



Study Guide
OF BIOCHEMISTRY
FOR 1ST PROF MBBS
2019-2020



PREPARED BY

DR. MUHAMMAