: Students should document their concept maps, case study analyses, self-assessment reflections, and key takeaways on biochemical pathways regulating metabolism and sleep in their logbooks.

Experiential-Learning 3.8 : Impact of Waste Evacuation on Homeostasis and Metabolic Health

Total Duration (4 Hours)

1. **Concept Mapping & Discussion (1 hour)** – Students will brainstorm the waste elimination pathways (renal, hepatic, gastrointestinal, respiratory, and sweat glands) and their role in metabolic balance and homeostasis. Discussions will include biochemical markers (urea, creatinine, bilirubin) and Unani concepts of *Istifrāgh (*waste evacuation).

2. **Case Study Analysis (1 hour)** – Students will analyze cases of metabolic disorders (renal insufficiency, hepatic dysfunction, constipation, acidosis) linked to impaired waste evacuation, interpreting biochemical reports (BUN, serum creatinine, liver function tests, blood pH).

3. **Simulation & Self-Assessment (1 hour)** – Students will track their hydration, urination patterns, and fiber intake, correlating them with metabolic health indicators. They will role-play scenarios depicting urinary retention, dehydration, and impaired liver detoxification, linking symptoms to metabolic disruptions.

4. **Symposium & Reflection (1 hour)** – A panel discussion on lifestyle and therapeutic strategies for maintaining waste elimination and metabolic health, integrating modern biochemical approaches and Unani principles.

Note: Students should document their concept maps, case study findings, self-assessment reflections, and key symposium insights in their logbooks.

Experiential-Learning 3.9 : Effects of Fluid Retention on Metabolism, Homeostasis, and Health

Total Duration (4 Hours)

1. **Concept Mapping & Discussion (1 hour)** – Students will brainstorm and explore fluid retention mechanisms, including osmolarity, electrolyte balance, ADH, aldosterone, ANP, and plasma proteins, as well as biochemical markers associated with edema and homeostasis.

2. **Case Study Analysis (1 hour)** – Students will visit the library to analyze cases of fluid retention disorders (e.g., edema, nephrotic syndrome, heart failure) using biochemical data such as serum sodium, potassium, creatinine, albumin, BNP, and urine-specific gravity.

3. **Simulation & Self-Assessment (1 hour**) – Students will monitor their daily water and sodium intake and track urine output. Through role-play scenarios depicting fluid retention symptoms (e.g., pitting edema, thirst, hypertension), they will evaluate the impact of biochemical markers on fluid balance.

4. **Presentations & Reflection (1 hour)** – Students will deliver presentations on preventive and therapeutic strategies for maintaining fluid balance, integrating biochemical, clinical, and Unani perspectives.

Note: Students should document their concept maps, case study analyses, self-assessment reflections, and key insights from simulations and presentations in their logbooks.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular Assessment. Assessment will be 75 marks for this module. Keep structure making pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the modular grade point as per table 6 C. Part A: Literature Review and Report (50 Marks) Students will conduct a literature review on a pre-assigned topic related to biomolecules. The review will focus on recent research and its clinical applications. The task will be completed within 4 hours. Examples:	6

• Carbohydrate: Glycogen metabolism in diabetes. • Protein: Protein misfolding in neurodegenerative diseases. • Lipid: Cholesterol metabolism and its role in atherosclerosis. Assessment Criteria (10 Marks Each): 1. Research depth & understanding 2. Report clarity & organization 3. Critical analysis & synthesis of findings 4. Use of references & citations 5. Time management & focus Part B: Case Study Analysis (25 Marks) Students will analyze a pre-assigned biochemical case study, applying biomolecular concepts to identify causes and propose interventions. The analysis will be completed within 2 hours. Examples: • Carbohydrates: Diabetes and insulin resistance. • Proteins: Cystic fibrosis and CFTR mutations. • Lipids: Hyperlipidaemia and cardiovascular risk. Assessment Criteria (5 Marks Each): 1. Problem identification & understanding 2. Application of biochemistry concepts 3. Proposal of biochemical interventions 4. Critical thinking & problem-solving 5. Presentation & clarity Or Any practical in converted form can be taken for assessment (35 Marks) and Any of the experientials as portfolio/ reflection/ presentation/ group discussion can be taken as an assessment (40 Marks)	

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical/experiential) learning session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/ Shows how/ Knows how/ Know)	3G Teaching Learning Methods
Module 4 : Ḥayātī Kīmiyā: Sālamātī Ḥayātiyāt حیاتی کیمیا: سالماتی حیاتیات (Biochemistry: Molecular Biology)						
Module Learning Objectives **(At the end of the module, the students should be able to)** 1. Illustrate the fundamental concepts of Molecular Biology. 2. Appraise the tools and techniques applied in Molecular Biology. 3. Identify the clinical implications and ethical considerations.						
Unit 1 DNA Structure 4.1.1. DNA Double Helix and Chromatin Structure 4.1.2. DNA Replication Mechanisms 4.1.3. DNA Repair and Mutation **References:** 85,86,87,88,89,90,91,94						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 3,CO 4,CO 8	Describe the structural components of DNA and chromatin	1	Lecture	CC	Knows-how	L,L&PPT
CO 3,CO 4,CO 8	Identify the key steps involved in DNA replication process	1	Lecture	CC	Knows-how	L,L&GD,L&PPT

CO 3,CO 4,CO 8	Illustrate DNA repair mechanisms and analyse the consequences of mutation	2	Lecture	CAN	Knows-how	L,L&PPT ,L_VC
CO 3,CO 4,CO 8	Demonstrate genetic inheritance through punnet squares and Pedigree analysis to predict and interpret inheritance patterns	6	Practical4.1	PSY-GUD	Shows-how	D,DIS,SIM
CO 3,CO 4,CO 8	Demonstrate the applications of major genetic analysis tools	6	Practical4.2	PSY-SET	Shows-how	D,DIS,LRI,L_VC,SIM
CO 3,CO 4,CO 8	Evaluate the significance of DNA in genetics and inheritance	6	Experiential-Learning4.1	CE	Does	BS,CBL,DIS,EDU,LRI,LS,PSM,RP,SDL
CO 1,CO 3,CO 4,CO 8	Identify hereditary diseases in context of Unani principles	6	Experiential-Learning4.2	CC	Does	BS,CBL,DIS,IBL,LS,PER,TBL

Unit 2 RNA Biology

4.2.1. Types of RNA and their Functions
4.2.2. Transcription Process and Regulation
4.2.3. RNA Processing and Modifications

References: 84,85,86,87,88,92,93

3A	3B	3C	3D	3E	3F	3G
CO 3,CO 4,CO 8	Discuss the roles of different types of RNA and steps involved in RNA processing	2	Lecture	CAN	Knows-how	L,L&PPT
CO 3,CO 4,CO 8	Describe the transcription process and key mechanisms regulating gene expression	2	Lecture	CC	Knows-how	L,L&PPT

CO 4,CO 6,CO 8	Demonstrate the applications of RNA-based techniques	6	Practical4.3	PSY-SET	Shows-how	CD,CBL,D,DIS,LRI
CO 3,CO 4,CO 6,CO 8	Appraise the RNA-based studies in case reports	6	Practical4.4	PSY-SET	Shows-how	CD,CBL,DIS,IBL,LRI,PER
CO 3,CO 4,CO 6,CO 8	Present the role of RNA in disease pathogenesis	6	Experiential-Learning4.3	CAP	Does	BS,CD,CBL,DIS,IBL,LRI,LS,PL,PER
CO 3,CO 4,CO 6,CO 8	Assess the importance of ethical considerations in RNA research and applications	6	Experiential-Learning4.4	AFT-VAL	Does	CBL,DIS,IBL,LS,PER,RLE

Unit 3 Protein Synthesis and Function

4.3.1. Translation Process
4.3.2. post-Translational Modifications
4.3.3. Protein Folding and Function
4.3.4. Protein-Protein Interactions

References: 85,86,87,88,94,95,96,97

3A	3B	3C	3D	3E	3F	3G
CO 3,CO 4,CO 6,CO 8	Describe the stages of translation and discuss the functional roles of various types of Post-Translational Modifications (PTMs)	2	Lecture	CC	Knows-how	L&PPT ,L_VC
CO 3,CO 4,CO 6,CO 8	Describe the process of protein folding and factors influencing it	1	Lecture	CC	Knows-how	L&PPT ,L_VC

CO 3,CO 4,CO 6,CO 8	Illustrate protein-protein interactions and their biological importance	1	Lecture	CC	Knows-how	L&GD,L&PPT ,L_VC
CO 3,CO 4,CO 6,CO 8	Analyze genetic mutations that impact protein synthesis in case reports	6	Practical4.5	PSY-SET	Shows-how	CD,CBL,D,DIS,LRI,LS,PER
CO 3,CO 4,CO 6,CO 8	Investigate the scientific literature to analiyze the role of protein dysfunctions in disease mechanisms and reflect on their clinical implications	5	Experiential-Learning4.5	CE	Does	BS,DIS,JC,LS,PL,PER,PBL,TBL

Unit 4 Cellular Function and Regulation

4.4.1. Cell Signalling Pathways
4.4.2. Gene Expression and Regulation
4.4.3. Cell Cycle and Apoptosis
4.4.4. Transcriptional Regulation
4.4.5. post-Translational Modifications
4.4.6. Epigenetic Mechanism

References: 94,95,96,97,98,99,100,101,102

3A	3B	3C	3D	3E	3F	3G
CO 3,CO 4,CO 6,CO 8	Describe the mechanism of cell signalling pathways	1	Lecture	CC	Knows-how	L,L&PPT
CO 3,CO 4,CO 6,CO 8	Discuss the phases of cell cycle and describe the mechanisms of apoptosis	2	Lecture	CC	Knows-how	L&PPT ,L_VC
CO 3,CO	Analyze case studies that illustrate the role of epigenetic mechanisms in regulating gene expression	5	Experiential-Learning4.6	CAN	Does	BS,CBL,DIS,JC,LRI,LS,PL,PER,PBL

4,CO 6,CO 8						
CO 3,CO 4,CO 6,CO 8	Assess real-world ethical dilemmas in epigenetics and propose responsible solutions	5	Experiential-Learning4.7	CE	Does	BS,CBL,DIS,IBL,LS,PER,PSM,SY

Practical Training Activity

Practical 4.1 : Genetic Inheritance: Punnet Squares and Pedigree Analysis

Total Duration (6 hours)

1. **Introduction to Genetic Inheritance (1 hour)** – The teacher will explain fundamental concepts, including dominant and recessive alleles, as well as Mendelian laws, using real-world examples.

2. **Punnett Square Demonstration (1 hour)** – A step-by-step explanation of monohybrid and dihybrid crosses will be provided to help predict genetic traits.

3. **Student Practice (1.5 hours)** – Students will solve inheritance problems individually or in groups to reinforce their understanding.

4. **Introduction to Pedigree Charts (1 hour)** – The teacher will explain pedigree chart symbols, structures, and how to interpret inheritance patterns in families.

5. **Pedigree Chart Analysis (1 hour)** – Students will examine case studies, trace traits across generations, and determine inheritance patterns.

6. **Concluding Discussion & Reflection (30 min)** – Students will summarize key findings, address challenges, and discuss insights. The teacher will clarify misconceptions and relate concepts to real-world genetics.

SOPs Reference: This procedure will follow the protocols of the National Center for Biotechnology Information (NCBI) or the guidelines of the American Society of Human Genetics (ASHG) for Punnett Square and Pedigree Analysis in genetic inheritance.

Note: Students should document key observations, problem-solving approaches, and conclusions from Punnett Square and Pedigree Chart analysis in their logbooks.

Practical 4.2 : Genetic Analysis Tools: Applications, Demonstrations & Unani Integration

Total Duration (6 hours)

1. **Introduction to Genetic Analysis Tools (1 hour)** – The teacher will introduce key genetic tools, including PCR, Next-Generation Sequencing (NGS), Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), Microarrays, and Fluorescence In Situ Hybridization (FISH), explaining their significance in genetic research and clinical applications.

2. **Demonstration via Repository Videos (2 hours)** – The teacher will present curated videos demonstrating each tool's functionality, methodology, and applications in genetic analysis.

3. **Group Discussion on Tool Applications (1.5 hours)** – Students will engage in a structured discussion, analyzing how these tools contribute to genetics and medical research.

4. **Exploration of Unani Integration (1.5 hours)** – The teacher will facilitate a brainstorming session where students will explore potential applications of genetic tools in Unani medicine, such as personalized treatments, disease susceptibility analysis, and herbal drug efficacy studies.

SOPs Reference: This procedure will follow the protocols of the National Center for Biotechnology Information (NCBI) or the guidelines of the American Society of Human Genetics (ASHG) for Genetic Analysis Tools.

Note: Students should document key insights, applications, and potential Unani integrations of genetic analysis tools in their logbooks.

Practical 4.3 : RNA-Based Techniques in Clinical Diagnostics

Total Duration (6 hours)

1. **Introduction & Overview (30 min)** – The teacher will introduce RNA-based techniques (RT-PCR & RNA sequencing). The objectives of the session will be outlined.

2. **Video Demonstration (1.5 hours)** – The teacher will present curated videos on RT-PCR and RNA sequencing in clinical diagnostics. Key steps and concepts will be explained during or after the videos.

3. **Q&A and Clarification (30 min)** – The teacher will address students' queries regarding the techniques and their workflows.

4. **Group Discussion & Reflection (1.5 hours)** – Students will engage in small group discussions on the applications, challenges, and future prospects of these techniques. They will share insights and critically analyze the implications in clinical practice.

5. **Case Study Analysis (1.5 hours)** – The teacher will present real-world applications of RT-PCR and RNA sequencing in diagnostics. Students will participate in group problem-solving activities based on hypothetical clinical cases.

6. **Conclusion & Feedback (30 min)** – The teacher will summarize key learnings from the session. Students will provide reflections and feedback on the activity.

SOPs for RNA-Based Techniques:

1. RT-PCR SOPs:

CLSI MM13-A & MM4-A2 standardized guidelines for molecular diagnostics and infectious disease detection.

2. RNA Sequencing SOPs:

Illumina & Oxford Nanopore RNA-Seq library preparation protocols.

ENCODE Consortium standardized RNA-Seq experimental guidelines.

Note: Students should document key insights, applications, and case study reflections on RT-PCR and RNA sequencing in their logbooks.

Practical 4.4 : RNA in Clinical Case Studies

Total Duration (6 hours)

1. **Introduction & Overview (30 min)** – The teacher will introduce RNA-based studies and their significance in clinical diagnostics. Overview of key RNA techniques (e.g., RT-PCR, RNA sequencing) used in case reports.

2. **Discussion on Research Articles (1 hour)** – The teacher will present and analyze selected RNA-based case reports from journals. Emphasis on methodologies, findings, and clinical applications.

3. **Student Article Selection & Review (1.5 hours)** – Each student will select a relevant RNA-based case report. They will analyze the study's objectives, RNA techniques used, key findings, and limitations.

4. **Student Presentations & Group Discussion (2 hours)** – Students will present summaries of their selected case reports. Group discussion on the implications of RNA-based findings in clinical practice.

5. **Critical Appraisal & Conclusion (1 hour)** – Evaluation of the reliability and reproducibility of RNA-based studies. Discussion on future research directions and limitations. Student feedback and closing remarks.

SOPs for RNA-Based Case Report Analysis:

1. PRISMA Guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

2. CARE Guidelines (Case Report Guidelines for Clinical and Genetic Studies)

3. ACMG Standards (American College of Medical Genetics Case Report Analysis)

Note: Students should document key takeaways, critical analyses, and reflections on RNA-based case reports in their logbooks.

Practical 4.5 : Genetic Mutations and Protein Synthesis - Case Reports

Total Duration (6 hours)

1. **Introduction & Overview (30 min)** – The teacher will introduce genetic mutations and their impact on protein synthesis. Overview of mutation types (e.g., missense, nonsense, frameshift) and their effects on protein structure and function.

2. **Case Report Demonstration & Discussion (1 hour)** – The teacher will present selected case reports on genetic mutations affecting protein synthesis. Explanation of mutation analysis techniques and interpretation of findings.

3. **Student Case Report Analysis (1.5 hours)** – Students will visit the library to analyze provided case reports, identify the genetic mutations involved, and interpret their effects on protein structure and function. Discussion on the techniques used for detecting mutations (e.g., Sanger sequencing, NGS).

4. **Student Presentations & Group Discussion (2 hours)** – Students will present their case report analyses, highlighting the mutation type and its clinical significance. Group discussion on the broader implications of genetic mutations in diseases.

5. **Critical Appraisal & Conclusion (1 hour)** – Evaluation of how different mutations impact protein function and lead to disease. Discussion on future research directions and therapeutic interventions. Student feedback and closing remarks.

SOPs for Genetic Mutation Analysis:

1. Mutation Identification & Case Report Analysis

Human Genome Variation Society (HGVS) Nomenclature Standards

2. Genetic Testing & Analysis Techniques

CLSI MM01-A3 (Molecular Diagnostic Methods for Genetic Testing)

3. Clinical Interpretation & Reporting

STROBE Guidelines for Genetic Case Reports

Note: Students should document their observations, mutation analyses, and reflections on the impact of genetic mutations on protein synthesis in their logbooks.

Experiential learning Activity

Experiential-Learning 4.1 : DNA and its Role in Genetics and Inheritance

Total Duration (6 Hours)

1. **Introduction & Concept Mapping (1 hour)** – The teacher will introduce the role of DNA in genetics and inheritance. Students will brainstorm key concepts related to DNA structure, function, and the impact of mutations.

2. **Case Study Analysis (1.5 hours)** – Students will visit the library to analyze cases of genetic disorders (e.g., sickle cell anaemia, colour blindness, cystic fibrosis) to explore DNA mutations, inheritance patterns, and environmental influences.

3. **Group Discussion & Problem-Solving (1.5 hours)** – Students will discuss how genetic and environmental factors interact in trait expression. They will compare and contrast dominant, recessive, and X-linked inheritance patterns.

4. **DNA Role-Playing Simulation & Storytelling (1 hour)** – Students will participate in an interactive role-playing activity, acting as different components of genetic inheritance (e.g., DNA, RNA, ribosomes, mutations) to simulate genetic processes. Alternatively, they can create a storytelling or comic strip illustrating genetic inheritance in real life.

5. **Debriefing & Reflection (1 hour)** – The teacher will facilitate a discussion on key takeaways, ethical considerations in genetic research, and future directions in DNA studies.

Note: Students should document their case study analyses, discussion insights, and reflections on DNA's role in inheritance and genetic disorders in their logbooks.

Experiential-Learning 4.2 : Unani Perspective on Hereditary Diseases

Total Duration (6 Hours)

1. **Introduction & Concept Mapping (1 hour)** – The teacher will introduce hereditary diseases in the context of Unani medicine, explaining key concepts like *Mizāj* (temperament), *Asbāb* (causes), and *Sū'-i-Mizāj Mā warūthi* (inherited imbalances). Students will brainstorm the role of genetics in disease inheritance from a Unani perspective.

2. **Research & Textual Analysis (1.5 hours)** – Students will visit the library to study a specific hereditary disease from classical Unani texts. They will analyze the influence of inherited and acquired factors on disease manifestation and progression.

3. **Case Study Interpretation (1.5 hours)** – Students will evaluate case studies of hereditary diseases, identifying how Unani scholars addressed these conditions. They will compare traditional Unani approaches with modern genetic explanations.

4. **Presentations & Discussion (1.5 hours)** – Students will present their findings, discussing Unani diagnostic principles and treatment strategies for hereditary diseases. A class discussion will follow, linking Unani concepts with contemporary genetics.

5. **Debriefing & Reflection (30 min)** – The teacher will summarize key insights and guide students in critically assessing how Unani medicine and modern genetics can complement each other in understanding hereditary diseases.

Note: Students should document their research findings, case study analyses, and reflections on the Unani perspective of hereditary diseases in their logbooks.

Experiential-Learning 4.3 : RNA's Role in Disease Pathways

Total Duration (6 Hours)

1. **Concept Mapping & Brainstorming (1 hour)** – Students will brainstorm and analyze the role of RNA in disease pathogenesis, mapping key concepts such as RNA-protein and RNA-RNA interactions, non-coding RNAs, and their impact on diseases like cancer and viral infections.

2. **Literature Review & Analysis (1.5 hours)** – Students will visit the library to review scientific literature, identifying RNA interactions in disease mechanisms. They will extract key findings on molecular pathways, gene regulation, and clinical relevance.

3. **Pathway Diagram Development (1.5 hours)** – Using their research, students will create visual representations of RNA-related disease mechanisms, illustrating RNA's role in gene expression, protein function, and disease progression.

4. **Presentations & Discussion (1.5 hours)** – Students will present their findings, explaining RNA's involvement in disease and participating in peer discussions to compare different RNA interactions and their therapeutic implications.

5. **Debriefing & Reflection (30 min)** – Students will summarize key insights, discuss challenges in RNA research, and reflect on the future of RNA-based therapeutics.

Note: Students should document their research findings, pathway diagrams, discussion insights, and reflections on RNA's role in disease pathogenesis in their logbooks.

Experiential-Learning 4.4 : Ethical dimensions of RNA research and applications

Total Duration (6 Hours)

1. **Literature Review & Case Studies (1 hour)** – Students will visit the library to research ethical concerns in RNA research, focusing on topics like gene editing (e.g., CRISPR), RNA-based therapies, and data privacy. Each student will select a case study highlighting ethical dilemmas.

2. **Preparation for Debate or Presentation (1.5 hours)** – Students will structure their findings into well organized arguments or presentations, addressing key ethical considerations such as patient consent, genetic privacy, and potential misuse of RNA technologies.

3. **Debate/Presentation Session (1.5 hours)** – Students will either participate in a debate or present their perspectives, defending their stance on ethical challenges in RNA research.

4. **Group Discussion & Peer Review (1.5 hours)** – A structured group discussion will follow, where students critically assess the ethical concerns presented, challenge viewpoints, and explore solutions for balancing innovation with ethical responsibility.

5. **Reflection & Documentation (30 min)** – Students will reflect on the significance of ethical considerations in RNA research and document key takeaways, personal insights, and future research directions.

Note: Students should document their literature review, debate/presentation arguments, peer discussion insights, and personal reflections on ethical challenges in RNA research in their logbooks.

Experiential-Learning 4.5 : Impact of Protein Dysfunction in Disease Mechanisms

Total Duration (5 Hours)

1. **Literature Search & Selection (1.5 hours)** – Students will visit the library to explore recent scientific literature on protein dysfunctions, selecting studies that focus on diseases such as Alzheimer's, cystic fibrosis, or cancer. They will brainstorm relevant research questions and identify gaps in the literature.

2. **Critical Review & Analysis (1 hour)** – Each student will analyze their chosen article, summarizing key findings on how protein misfolding, mutations, or dysfunction contribute to disease mechanisms. This session will follow a journal club format, encouraging collaborative review and discussion.

3. **Discussion & Thematic Organization (1 hour)** – Students will compare findings, identify common patterns of protein dysfunction across diseases, and brainstorm connections to clinical practice. They will organize insights into key themes with clinical relevance.

4. **Presentation of Key Insights (1 hour)** – Students will present their findings, explaining the role of protein dysfunction in disease progression and its implications for diagnosis and treatment. Peers will engage in discussions, offering critiques and additional perspectives, simulating a journal club environment.

5. **Reflection & Clinical Implications (30 min**) – Students will reflect on how understanding protein dysfunction advances clinical practice and therapeutic strategies. They will also brainstorm future research directions and potential interventions.

Note: Students should document their literature review process, key insights, comparative discussions, and reflections on the clinical implications of protein dysfunctions in their logbooks.

Experiential-Learning 4.6 : Epigenetics and Gene Expression Regulation - Case Studies

Total Duration (5 Hours)

1. **Literature Review & Case Selection (1.5 hours)** – Students will visit the library to research and select case studies on epigenetic mechanisms regulating gene expression.

2. **Case Study Analysis & Discussion (1.5 hours)** – Students will brainstorm and analyze key epigenetic changes, their biological impact, and ethical implications.

3. **Journal Club (1 hour)** – Students will present their findings and participate in peer discussions, exchanging insights and perspectives on the selected case studies.

4. **Reflection & Documentation (1 hour)** – Students will summarize key takeaways, analyze real-world applications of epigenetics, and reflect on their learning experiences.

Note: Students must document case study summaries, discussion insights, peer feedback, and personal reflections in their logbooks.

Experiential-Learning 4.7 : Ethical Challenges in Epigenetics

Total Duration (5 Hours)

1. **Literature Review & Case Studies (1.5 hours)** – Students will visit the library to research ethical dilemmas in epigenetics, selecting case studies on gene regulation, environmental influences, or epigenetic therapies.

2. **Preparation for Presentation (1.5 hours)** – Students will brainstorm and organize their findings into structured arguments or presentations, focusing on topics such as genetic privacy, discrimination risks, and the ethical use of epigenetic data.

3. **Symposium (1 hour)** – Students will present their perspectives on ethical challenges in epigenetics, considering viewpoints from scientists, policymakers, and patients.

4. **Group Discussion & Reflection (1 hour)** – Students will critically assess the ethical concerns presented, challenge differing viewpoints, and propose responsible solutions.

Note: Students must document real-world ethical dilemmas in epigenetics, including case studies, presentation arguments, group discussion insights, and proposed solutions, in their logbooks.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular Assessment. Assessment will be 75 marks for this module. Keep structure making pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the modular grade point as per table 6 C.	6

Part A: Concept Mapping (50 Marks)
Students will create a concept map on a biochemical process related to DNA, RNA, protein synthesis, or cellular regulation. The map should visually represent key concepts, relationships, and mechanisms. This activity will be completed within 4 hours.

Examples:

- DNA Structure: Concept map on DNA replication, including enzymes, mechanisms, and regulatory steps.
- RNA Biology: Mapping the process of transcription and post-transcriptional modifications.
- Protein Synthesis: Representation of translation, ribosomal function, and regulatory factors.
- Cellular Regulation: Mapping signal transduction pathways involved in cell cycle control.

Assessment Criteria (10 Marks Each):

1. Accuracy and depth of biochemical concepts
2. Logical structure and clarity of connections
3. Creativity and organization of the map
4. Inclusion of key regulatory mechanisms
5. Effective presentation and explanation of the map

Part B: Role-Play Simulation (25 Marks)
specific role and act out the interactions to demonstrate understanding. The activity will be conducted in groups within 2 hours.

Examples:

- DNA Structure: Students act as helicase, DNA polymerase, and ligase to demonstrate DNA replication.
- RNA Biology: Simulation of transcription, where students represent RNA polymerase, promoters, and transcription factors.
- Protein Synthesis: A role-play on translation, including mRNA, tRNA, ribosomes, and elongation factors.
- Cellular Regulation: Demonstrating signal transduction, with students acting as receptors, kinases, and second messengers.

Assessment Criteria (5 Marks Each):

1. Accuracy in representing molecular functions
2. Creativity and engagement in the simulation
3. Clear demonstration of biochemical interactions
4. Teamwork and coordination
5. Explanation of the biochemical process during debriefing

Or Any practical in converted form can be taken for assessment (35 Marks) and Any of the experientials as portfolio/reflection/presentation/group discussion can be taken as an assessment (40 Marks)	

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical/experiential) learning session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/ Shows how/ Knows how/ Know)	3G Teaching Learning Methods
Module 5 : خامرہ جات؛ حامل آکسیجن لحمیات؛ آکسیجن سے متحق فری ریڈیکلس Khāmirah Jāt; Ḥāmil-e-Āksījan Laḥmiyāt; Āksījan se Hāṣil Āzād Judhūr (Enzymes; Oxygen Transporting Proteins; Oxygen-derived Free Radicals)						
Module Learning Objectives **(At the end of the module, the students should be able to)** 1. Describe the roles of enzymes and oxygen-transporting proteins in biochemical reactions and physiological processes. 2. Demonstrate to observe the effects of enzymes and oxygen-derived free radicals on body. 3. Identify the role of oxidative stress on human body.						
Unit 1 Enzymes 5.1.1. Concept of Enzymes 5.1.2. Factors Affecting Enzyme Activity 5.1.3. Enzyme Kinetics 5.1.4. Enzyme Inhibition **References:** 103,104,105						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 1,CO 3,CO 4,CO 6	Discuss the basic structure of enzymes and their role as biological catalysts in metabolic reactions	2	Lecture	CC	Knows-how	L,L&PPT ,L_VC
CO 1,CO	Recognize key factors influencing enzyme activity and explain their impact on reaction rates	2	Lecture	CC	Knows-how	L,L&PPT

3,CO 4,CO 6						
CO 1,CO 3,CO 4,CO 6	Describe enzyme kinetics using Michaelis-Menten Model & distinguish between different types of enzyme inhibition	3	Lecture	CAN	Knows-how	L,L&GD
CO 1,CO 3,CO 4,CO 6	Quantify liver enzymes (SGOT, SGPT, ALP) using biochemical assays	5	Practical5.1	PSY-MEC	Shows-how	DL,DIS,LRI,PT
CO 1,CO 3,CO 4,CO 6	Identify enzyme defects, evaluate pathways, and propose diagnostics in enzymopathy cases	5	Practical5.2	CAN	Shows-how	BS,CD,CBL,D,DIS,LRI,PBL
CO 1,CO 3,CO 4,CO 6	Analyze the effects of sleep on enzymatic activity in the body	5	Practical5.3	CAN	Shows-how	CBL,D,DIS,JC,LS,PER,PSM

Unit 2 Oxygen Transporting Proteins

5.2.1. Heamoglobin and Myoglobin
5.2.2. Regulation of Heamoglobin Function
5.2.3. Bohr Effect
5.2.4. Hemoglobinopathies

References: 106,107,108,109,110

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 3,CO 4,CO 6	Identify the structural differences between haemoglobin and myoglobin and its clinical significance	2	Lecture	CAN	Knows-how	L,L&PPT ,L_VC
CO 1,CO	Analyze the factors regulating haemoglobin’s oxygen affinity and explain the Bohr effects	2	Lecture	CAN	Knows-how	L,L&GD,L&PPT

3,CO 4,CO 6						
CO 1,CO 3,CO 4,CO 6	Discuss common hemoglobinopathies	2	Lecture	CC	Knows-how	L,L&GD,L&PPT
CO 1,CO 3,CO 4,CO 6	Demonstrate the structure of haemoglobin and myoglobin, highlighting their roles in oxygen transport using AV aids	5	Practical5.4	CAN	Shows-how	CBL,D-M,L_VC,PER,PBL
CO 1,CO 3,CO 4,CO 6	Differentiate anemia cases based on abnormalities in oxygen-transporting proteins and propose diagnostics	5	Practical5.5	CAN	Shows-how	CD,CBL,DIS,LRI,PSM
CO 1,CO 3,CO 4,CO 6	Appraise scientific literature on oxygen-transporting proteins, showcasing research and analytical skills	5	Experiential-Learning5.1	AFT-VAL	Does	CBL,DIS,JC,LS,PER,PBL
CO 1,CO 3,CO 4,CO 6	Design content to raise social awareness of the link between mental and physical health, emphasizing the role of positive emotions in oxygen transport	5	Experiential-Learning5.2	AFT-VAL	Does	CBL,DIS,IBL,LS,PL,PER,PSM,SIM

Unit 3 Oxygen-derived Free Radicals

5.3.1. Brief Concept about Free Radical Generation
5.3.2. Types of Radicals
5.3.3. Affiliation with Diseases
5.3.4. Role of ROS in Antimicrobial and Cytotoxic Activity

References: 108,109,110

3A	3B	3C	3D	3E	3F	3G
CO 1,CO	Describe free radicals and explain their generation through metabolic processes and environmental factors	2	Lecture	CC	Knows-how	L,L&PPT ,Mnt

3,CO 4,CO 6						
CO 1,CO 3,CO 4,CO 6	Analyze the role of antioxidants in cellular protection and potential disease prevention	5	Practical5.6	CAN	Shows-how	CBL,D-M,L&PPT ,PSM
CO 1,CO 3,CO 4,CO 6	Demonstrate the association between reactive oxygen species (ROS) and diseases, focusing on oxidative stress in pathogenesis	5	Experiential-Learning5.3	PSY-GUD	Does	CBL,DIS,LS,PER,PBL,TBL,W
CO 1,CO 3,CO 4,CO 6	Illustrate a perspective on reactive oxygen species (ROS) as a mechanism of antimicrobial defence	4	Experiential-Learning5.4	CE	Does	CBL,DIS,LS,PAL,PER,PSM
CO 1,CO 3,CO 4,CO 6	Assess the influence of air pollution on oxidative stress and its contribution to cellular damage	4	Experiential-Learning5.5	CE	Does	BS,CBL,DIS,IBL,LS,PBL,PSM
CO 1,CO 3,CO 4,CO 6	Analyze the influence of different types of physical activity on the body's antioxidant defence mechanisms	4	Experiential-Learning5.6	CAN	Does	CBL,DIS,LRI,LS,PER,PBL,PSM,TBL
CO 1,CO 3,CO 4,CO 6	Integrate perspectives in a group discussion on the influence of psychological stress on the production of oxygen-derived free radicals	4	Experiential-Learning5.7	PSY-GUD	Does	CBL,C_L,DIS,LS,PER,PSM,TBL
CO 1,CO 3,CO 4,CO 6	Appraise the influence of free radicals on the regulation of the sleep-wake cycle	4	Experiential-Learning5.8	CE	Does	CBL,C_L,DIS,IBL,LS,PBL
CO 1,CO	Interpret the role of oxidative stress in bowel retention mechanisms	4	Experiential-Learning5.9	CC	Does	CD,CBL,DIS,LS,PBL

3,CO 4,CO 6						

Practical Training Activity

Practical 5.1 : Biochemical Quantification of Liver Enzymes

Total Duration (5 Hours)

1. **Introduction & Theory (30 min)** – The teacher will explain liver enzyme functions, clinical significance, assay principles, and relevant SOP guidelines (IFCC, DGKC).

2. **Demonstration (1 hour)** – The teacher will demonstrate reagent preparation, sample handling, and assay execution for SGOT, SGPT, and ALP.

3. **Student Practical (2 hours)** – Students will perform the enzyme assays under supervision, measure absorbance using a spectrophotometer, and record results.

4. **Data Analysis (45 min)** – The teacher will guide students in calculating enzyme activity (IU/L) using standard equations and interpreting results.

5. **Discussion & Conclusion (45 min**) – The teacher will review findings, discuss sources of error, troubleshoot issues, explain clinical implications, and conduct a Q&A session.

SOPs Reference:

The procedure will follow the IFCC (International Federation of Clinical Chemistry) and DGKC (German Society for Clinical Chemistry) guidelines for liver enzyme quantification using kinetic and colorimetric assays:

SGOT (AST) Assay: Kinetic method, absorbance at 340 nm.

SGPT (ALT) Assay: Kinetic method, absorbance at 340 nm.

ALP Assay: Colorimetric method, absorbance at 405 nm.

Note: Students must document all steps of the experiment in their practical log books, including reagent details, sample data, spectrophotometric readings, calculations, and interpretations.

Practical 5.2 : Diagnostic Evaluation of Enzymopathies – Case Studies

Total Duration (5 Hours)

1. **Introduction & Case Discussion (30 min)** – The teacher will brainstorm enzymopathies, explaining their clinical significance, common enzyme defects, and metabolic consequences. Students will discuss enzyme deficiencies and their impact on biochemical pathways.

2. **Demonstration (1.5 hours**) – The teacher will demonstrate how to analyze metabolic pathways, identify enzyme defects, and interpret biochemical changes. Students will examine case studies, mapping enzyme deficiencies to clinical manifestations and compensatory mechanisms.

3. **Student Case Analysis (1.5 hours**) – Students will be provided with laboratory test results, including enzyme activity levels, metabolite concentrations, and genetic findings. They will analyze the data to determine the affected pathway, identify the defective enzyme, and correlate findings with clinical symptoms.

4. **Case-Based Problem Solving (1 hour)** – The teacher will present additional patient cases, and students will work in groups to interpret lab results, propose differential diagnoses, and suggest further investigations. Each group will present their findings and justify their conclusions.

5. **Discussion & Conclusion (30 min)** – The teacher will summarize key learning points, review student interpretations, discuss sources of diagnostic errors, and explain the clinical implications of enzyme defects. A Q&A session will follow.

SOPs Reference:

Interpretations will follow IFCC, CLSI, and WHO guidelines, covering:

Enzyme Activity – IFCC reference values.

Metabolite Analysis – HPLC/GC-MS diagnostic thresholds.

Genetic Testing – PCR/NGS mutation analysis.

Note: Students must document all case details, lab result interpretations, pathway analyses, and conclusions in their logbooks.

Practical 5.3 : Impact of Sleep on Enzyme Regulation

Total Duration (5 Hours)

1. **Introduction & Objective (1 hour)** – The teacher will introduce the topic, explaining the relationship between sleep and enzyme regulation. Students will discuss key enzymes affected by sleep patterns.

2. **Literature Search & Selection (1.5 hours**) – The teacher will demonstrate effective search strategies using scientific databases. Students will visit library to identify and select relevant research articles.

3. **Data Extraction & Analysis (1 hour)** – Students will review selected articles, extract key findings, and analyze how sleep influences enzyme activity and metabolism.

4. **Journal Club (1 hour)** – Students will present their findings. The teacher will summarize key insights, discuss research gaps, and address questions.

5. **Reflection & Practical Application (30 min)** – Students will document key insights, personal reflections, and real-world applications.

SOPs Reference:

The review process will follow:

Database Search – Using PubMed, Google Scholar, Scopus for peer-reviewed articles.

Citation & Referencing – Following American Psychological Assosiation (APA), Modern Language Association (MLA), or Vancouver styles.

Critical Appraisal – Evaluating sources using PRISMA or CASP frameworks.

Note: Students must document literature sources, extracted data, and key conclusions in their logbooks.

Practical 5.4 : Structure-Function Relationships in Oxygen Transport Proteins

Total Duration (5 Hours)

1. **Introduction (30 min)** – The teacher will discuss the structures and oxygen transport roles of hemoglobin and myoglobin.

2. **Demonstration with AV Aids (1.5 hour**s) – Using 3D models, animations, or molecular software, the teacher will illustrate structural differences and oxygen-binding mechanisms.

3. **Comparative Analysis (1.5 hours)** – Students will analyze and compare oxygen dissociation curves, cooperative binding in hemoglobin, and the physiological significance of myoglobin.

4. **Case-Based Application (1 hour)** – The teacher will present clinical scenarios (e.g., anemia, myoglobinuria, high-altitude adaptation). Students will apply their understanding to interpret cases.

5. **Conclusion & Q&A (30 mi**n) – The teacher will summarize key concepts, clarify doubts, and facilitate discussion on the biomedical relevance of hemoglobin and myoglobin.

Note: Students must document key observations, structural comparisons, and case study interpretations in their logbooks.

Practical 5.5 : Diagnosing Anaemia: Case-Based Approach to Oxygen-Transport Protein Abnormalities

Total Duration (5 Hours)

1. **Introduction & Case Discussion (30 min)** – The teacher will introduce anaemia, its impact on oxygen transport, and key oxygen-transporting proteins (haemoglobin, myoglobin).

2. **Case Study Review (1.5 hours)** – Students will analyze provided case studies with lab reports (Hb levels, RBC indices, iron studies) to identify abnormalities.

3. **Diagnostic Approach (1.5 hours)** – The teacher will explain diagnostic techniques (CBC, haemoglobin electrophoresis, genetic testing). Students will interpret lab findings and propose diagnostic pathways.

4. **Group Discussion & Problem-Solving (1 hour)** – Students will work in groups to compare findings, discuss differential diagnoses, and justify diagnostic choices.

5. **Conclusion & Q&A (30 min)** – The teacher will summarize key concepts, clarify doubts, and discuss clinical implications.

SOPs Reference:

Interpretations will follow standard diagnostic guidelines:

CBC Analysis – Based on WHO & CLSI guidelines for anaemia classification.

Haemoglobin Electrophoresis – Following IFCC standards for detecting haemoglobin variants.

Iron Studies & Genetic Testing – Referencing standard clinical protocols for diagnosing iron deficiency, thalassemia, and other hemoglobinopathies.

Note: Students must document case details, diagnostic interpretations, and conclusions in their logbooks.

Practical 5.6 : Role of Antioxidants in Cellular Health and Disease Prevention

Total Duration (5 Hours)

1. **Introduction & Theoretical Background (30 min)** – The teacher will explain antioxidants' role in neutralizing free radicals, their sources, and their significance in disease prevention.

2. **Demonstration with AV Aids (1.5 hours)** – Using diagrams, animations, or biochemical assay examples, the teacher will illustrate oxidative stress mechanisms and antioxidant defense systems.

3. **Case Study Analysis (1.5 hours)** – Students will analyze case studies linking oxidative stress to diseases (e.g., cancer, neurodegenerative disorders) and evaluate the protective role of antioxidants.

4. **Group Discussion & Problem-Solving (1 hour)** – Students will work in groups to compare antioxidant mechanisms, discuss research findings, and propose antioxidant-based disease prevention strategies.

5. **Conclusion & Q&A (30 min)** – The teacher will summarize key insights, clarify doubts, and discuss the clinical relevance of antioxidants.

SOPs Reference: Interpretations will follow standard research and diagnostic methodologies:

Oxidative Stress Marker Analysis – WHO & CLSI guidelines for measuring MDA (malondialdehyde) and total antioxidant capacity (TAC).

Antioxidant Activity Assays – IFCC standards for methods like DPPH, FRAP, and ORAC.

Note: Students must document key observations, case study findings, and discussions in their logbooks.

Experiential learning Activity

Experiential-Learning 5.1 : Current Advances in Oxygen-Transporting Proteins: A Critical Evaluation

Total Duration (5 Hours)

Journal Club:

1. **Introduction & Objective Setting (30 min)** – Students will be introduced to oxygen-transporting proteins and critical appraisal skills. Groups will receive assigned research papers.

2. **Individual Reading & Analysis (1 hour)** – Students will visit the library and independently review papers, analyzing methodology, findings, and implications.

3. **Group Discussion & Synthesis (1 hour)** – Students will compare findings, identify research gaps, and prepare a 5-minute presentation.

4. **Journal Club Presentations & Peer Review (1.5 hours)** – Students will present their findings and critiques. The potential applications and limitations of the research. After presentations, peers will provide constructive feedback through a structured review process. The teacher will summarize key discussions and insights.

5. **Reflection & Practical Application (1 hour)** – Students will document key insights, personal reflections, and real-world applications.

Note: Students must document their literature analysis, discussion points, presentation summaries, and reflections in their logbooks.

Experiential-Learning 5.2 : Impact of Mental Health on Oxygen Transport and Physical Health

Total Duration (5 Hours)

1. **Literature Review & Case Studies (1 hour)** – Students will visit the library and explore scientific and Unani perspectives on how positive emotions influence oxygen transport and circulation, using a structured review template.

2. **Data Analysis & Content Development (1 hour)** – Students will analyze research on haemoglobin function and emotional impact on oxygen transport and develop awareness materials (posters, or articles).

3. **Presentation & Community Engagement (2 hours)**

Presentations (45 min): Students will present key findings in a faculty-led discussion.

Mini Awareness Campaign (45 min): Students will create and refine campaign materials and simulate an awareness effort.

Peer Review & Discussion (30 min): Students will evaluate each other's work for clarity and impact.

4. **Reflection & Action Plan (1 hour)** – Students will document insights, assess engagement impact, and propose strategies to integrate positive emotions into daily life using guided reflections.

Note: Students must document all activities in their logbooks for assessment.

Experiential-Learning 5.3 : Role of Reactive Oxygen Species (ROS) in Disease Pathogenesis

Total Duration (5 Hours)

1. **Literature Review & Case Studies (1 hour)** – Students will visit the library and explore scientific research on ROS and its role in disease pathogenesis, focusing on oxidative stress in conditions like neurodegenerative disorders, cardiovascular diseases, and cancer. They will analyze case studies that highlight the impact of ROS on cellular damage and disease progression.

2. **Data Analysis & Content Development (1.5 hours)** – Students will examine oxidative stress biomarkers and antioxidant defences, creating educational materials like infographics or articles.

3. **Presentation & Community Engagement (1.5 hours)** – Students will present findings through group discussions, workshops, or online campaigns to raise awareness about oxidative stress prevention.

4. **Reflection & Action Plan (1 hour)** – Students will document insights, assess engagement impact, and propose strategies to reduce oxidative stress in daily life.

Note: Students must maintain logbooks to record research findings, content creation, engagement activities, and reflections.

Experiential-Learning 5.4 : Reactive Oxygen Species (ROS) as a Mechanism of Antimicrobial Defence

Total Duration (4 Hours)

1. **Literature Review & Case Studies (1 hour)** – Students will visit the library and explore ROS production in immune responses and analyze case studies on its role in pathogen clearance.

2. **Data Analysis & Critical Appraisal (1 hour)** – Students will assess studies on ROS-driven microbial destruction, identifying research gaps and therapeutic potential.

3. **Presentation & Discussion (1 hour)** – Students will present their analyses, discussing ROS as a double-edged sword in immunity-balancing antimicrobial defence with host tissue protection. Peer feedback will refine perspectives on ROS regulation.

4. **Reflection & Application (1 hour)** – Students will debate future research directions and ethical considerations of ROS-based therapies.

Note: Students will document key insights and research questions in their logbooks.

Experiential-Learning 5.5 : Impact of Air Quality on Oxidative Stress and Cellular Damage

Total Duration (4 Hours)

Inquiry-Based Learning:

1. **Question Formulation & Literature Exploration (1 hour)** – Students will brainstorm and develop key research questions about how air pollution induces oxidative stress. They will visit the library and explore scientific literature on pollutants like PM, NOx, and O_3, identifying mechanisms of ROS generation and cellular damage.

2. **Data Investigation & Hypothesis Development (1 hour**) – Students will analyze oxidative stress biomarkers (e.g., malondialdehyde, 8-OHdG) in pollution-exposed populations and formulate hypotheses on pollution-induced damage.

3. **Experimental Design & Case Study Analysis (1 hour)** – Students will design a hypothetical study or analyze case studies on air pollution and oxidative stress. They will discuss variables, controls, and ethical considerations in air pollution research.

4. **Reflection & Application (1 hour)** – Students will propose policy recommendations or public health strategies to mitigate pollution-induced oxidative damage.

Note: Students will document findings, study designs, and reflections in their logbooks.

Experiential-Learning 5.6 : Impact of Physical Activity on Antioxidant Defence

Total Duration (4 Hours)

Problem-Based Learning (PBL):

1. **Problem Identification & Literature Review (1 hour)** – Students will visit the library and explore how various physical activities (aerobic, resistance, high-intensity interval training) impact oxidative stress and antioxidant defence, identifying key research gaps.

2. **Case Study & Data Analysis (1 hour)** – Students will analyze research on antioxidant biomarkers (e.g., superoxide dismutase, catalase, glutathione) in athletes and sedentary individuals to assess oxidative balance.

3. **Solution Development & Discussion (1 hour)** – Students will propose exercise strategies that enhance antioxidant responses while minimizing oxidative damage.

4. **Reflection & Application (1 hour)** – Students will evaluate exercise's role in antioxidant defence and develop research-based training recommendations.

Note: Students must document their research findings, case study analyses, proposed solutions, and reflections in their logbooks.

Experiential-Learning 5.7 : Role of Psychological Stress in Oxygen-Derived Free Radical Production

Total Duration (4 Hours)

Collaborative-Based Learning:

1. **Pre-Discussion Research & Literature Review (1 hour)** – Students will visit the librarry and explore scientific literature on psychological stress, stress hormones (cortisol, adrenaline), and their role in generating reactive oxygen species (ROS). Each group will summarize key findings for discussion.

2. **Group Discussion & Knowledge Sharing (1 hour)** – Students will engage in structured discussions, addressing questions such as:

How does chronic stress influence mitochondrial ROS production?

What are the physiological pathways linking stress and oxidative stress?

How do antioxidants and stress management techniques counteract oxidative damage?

3. **Case Study & Problem Solving (1 hour)** – Students will analyze real-life cases of stress-related disorders (e.g., anxiety, depression) and propose lifestyle-based solutions to mitigate oxidative damage.

4. **Reflection & Application (1 hour)** – Students will reflect on insights and develop awareness materials (e.g., infographics, blogs, or presentations) on stress management and oxidative stress reduction.

Note: Students will document key findings, discussions, and reflections in their logbooks, emphasizing key insights and proposed solutions.

Experiential-Learning 5.8 : Role of Free Radicals in Regulating the Sleep-Wake Cycle

Total Duration (4 Hours)

Inquiry-Based Learning:

1. **Formulating Research Questions & Literature Exploration (1 hour)** – Students will vist the library and develop key research questions, such as:

How do free radicals influence sleep-regulating neurotransmitters?

What role does oxidative stress play in circadian rhythm disruptions?

Can antioxidants improve sleep quality?

They will explore scientific literature on oxidative stress, melatonin secretion, and sleep disorders.

2. **Data Analysis & Hypothesis Development (1 hour)** – Students will analyze oxidative stress markers in sleep-deprived individuals and formulate hypotheses on their impact on sleep regulation.

3. **Case Study & Discussion (1 hour)** – Students will examine real-life sleep disorder cases and discuss oxidative stress-related interventions like antioxidants and lifestyle changes.

4. **Reflection & Application (1 hour)** – Students will reflect on findings, propose real-world solutions, and design awareness materials on oxidative stress and sleep health.

Note: Students will document research questions, analyses, and reflections in logbooks.

Experiential-Learning 5.9 : Impact of Oxidative Stress on Bowel Retention Mechanisms

Total Duration (4 Hours)

Case-Based Learning:

1. **Case Introduction & Problem Identification (1 hour)** – Students will be presented with real or simulated patient cases of bowel retention disorders (e.g., chronic constipation, IBS, neurogenic bowel dysfunction). Students will analyze cases, identifying symptoms and potential links to oxidative stress.

2. **Literature Review & Hypothesis Development (1 hour)** – Students will visit the library and explore scientific literature on oxidative stress biomarkers and gut motility, then formulate hypotheses on its role in bowel retention.

3. **Case Analysis & Group Discussion (1 hour)** – Students will discuss findings, evaluate research evidence, and propose possible interventions like antioxidants or dietary changes.

4. **Presentation & Reflection (1 hour)** – Students will present their case findings, receive feedback, and reflect on key takeaways.

Note: Students will record case analysis, research findings, and reflections in their logbooks for assessment.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular Assessment. Assessment will be 75 marks for this module. Keep structure making pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the modular grade point as per table 6 C. Part A: Poster Presentation (50 Marks) Students will create a pre-assigned scientific poster summarizing key biochemical processes, clinical relevance, and recent research on enzymes, oxygen transport, or oxidative stress. The poster will be presented in a mini-conference format. Examples: • Enzymes: Enzyme inhibition in drug design. • Oxygen Transporting Proteins: Adaptations of haemoglobin in high-altitude physiology. • Oxygen-Derived Free Radicals: Role of antioxidants in disease prevention. Assessment Criteria (10 Marks Each): 1. Scientific accuracy and depth of content 2. Clarity, organization, and visual appeal	6

3. Relevance to medical biochemistry 4. Presentation skills and engagement 5. Ability to answer audience questions Part B: Case-Based Quiz (25 Marks) Students will participate in an interactive quiz featuring clinical case scenarios related to enzymatic activity, oxygen transport, and oxidative stress. The quiz will assess problem-solving, conceptual understanding, and application of biochemical principles. Examples: • Enzymes: Identifying enzyme deficiencies in metabolic disorders (e.g., phenylketonuria, G6PD deficiency). • Oxygen Transporting Proteins: Case scenario on haemoglobin variants affecting oxygen binding (e.g., sickle cell disease, thalassemia). • Oxygen-Derived Free Radicals: Identifying oxidative stress markers in diseases (e.g., neurodegeneration, cardiovascular disorders). Assessment Criteria (5 Marks Each): 1. Accuracy in answering case-based questions 2. Application of biochemical concepts 3. Clinical reasoning and decision-making 4. Justification of answers 5. Time management Or Any practical in converted form can be taken for assessment (35 Marks) and Any of the experientials as portfolio/reflection/presentation/group discussion can be taken as an assessment (40 Marks)	

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical/experiential) learning session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/ Shows how/ Knows how/ Know)	3G Teaching Learning Methods
Module 6 : کلیاتِ طب: مصادر و مراجع Kulliyāt-i-Ṭibb: Maṣādir-o-Marāji‘ (Kulliyāt-i-Ṭibb: Classical Sources)						
Module Learning Objectives **(At the end of the module, the students should be able to)** 1. Illustrate the level of understanding of *Kulliyāt-i-Ṭibb* (Basic Principles of Unani Medicine) in Greco-Roman era. 2. Analyze critically the works of Arab scholars pertaining to *Kulliyāt-i-Ṭibb.* 3. Comprehend merits and demerits of different works related to *Kulliyāt-i-Ṭibb* as professed by scholars of different ages.						
Unit 1 یونانی و رومی عہد (Greco-Roman Scholarship) 6.1.1. Greco-Roman Scholarly Contributions to the Foundations of *Kulliyāt-i-Ṭibb* **References:** 8,9,17,24,25,26,27,32,36,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,134,140,141,142,145,148,149,150,151,152,153,154,155,156						
3A	3B	3C	3D	3E	3F	3G
CO 1,CO 2,CO 7	Appraise the works of Greek and Roman scholars	5	Lecture	CE	Knows-how	L,L&GD,L&PPT
CO 1,CO 2,CO 7	Demonstrate the content, significance, and limitations of key works in Greek scholarship on *Kulliyāt-i-Ṭibb*	5	Practical6.1	CE	Shows-how	DIS,IBL,JC,LS,Mnt,PL,PER,PBL
CO 1,CO 2,CO 7	Analyze the content, significance, and limitations of key works in Roman scholarship on *Kulliyāt-i-Ṭibb*	5	Practical6.2	CE	Shows-how	DIS,IBL,LS,PL,PER,SY
CO 1,CO 2,CO 7	Compile and evaluate the works of Greek scholars in reference to *Kulliyāt-i-Ṭibb*	6	Experiential-	CE	Does	DIS,IBL,KL,LS,PL,PBL

			Learning6.1			
CO 1,CO 2,CO 7	Compile and evaluate the works of Roman scholars in reference to *Kulliyāt-i-Ṭibb*	5	Experiential-Learning6.2	CE	Does	BS,CBL,DIS,IBL,KL,LS,PBL
Unit 2 (قرونِ وسطیٰ کی عبقریت(500–1500 عیسوی) Medieval Scholarship (500–1500 AD) 6.2.1. Medieval Scholars and Their Lasting Contributions to *Kulliyāt-i-Ṭibb* **References:** 1,2,3,4,5,6,7,10,11,14,16,19,20,21,22,23,26,29,30,33,34,35,36,73,74,75,93,104,132,133,134,135,136,137,138,140,142,145,146,148,149,150,151,152,153,154,155,156						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 1,CO 2,CO 7	Analyse the works of Medieval scholars	5	Lecture	CE	Knows-how	L&PPT ,LS
CO 1,CO 2,CO 7	Assess the content of works of Arab scholars (8th-11th Century) critically in reference to *Kulliyāt-i-Ṭibb*	5	Practical6.3	CAN	Shows-how	DIS,IBL,LS,PER
CO 1,CO 2,CO 7	Analyze the content of works of Arab scholars (12th–15th Century) critically in reference to *Kulliyāt-i-Ṭibb*	5	Practical6.4	CAN	Shows-how	DIS,IBL,LS,PL,PBL
CO 1,CO 2,CO 7	Compile and evaluate the works of Arab scholars (8th–11th Century) in reference to *Kulliyāt-i-Ṭibb*	6	Experiential-Learning6.3	CE	Does	BS,CBL,D,DIS,KL,LS,W
CO 1,CO 2,CO 7	Compile and evaluate the works of Arab scholars (12th–15th Century) in reference to *Kulliyāt-i-Tibb*	5	Experiential-Learning6.4	CE	Does	BS,CBL,DIS,EDU,KL,LS,PER
CO 1,CO 2,CO 7	Interpret the medieval Unani texts using language laboratory resources	6	Experiential-Learning6.5	PSY-GUD	Does	EDU,IBL,KL,PBL,SDL

Unit 3 ہندی عقریت(Indian Scholarship)

6.3.1. Scholarly Heritage of India in the Development of *Kulliyāt-i-Ṭibb*

References: 22,83,125,137,138,139,140,141,142,143,144,145,147,148,149,150,151,152,153,154,155,156

3A	3B	3C	3D	3E	3F	3G
CO 1,CO 2,CO 7	Appraise the works of Indian scholars	5	Lecture	CE	Knows-how	L,L&GD,L&PPT ,LS,PL,PER
CO 1,CO 7	Analyze the Contributions of Indian Scholars to *Kulliyāt-i-Ṭibb*	5	Practical6.5	CAN	Shows-how	DIS,IBL,LS,PER,PBL
CO 1,CO 2,CO 7,CO 8	Identify the potentials and challenges of Indian scholarship in *Kulliyāt-i-Ṭibb*	5	Practical6.6	CAN	Shows-how	DIS,IBL,LS,PBL
CO 1,CO 2,CO 5,CO 7,CO 8	Compile and evaluate the works of Indian scholars in reference to *Kulliyāt-i-Ṭibb* before AD 1900	6	Experiential-Learning6.6	CE	Does	BS,CBL,DIS,IBL,JC,KL,LS,PL,PER,PBL
CO 1,CO 2,CO 5,CO 8	Compile the works of Indian scholars in reference to *Kulliyāt-i-Ṭibb* after AD 1900	5	Experiential-Learning6.7	CE	Does	BS,CBL,DIS,KL,LS,PSM

Practical Training Activity

Practical 6.1 : Greek Scholarship in *Kulliyāt-i-Ṭibb*: Prospects and Limitations

Total Duration (5 Hours)

Journal Club:

1. **Introduction & Task Orientation (30 min)** – The teacher will introduce objectives and expectations. Students will receive assigned Greek scholars (e.g., Hippocrates, Aristotle).

2. **Library Visit & Resource Collection (1.5 hours)** – Under teacher supervision, students will collect and analyze sources, with guided discussions on key texts and interpretations.

3. **Article Analysis & Note Preparation (45 min)** – The teacher will lead a structured analysis of journal articles, comparing classical and modern perspectives in *Kulliyāt-i-Ṭibb.*

4. **Presentation Drafting & Peer Discussion (45 min)** – The teacher will mentor students in structuring presentations, refining arguments, and facilitating peer discussions.

5. **Journal Club (1 hour)** – The teacher will moderate presentations, prompt critical discussions, and guide students in addressing feedback.

6. **Conclusion & Final Reflections (30 min)** – The teacher will synthesize insights, lead discussions on key findings, and encourage future research directions.

Note: The students will document key learnings, sources, and reflections in their logbooks for assessment and future reference.

Practical 6.2 : Roman Scholarship in *Kulliyāt-i-Ṭibb*: Prospects and Limitations

Total Duration (5 Hours)

Symposium:

1. **Introduction & Task Assignment (30 min)** – The teacher will outline objectives, assign Roman scholars (e.g., Galen, Rufus), and provide evaluation criteria.

2. **Library Research & Text Analysis (1.5 hours)** – Under teacher supervision, students will analyze texts, annotate key concepts, and discuss their significance.

3. **Comparative Review (1 hour)** – The teacher will lead discussions, guiding students in comparing Roman scholarship with modern perspectives and identifying limitations.

4. **Scholarly Symposium (1 hour)** – The teacher will moderate presentations, prompt critical discussions, and refine scholarly arguments.

5. **Conclusion & Synthesis (1 hour)** – The teacher will consolidate insights, highlight debates, and facilitate final reflections on Roman scholarship's impact.

Note: The students will document key findings, critical evaluations, and discussion insights for future reference.

Practical 6.3 : Arab Scholars' Works (8th–11th Century) in *Kulliyāt-i-Ṭibb*

Total Duration (5 Hours)

Debate:

1. **Introduction & Task Assignment (30 min)** – The teacher will outline objectives, assign scholars (e.g., Al-Razi, Al-Farabi, Ibn Sina, Al-Zahrawi), and provide analysis guidelines.

2. **Library Research & Text Analysis (1.5 hours)** – Under teacher supervision, students will examine classical texts, annotate key contributions, and discuss their relevance.

3. **Comparative Review (1 hour)** – The teacher will lead discussions on Arab scholarship's advancements, limitations, and influences from Greek and Roman traditions.

4. **Structured Debate (1 hour)** – The teacher will moderate a debate, ensuring evidence-based arguments on the significance of Arab contributions.

5. **Conclusion & Reflection (1 hour)** – The teacher will synthesize key insights and guide student reflections on Arab scholarship's impact on *Kulliyāt-i-Ṭibb*.

Note: The students will systematically document key findings, comparative analyses, debate arguments, and critical reflections for assessment and future research.

Practical 6.4 : Contributions of Arab Scholars (12th–15th Century) to *Kulliyāt-i-Ṭibb*

Total Duration (5 Hours)

Thematic Review & Concept Mapping:

1. **Introduction & Task Assignment (30 min)** – The teacher will define objectives, assign scholars (e.g., Ibn Rushd, Ibn al-Nafis), and outline thematic areas for structured analysis (e.g., *Asbab-e-Sitta Zarroriya, Huzoom-e-Arba*).

2. **Guided Literature Review (1.5 hours)** – Under teacher supervision, students will examine texts, extract key themes, and interpret scholarly contributions.

3. **Concept Mapping & Comparative Analysis (1 hour)** – The teacher will facilitate connections between Arab, Greek, and Roman traditions, guiding students in developing structured concept maps.

4. **Group Discussion & Synthesis (1 hour)** – The teacher will lead discussions, refine analytical insights, and ensure critical engagement.

5. **Conclusion & Reflection (1 hour)** – The teacher will consolidate key insights, direct reflective discussions, and ensure critical engagement with Arab scholars' contributions.

Note: Students will document extracted themes, comparative analyses, and concept maps for assessment and future research.

Practical 6.5 : Indian Scholars in *Kulliyāt-i-Ṭibb*: Annotations and Concept Mapping

Total Duration (5 Hours)

Annotated Bibliography & Concept Mapping:

1. **Introduction & Task Orientation (30 min)** – The teacher will outline objectives, assign scholars (e.g., Hakim Akbar Arzani, Hakim Muhammad Azam Khan), and explain the methodology.

2. **Guided Research & Source Collection (1.5 hours)** – Under teacher supervision, students will gather primary and secondary sources, with guidance on credibility and text interpretation.

3. **Annotated Bibliography (1 hour)** – The teacher will direct students in summarizing key works, ensuring relevance, methodological clarity, and scholarly contributions.

4. **Concept Mapping & Analysis (1 hour)** – The teacher will lead discussions on scholarly influences (Greek, Roman, Arab) and guide students in structuring thematic concept maps.

5. **Conclusion & Reflection (1 hour**) – The teacher will consolidate insights, facilitate discussions, and encourage critical reflection.

Note: Students will document bibliographic entries, concept maps, and reflections under teacher guidance, analyzing Indian scholars' contributions and refining research skills.

Practical 6.6 : Indian Scholarship in *Kulliyāt-i-Ṭibb*: Potentials and Challenges

Total Duration (5 Hours)

Critical Analysis & Concept Mapping:

1. **Introduction & Task Orientation (30 min)** – The teacher will introduce objectives, key themes, and methodology for assessing the potentials and challenges of Indian scholarship.

2. **Guided Research & Source Collection (1.5 hours)** – Under teacher supervision, students will gather and analyze primary and secondary sources, evaluating scholarly contributions and challenges.

3. **Critical Analysis & Evaluation (1 hour)** – The teacher will guide students in assessing theoretical advancements, methodologies, and historical contexts of Indian scholars.

4. **Comparative Discussion & Concept Mapping (1 hour)** – The teacher will facilitate discussions on Indian scholarship's alignment with or divergence from Greek, Roman, and Arab traditions, assisting in comparative concept mapping.

5. **Conclusion & Reflection (1 hour)** – The teacher will synthesize key insights, emphasize major findings, and guide reflective discussions.

Note: Students will document research findings, evaluations, and concept maps, critically analyzing contributions, identifying challenges, and refining research skills.

Experiential learning Activity

Experiential-Learning 6.1 : Contributions of Greek Scholars to *Kulliyāt-i-Ṭibb*

Total Duration (6 Hours)

1. **Library Research and Text Exploration (2 hours)** – Students will visit the library to access selected translated works of Greek philosophers to identify key philosophical principles related to health, disease, and physiology.

2. **Comparative Chart Development (1.5 hours)** – Students will create a comparative chart highlighting the extracted principles and their interpretations in *Kulliyāt-i-Tibb*, focusing on differences, similarities, and adaptations.

3. **Interactive Poster Session (1.5 hours)** – Students will design posters summarizing their comparative charts and key findings. A gallery walk will be conducted where students view each other's posters, provide feedback, and engage in discussions to broaden their understanding.

4. **Reflection and Peer Feedback (30 min)** – Students will reflect on the influence of Greek principles on Unani thought and engage in peer discussions for collaborative insights.

5. **Documentation and Submission (30 min)** – Students will submit a report including extracted principles, comparative analysis, charts, and reflections.

Note: Students must document their activities, key findings, and reflections in their logbooks.

Experiential-Learning 6.2 : Contributions of Roman Scholars to *Kulliyāt-i-Ṭibb*

Total Duration (5 Hours)

1. **Brainstorming (30 min)** – Students will identify key Roman scholars and major themes such as anatomy, physiology, pathology, pharmacology, diagnostics, treatment, and ethics, forming research questions.

2. **Inquiry-Based Learning (1.5 hours)** – Students will visit the library and investigate Roman contributions using primary and secondary sources, analyzing their influence on *Kulliyāt-i-Ṭibb*.

3. **Problem-Based Learning (1.5 hours)** – Students will solve case-based scenarios applying medical theories, diagnostic methods, and therapeutic approaches attributed to Roman scholars, drawing connections with *Kulliyāt-i-Tibb*.

4. **Compilation and Reflection (1.5 hours)** – Students will compile their findings into structured reports, including case analyses, key insights. This will be followed by individual reflections on the learning process.

Note: Students should document problem-solving processes, conclusions, and reflections in their logbooks, integrating illustrations and references where applicable.

Experiential-Learning 6.3 : Contributions of Arab Scholars (8th–11th Century) to *Kulliyāt-i-Ṭibb*

Total Duration (6 Hours)

1. **Brainstorming and Library Session (2 hours)** – Students will identify key Arab scholars (8th–11th Century), their contributions, and relevant themes in *Kulliyāt-i-Tibb*. In the library session, they will explore primary and secondary sources, compiling data for further analysis.

2. **Reflective Study and Annotated Reading (2 hours)** – Students will conduct an in-depth reading of selected texts from Arab scholars. They will annotate key insights, reflect on the significance of contributions, and write brief summaries analyzing the influence of Arab scholars on *Kulliyāt-i-Tibb*. Comparative reflections with Greek concepts will be encouraged.

3. **Workshop (2 hours)** – Students will conduct comparative analysis, case studies, and skill-based activities, such as demonstrating classical diagnostic techniques and discussing ethical considerations based on Arab scholars' works. Students will present findings and assess their significance in *Kulliyāt-i-Tibb*.

Note: Students must document their selected scholar, key findings, and insights in logbooks with structured summaries, key concepts, and relevant illustrations.

Experiential-Learning 6.4 : Contributions of Arab Scholars (12th–15th Century) to *Kulliyāt-i-Ṭibb*

Total Duration (5 Hours)

1. **Brainstorming (1 hour)** – Students will identify key Arab scholars (12th–15th Century) and major themes such as anatomy, diagnostics, treatment principles, and medical ethics, generating research questions.

2. **Library Session (1 hour)** – Students will visit the library and explore primary and secondary sources to gather data on scholars' contributions, tracing their influence on later *Tibbī* literature.

3. **Compilation and Analysis (2 hours)** – Students will compile their research findings into structured summaries. This will include comparative analysis, key insights, and thematic reflections on scholars' contributions to *Kulliyāt-i-Tibb*. They may use tables, charts, or concept maps to present their understanding.

4. **Presentations and Reflections (1 hour)** – Students will present their research using visual aids, infographics, and structured discussions, demonstrating the relevance of these contributions to *Kulliyāt-i-Tibb* and their legacy in Unani medicine.

Note: Students must record key scholars, findings, compilation insights, and presentation reflections with structured summaries and relevant illustrations in their logbooks.

Experiential-Learning 6.5 : Interpretation of Medieval Unani Texts Using Language Laboratory Resources

Total Duration (6 Hours)

1. **Introduction and Orientation (30 min)** – The student will receive an overview of the selected texts, key terminologies in Arabic and Persian, and familiarize themselves with language lab tools.

2. **Guided Text Analysis (2 hours)** – The student will listen to audio renditions, practice pronunciation, and identify key medical terms using language lab software.

3. **Translation and Interpretation Exercise (2 hours)** – The student will translate excerpts to English or Urdu, analyze their meaning, and compare with annotated references for accuracy.

4. **Reflection and Analysis (1 hour)** – The student will reflect on challenges faced, strategies used, and language improvements, receiving teacher's feedback.

5. **Documentation and Submission (30 minutes)** – The student will compile translations, interpretations, and reflections into a report for submission.

Note: Students must document their activities, including observations, challenges, and reflections, in their logbooks for submission with the report.

Experiential-Learning 6.6 : Contributions of Indian Scholars to *Kulliyāt-i-Ṭibb* Before AD 1900

Total Duration (6 Hours)

1. **Brainstorming and Question Formulation (1 hour)** – Students will identify key scholars (before AD 1900) and themes like *Usūl-i-Tashkhīs* and *Uṣūl-i-'Ilāj*. They will formulate research questions for further exploration.

2. **Library and Research (2 hours)** – Students will conduct research using primary and secondary sources, compiling findings on diagnostic methods, treatments, and philosophical perspectives.

3. **Comparative Analysis and Reflection (1.5 hours)** – Each student will create a comparative analysis report, highlighting similarities and differences in scholars' contributions. They will document reflections on how these concepts evolved and their relevance to *Kulliyāt-i-Tibb*.

4. **Journal Club and Discussion (1.5 hours)** – Students will present their findings by selecting excerpts from research papers or historical texts. This will be followed by teacher-guided analytical discussions, encouraging peer feedback and deeper insights.

Note: Students must document key findings, comparative analysis, reflections, and journal club insights in logbooks with structured summaries, key concepts, and relevant illustrations.

Experiential-Learning 6.7 : Contributions of Indian Scholars to *Kulliyāt-i-Ṭibb* After AD 1900

Total Duration (5 Hours)

1. **Brainstorming (1 hour)** – Students will identify key Indian scholars (after AD 1900) and their contributions to *Kulliyāt-i-Tibb*, focusing on themes such as diagnostics, treatment principles, pharmacology, and medical ethics.

2. **Library Session (1 hour)** – Students will explore primary and secondary sources, compiling data on scholars' works, innovations, and their impact on *Tibb*.

3. **Comparative Analysis and Reflection (1.5 hours)** – Students will individually analyze their findings, compare scholars' contributions, and develop comparative reports highlighting advancements in *Kulliyāt-i-Tibb*.

4. **Case Study Analysis (1.5 hours)** – Students will analyze real or hypothetical patient cases, applying diagnostic principles, treatment methods, and ethical considerations based on the works of Indian scholars. They will present their conclusions and justify their decisions using relevant concepts from *Kulliyāt-i-Tibb*.

Note: Students must document key scholars, findings, comparative analysis, and case study insights with structured summaries and relevant illustrations in their logbooks.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular Assessment. Assessment will be 75 marks for this module. Keep structure making pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the modular grade point as per table 6 C. Part-A: Comparative Analysis Essay (50 Marks) Students will critically analyze and compare key concepts in *Kulliyāt-i-Ṭibb*, highlighting similarities, differences, and historical influences on medical thought. Examples: • Galen's theory of blood movement through pores in the heart vs. Ibn al-Nafis' discovery of pulmonary circulation, which challenged Galenic thought. • Galenic theories on disease caused by humoral imbalances vs. Al-Razi's contributions to differential diagnosis and recognition of environmental factors in disease causation. Assessment Criteria (10 Marks Each): 1. Depth of analysis and historical accuracy 2. Use of primary classical sources 3. Critical comparison of different traditions 4. Clarity of argument and structure 5. Referencing and citations Part B: Translated Text Interpretation (25 Marks) Students will analyze translated excerpts from classical medical texts in *Kulliyāt-i-Ṭibb*, focusing on comprehension, historical context, and relevance to	6

modern medicine. Assessment Criteria (5 Marks Each): 1. Understanding of Core Concepts 2. Historical and Philosophical Context 3. Interpretation and Analysis 4. Application to Modern Perspectives 5. Clarity and Organization Or Any practical in converted form can be taken for assessment (35 Marks) and Any of the experientials as portfolio/reflection/presentation/group discussion can be taken as an assessment (40 Marks)	

Table 4 : Practical Training Activity

(*Refer table 3 of similar activity number)

Practical No*	Practical name	Hours
1.1	Key Conceptual Terminologies in Kulliyāt-i-Ṭibb	2
1.2	Istiqrāʾ and Qaḍiyya in Kulliyat-i-Ṭibb	2
1.3	Jins, Jins al-Ajnās, Ajnas al Amrāḍ, Nawʻ, and Faṣl in Kulliyāt-i- Ṭibb	2
1.4	Interrelation between Qiyās and Tajriba	2
1.5	Physical and Metaphysical Realities	2
2.1	Impact of Mechanical Forces on Blood Pressure	4
2.2	Osmotic Forces through Osmotic Phenomena	4
2.3	Nerve Impulses in Neuromuscular Disorders	4
2.4	Blood Vessel Elasticity and Compliance	4
2.5	Viscosity Analysis of Liquid Samples	4
2.6	Calorimetric Analysis of Food Energy Content	5
2.7	Correlation between Thermoregulation and Ḥarārat Gharīziyya	5

3.1	Serum Glucose Test for Metabolic Assessment	5
3.2	HbA1c Test for Metabolic Assessment	5
3.3	Uric Acid Level Estimation and Analysis	5
3.4	Serum Albumin Estimation and Interpretation	5
3.5	Quantitative Estimation of Cholesterol Levels	5
3.6	Quantitative Estimation of HDL, LDL, and VLDL Cholesterol Levels in Serum	5
4.1	Genetic Inheritance: Punnet Squares and Pedigree Analysis	6
4.2	Genetic Analysis Tools: Applications, Demonstrations & Unani Integration	6
4.3	RNA-Based Techniques in Clinical Diagnostics	6
4.4	RNA in Clinical Case Studies	6
4.5	Genetic Mutations and Protein Synthesis - Case Reports	6
5.1	Biochemical Quantification of Liver Enzymes	5
5.2	Diagnostic Evaluation of Enzymopathies – Case Studies	5
5.3	Impact of Sleep on Enzyme Regulation	5
5.4	Structure-Function Relationships in Oxygen Transport Proteins	5
5.5	Diagnosing Anaemia: Case-Based Approach to Oxygen-Transport Protein Abnormalities	5
5.6	Role of Antioxidants in Cellular Health and Disease Prevention	5
6.1	Greek Scholarship in Kulliyāt-i-Ṭibb: Prospects and Limitations	5
6.2	Roman Scholarship in Kulliyāt-i-Ṭibb: Prospects and Limitations	5
6.3	Arab Scholars' Works (8th–11th Century) in Kulliyāt-i-Ṭibb	5
6.4	Contributions of Arab Scholars (12th–15th Century) to Kulliyāt-i-Ṭibb	5
6.5	Indian Scholars in Kulliyāt-i-Ṭibb: Annotations and Concept Mapping	5
6.6	Indian Scholarship in Kulliyāt-i-Ṭibb: Potentials and Challenges	5

Table 5 : Experiential learning Activity

(*Refer table 3 of similar activity number)

Experiential learning No*	Experiential name	Hours
1.1	Application of Conceptual Terminologies in Kulliyāt-i-Ṭibb	2
1.2	Istiqrā and Qaḍiyya in Kulliyāt-i-Ṭibb	2
1.3	Distinction of Terminologies in Kulliyāt-i-Ṭibb	2
1.4	Research Module Based on Qiyās and Tajriba	3
1.5	Challenges and Solutions in Understanding Physical and Metaphysical Realities in Ṭibb	2
1.6	Appraisal of Asbāb Wujūd and Mawalīd Thalatha in Relation to Ajsām Badan	2
2.1	Mechanical Forces in Joint Biomechanics: Real-world Analysis	4
2.2	Selective Permeability and Solute Content: Key Examples	5
2.3	Physical Forces Involved in Different Body Movements	5
2.4	Mechanical Properties of Blood Vessels and Blood Flow	5
2.5	Fluid Dynamics in Real-World Physiology	5
2.6	Impact of Thermo-Chemistry on Food and Energy Reserves	5
2.7	Thermodynamics and Its Influence on Mizāj A'ḍa	5
2.8	Effects of Ḥammām (Steam Bath) on Thermoregulation	5
3.1	Congenital Metabolic Disorders and their Impact on Metabolic Pathways	5
3.2	Metabolic Pathways and Unani Insights into Acquired Disorders	5
3.3	Impact of Seasonal Variations on Biomolecule Metabolism	5
3.4	Dietary Habits and their Impact on Biomolecule Metabolism - Case Studies	4
3.5	Impact of Physical Activity on Biomolecule Metabolism	4

3.6	Psychological Factors Influencing Eating Behaviour and Metabolism	4
3.7	Role of Sleep in Metabolic Regulation	4
3.8	Impact of Waste Evacuation on Homeostasis and Metabolic Health	4
3.9	Effects of Fluid Retention on Metabolism, Homeostasis, and Health	4
4.1	DNA and its Role in Genetics and Inheritance	6
4.2	Unani Perspective on Hereditary Diseases	6
4.3	RNA's Role in Disease Pathways	6
4.4	Ethical dimensions of RNA research and applications	6
4.5	Impact of Protein Dysfunction in Disease Mechanisms	5
4.6	Epigenetics and Gene Expression Regulation - Case Studies	5
4.7	Ethical Challenges in Epigenetics	5
5.1	Current Advances in Oxygen-Transporting Proteins: A Critical Evaluation	5
5.2	Impact of Mental Health on Oxygen Transport and Physical Health	5
5.3	Role of Reactive Oxygen Species (ROS) in Disease Pathogenesis	5
5.4	Reactive Oxygen Species (ROS) as a Mechanism of Antimicrobial Defence	4
5.5	Impact of Air Quality on Oxidative Stress and Cellular Damage	4
5.6	Impact of Physical Activity on Antioxidant Defence	4
5.7	Role of Psychological Stress in Oxygen-Derived Free Radical Production	4
5.8	Role of Free Radicals in Regulating the Sleep-Wake Cycle	4
5.9	Impact of Oxidative Stress on Bowel Retention Mechanisms	4
6.1	Contributions of Greek Scholars to Kulliyāt-i-Ṭibb	6
6.2	Contributions of Roman Scholars to Kulliyāt-i-Ṭibb	5
6.3	Contributions of Arab Scholars (8th–11th Century) to Kulliyāt-i-Ṭibb	6

6.4	Contributions of Arab Scholars (12th–15th Century) to Kulliyāt-i-Ṭibb	5
6.5	Interpretation of Medieval Unani Texts Using Language Laboratory Resources	6
6.6	Contributions of Indian Scholars to Kulliyāt-i-Ṭibb Before AD 1900	6
6.7	Contributions of Indian Scholars to Kulliyāt-i-Ṭibb After AD 1900	5

Table 6 : Assessment Summary: Assessment is subdivided in A to H points
6 A : Number of Papers and Marks Distribution

Subject Code	Paper	Theory	Practical	Total
UNIPG-AB-KUT	1	100	200	300

6 B : Scheme of Assessment (Formative and Summative Assessment)

Credit frame work

UNIPG-AB-KUT consists of 6 modules totaling 16 credits, which correspond to 480 Notional Learning Hours. Each credit comprises 30 Hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Formative Assessment : Module wise Assessment:will be done at the end of each module. Evaluation includes learners active participation to get Credits and Marks. Each Module may contain one or more credits.

Summative Assessment: Summative Assessment (University examination) will be carried out at the end of Semester II.

6 C : Calculation Method for Modular Grade Points (MGP)

Module Number & Name (a)	Credits (b)	Actual No. of Notional Learning Hours (c)	Attended Number of notional Learning hours (d)	Maximum Marks of assessment of modules (e)	Obtained Marks per module (f)	MGP =d*f/c*e*100
M1. فلسفیانہ مفاہیم Falsafiyāna Mafāhīm (Philosophical Concepts)	1	30		25		
M2. طبی حیاتی طبیعیات Ṭibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics)	3	90		75		
M3. طبی حیاتی کیمیا: حیاتیاتی سالمات Ṭibbī Ḥayātī Kīmiyā: Ḥayātiyātī Sālamāt (Medical Biochemistry: Biomolecules)	3	90		75		
M4. حیاتی کیمیا: سالماتی حیاتیات Ḥayātī Kīmiyā: Sālamātī Ḥayātiyāt (Biochemistry: Molecular Biology)	3	90		75		
M5. خامرہ جات؛ حامل آکسیجن لحمیات؛ آکسیجن سے مشتق فری ریڈیکلس Khāmirah Jāt; Ḥāmil-e-Āksījan Laḥmiyāt; Āksījan se Hāṣil Āzād Judhūr (Enzymes; Oxygen Transporting Proteins; Oxygen-derived Free Radicals)	3	90		75		
M6. کلیات طب: مصادر و مراجع Kulliyāt-i-Ṭibb: Maṣādir-o-Marāji' (Kulliyāt-i-Ṭibb: Classical Sources)	3	90		75		
MGP = ((Number of Notional learning hours attended in a module) X (Marks obtained in the modular assessment) / (Total number of Notional learning hours in the module) X (Maximum marks of the module)) X 100						

6 D : Semester Evaluation Methods for Semester Grade Point Average (SGPA)

SGPA will be calculated at the end of the semester as an average of all Module MGPs. Average of MGPS of the Semester For becoming eligible for Summative assessment of the semester, student should get minimum of 60% of SGPA

SGPA = Average of MGP of all modules of all papers = add all MGPs in the semester/ no. of modules in the semester Evaluation Methods for Modular Assessment

A S.No	B Module number and Name	C MGP
1	M1.فلسفیانہ مفاہیمFalsafiyāna Mafāhīm (Philosophical Concepts)	C 1
2	M2. طبی حیاتی طبیعیاتṬibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics)	C 2
3	M3.طبی حیاتی کیمیا: حیاتیاتی سالماتṬibbī Ḥayātī Kīmiyā: Ḥayātiyātī Sālamāt (Medical Biochemistry: Biomolecules)	C 3
4	M4.حیاتی کیمیا: سالماتی حیاتیاتḤayātī Kīmiyā: Sālamātī Ḥayātiyāt (Biochemistry: Molecular Biology)	C 4
5	M5.خامرہ جات؛ حامل آسیجن لحمیات؛ آسیجن سے متشق فری ریڈیکلسKhāmirah Jāt; Ḥāmil-e-Āksījan Laḥmiyāt; Āksījan se Hāṣil Āzād Judhūr (Enzymes; Oxygen Transporting Proteins; Oxygen-derived Free Radicals)	C 5
6	M6.کلیات طب: مصادر و مراجعKulliyāt-i-Ṭibb: Maṣādir-o-Marāji' (Kulliyāt-i-Ṭibb: Classical Sources)	C 6
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6) / Number of modules(6)

S. No	Evaluation Methods
1.	Method explained in the Assessment of the module or similar to the objectives of the module.

6 E : Question Paper Pattern

MD/MS Unani Examination
UNIPG-AB-KUT
Sem II
Time: 3 Hours ,**Maximum Marks:** 100
INSTRUCTIONS: All questions compulsory

		Number of Questions	Marks per question	Total Marks
Q 1	Application-based Questions (ABQ)	1	20	20
Q 2	Short answer questions (SAQ)	8	5	40
Q 3	Analytical based structured Long answer question (LAQ)	4	10	40
				100

6 F : Distribution for summative assessment (University examination)

S.No	List of Module/Unit	ABQ	SAQ	LAQ
(M- 1) فلسفیانہ مفاہیم Falsafiyāna Mafāhīm (Philosophical Concepts) (Marks: Range 5-20)				
1	**(U-1)** اساسی اصطلاحات Asāsī Iṣṭilāḥāt (Key Conceptual Terminologies)	No	Yes	Yes
2	**(U-2)** منطق Manṭiq (Logic)	Yes	Yes	Yes
3	**(U-3)** مفہوم وجود Mafhūm-i Wujūd (Concept of Existence)	No	Yes	Yes
(M- 2) طبی حیاتی طبیعیات Ṭibbī Ḥayātī Ṭabī'iyāt (Medical Biophysics) (Marks: Range 5-20)				
1	**(U-1)** Human Body and Physical Forces	No	Yes	Yes
2	**(U-2)** Haemodynamics	Yes	Yes	Yes
3	**(U-3)** Thermodynamics	Yes	Yes	Yes
(M- 3) طبی حیاتی کیمیا: حیاتیاتی سالمات Ṭibbī Ḥayātī Kīmiyā: Ḥayātiyātī Sālamāt (Medical Biochemistry: Biomolecules) (Marks: Range 5-20)				
1	**(U-1)** Carbohydrate	Yes	Yes	Yes
2	**(U-2)** Protein	Yes	Yes	Yes
3	**(U-3)** Lipid	No	Yes	Yes
4	**(U-4)** Biomolecules: Applied Aspects	Yes	Yes	Yes
(M- 4) حیاتی کیمیا: سالماتی حیاتیات Ḥayātī Kīmiyā: Sālamātī Ḥayātiyāt (Biochemistry: Molecular Biology) (Marks: Range 5-20)				
1	**(U-1)** DNA Structure	No	Yes	Yes
2	**(U-2)** RNA Biology	Yes	Yes	Yes
3	**(U-3)** Protein Synthesis and Function	Yes	Yes	Yes
4	**(U-4)** Cellular Function and Regulation	Yes	Yes	Yes
(M- 5) خامرہ جات؛ حاملِ آکسیجن لحمیات؛ آکسیجن سے متحق فری ریڈیکلس Khāmirah Jāt; Ḥāmil-e-Āksījan Laḥmiyāt; Āksījan se Hāṣil Āzād Judhūr (Enzymes; Oxygen Transporting Proteins; Oxygen-derived Free Radicals) (Marks: Range 5-20)				
1	**(U-1)** Enzymes	No	Yes	Yes

2	**(U-2)** Oxygen Transporting Proteins	Yes	Yes	Yes
3	**(U-3)** Oxygen-derived Free Radicals	Yes	Yes	Yes
(M- 6) کلیاتِ طب: مصادر و مراجع Kulliyāt-i-Ṭibb: Maṣādir-o-Marāji‘ (Kulliyāt-i-Ṭibb: Classical Sources) (Marks: Range 5-20)				
1	**(U-1)** یونانی و رومی عبقریت (Greco-Roman Scholarship)	Yes	Yes	No
2	**(U-2)** قرونِ وسطیٰ کی عبقریت (500–1500 عیسوی) Medieval Scholarship (500–1500 AD)	Yes	Yes	Yes
3	**(U-3)** ہندی عبقریت (Indian Scholarship)	No	Yes	Yes

6 G : Instruction for the paper setting & Blue Print for Summative assessment (University Examination)

Instructions for the paper setting.

1. 100 marks question paper shall contain:-
• Application Based Question: 1 No (carries 20 marks)
• Short Answer Questions: 8 Nos (each question carries 05 marks)
• Long Answer Questions: 4 Nos (each question carries 10 marks)
2. Questions should be drawn based on the table 6F.
3. Marks assigned for the module in 6F should be considered as the maximum marks. No question shall be asked beyond the maximum marks.
4. Refer table 6F before setting the questions. Questions should not be framed on the particular unit if indicated “NO”.
5. There will be a single application-based question (ABQ) worth 20 marks. No other questions should be asked from the same module where the ABQ is framed.
6. Except the module on which ABQ is framed, at least one Short Answer Question should be framed from each module.
7. Long Answer Question should be analytical based structured questions assessing the higher cognitive ability.
8. Use the Blueprint provided in 6G or similar Blueprint created based on instructions 1 to 7

Blueprint

Question No	Type of Question	Question Paper Format
Q1	**Application based Questions** 1 Question 20 marks All compulsory	M1.U2 **Or** M3.U1 **Or** M3.U2 **Or** M3.U4 **Or** M4.U2 **Or** M4.U3 **Or** M4.U4 **Or** M6.U1 **Or** M6.U2 **Or** M2.U2 **Or** M2.U3 **Or** M5.U2 **Or** M5.U3
Q2	**Short answer Questions** Eight Questions 5 Marks Each All compulsory	1. M2.U1 **Or** . M3.U1 **Or** . M4.U1 2. M1.U1 **Or** . M3.U2 **Or** . M5.U1 3. M1.U2 **Or** . M4.U2 **Or** . M6.U1 4. M1.U3 **Or** . M2.U2 **Or** . M5.U2 5. M2.U3 **Or** . M3.U3 6. M4.U3 **Or** . M5.U3 7. M6.U2 **Or** . M3.U4 8. M4.U4 **Or** . M6.U3
Q3	**Analytical Based Structured Long answer Questions** Four Questions 10 marks each All compulsory	1. M2.U1 **Or** . M3.U1 **Or** . M4.U1 **Or** . M5.U1 **Or** . M6.U2 2. M1.U1 **Or** . M3.U2 **Or** . M4.U2 **Or** . M5.U2 **Or** . M4.U4 3. M1.U2 **Or** . M2.U2 **Or** . M4.U3 **Or** . M5.U3 4. M1.U3 **Or** . M2.U3 **Or** . M3.U3 **Or** . M6.U3 **Or** . M3.U4

6 H : Distribution of Practical Exam (University Examination)

S.No	Heads	Marks

1	**Long case (80 Marks):** **Quantitative estimation: Duration - 90 minutes** The student will be required to perform a practical task involving quantitative estimation from Modules 3, 4, or 5. The task will focus on any one of the following estimations: (1) Serum glucose test for metabolic assessment. (2) HbA1c test for metabolic assessment. (3) Uric acid level estimation and analysis. (4) Serum albumin estimation and interpretation. (5) Quantitative estimation of cholesterol levels. (6) Quantitative estimation of HDL, LDL, and VLDL cholesterol levels in serum, and (7) Biochemical quantification of liver enzymes. The student must conduct the experiment, perform the estimation, and analyze the results in relation to their clinical significance and the theoretical concepts involved. Assessment criteria (80 Marks): 1. Execution of the practical task (40 marks): Task for Students: Perform the experiment accurately, maintain safety protocols, and document observations. Evaluation by Examiners: Assess setup accuracy, precision of results, adherence to safety, and troubleshooting skills. 2. Data interpretation (20 marks): Task for Students: Present results in an organized format and analyze data with reference to theoretical concepts. Evaluation by Examiners: Evaluate clarity of presentation, accuracy of analysis, and application of theory. 3. Clinical relevance & conclusion (20 marks): Task for Students: Interpret findings in a clinical context and provide a logical conclusion. Evaluation by Examiners: Assess clinical relevance, scientific accuracy, and connection to real-world applications.	80
2	**Short Case (2x30= 60 Marks):** **(a) Practical demonstration (30 Marks): Duration - 30 minutes** The student will perform a practical task related to experimental demonstration and analysis, chosen from one of the following topics: (1) Demonstration of mechanical forces on blood pressure regulation. (2) Demonstration of osmotic forces in biological systems. (3) Demonstration of nerve impulses in nerve diseases and muscular disorders. (4) Demonstration of blood vessel elasticity. (5) Demonstration of the viscosity of liquid samples. (6) Evaluation of food energy value using calorimetry, and (7) Punnett square analysis. The student is expected to conduct the experiment, perform the demonstration, and analyze the results, focusing on their clinical significance and theoretical relevance. Assessment criteria (30 Marks): 1. Execution of the practical task (20 Marks): Task for Students: Perform the experiment accurately, maintain safety protocols, and document observations. Evaluation by Examiners: Assess setup accuracy, precision of results, adherence to safety, and troubleshooting skills. 2. Data interpretation (5 Marks): Task for Students: Present results clearly and analyze them based on theoretical concepts. Evaluation by Examiners: Evaluate clarity of presentation, accuracy of analysis, and application of theory. 3. Clinical relevance & conclusion (5 Marks): Task for Students: Relate findings to clinical contexts and provide a logical conclusion. Evaluation by Examiners:	60

	Assess clinical relevance, scientific accuracy, and connection to real-world applications. **(b) Application of logic: Inductive and deductive approaches (30 Marks): Duration - 30 minutes.** The student will apply inductive and deductive reasoning to solve a logical problem, analyze data, or draw conclusions based on given scenarios. Assessment Criteria: 1. Execution of Task (20 Marks): The student must identify and apply the appropriate reasoning method, ensuring logical consistency and precision in conclusions, while documenting each step systematically. 2. Data Interpretation (5 Marks): The student should present findings clearly and concisely, analyzing results accurately and relating them to the relevant logical principles. 3. Relevance and Conclusion (5 Marks): The student is expected to relate the reasoning process to real-world applications and provide a coherent, logically derived conclusion.	
3	**Viva-voce (40 Marks):** Examiner 1 (20 marks) Examiner 2 (20 marks)	40
4	**Logbook Assessment**	10
5	**Practical Record Assessment:** Students must maintain a record book comprising 16 practicals.	10
Total Marks		**200**

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157	x
158	x
159	x
160	x
161	x
162	x
163	x
164	x
165	x
166	x
167	x
168	x
169	x
170	x
171	x
172	x
173	x
174	x
175	x
176	x
177	x

Abbreviations

Domain		T L Method		Level	
CK	Cognitive/Knowledge	L	Lecture	K	Know
CC	Cognitive/Comprehension	L&PPT	Lecture with PowerPoint presentation	KH	Knows how
CAP	Cognitive/Application	L&GD	Lecture & Group Discussion	SH	Shows how
CAN	Cognitive/Analysis	L_VC	Lecture with Video clips	D	Does
CS	Cognitive/Synthesis	REC	Recitation		
CE	Cognitive/Evaluation	SY	Symposium		
PSY-SET	Psychomotor/Set	TUT	Tutorial		
PSY-GUD	Psychomotor/Guided response	DIS	Discussions		
PSY-MEC	Psychomotor/Mechanism	BS	Brainstorming		
PSY-ADT	Psychomotor Adaptation	IBL	Inquiry-Based Learning		
PSY-ORG	Psychomotor/Origination	PBL	Problem-Based Learning		
AFT-REC	Affective/ Receiving	CBL	Case-Based Learning		
AFT-RES	Affective/Responding	PrBL	Project-Based Learning		
AFT-VAL	Affective/Valuing	TBL	Team-Based Learning		
AFT-SET	Affective/Organization	TPW	Team Project Work		
AFT-CHR	Affective/ characterization	FC	Flipped Classroom		
		BL	Blended Learning		
		EDU	Edutainment		
		ML	Mobile Learning		
		ECE	Early Clinical Exposure		
		SIM	Simulation		
		RP	Role Plays		
		SDL	Self-directed learning		
		PSM	Problem-Solving Method		
		KL	Kinaesthetic Learning		
		W	Workshops		
		GBL	Game-Based Learning		
		LS	Library Session		
		PL	Peer Learning		
		RLE	Real-Life Experience		

		PER	Presentations		
		D-M	Demonstration on Model		
		PT	Practical		
		X-Ray	X-ray Identification		
		CD	Case Diagnosis		
		LRI	Lab Report Interpretation		
		DA	Drug Analysis		
		D	Demonstration		
		D-BED	Demonstration Bedside		
		DL	Demonstration Lab		
		DG	Demonstration Garden		
		FV	Field Visit		
		JC	Journal Club		
		Mnt	Mentoring		
		PAL	Peer Assisted Learning		
		C_L	Co Learning		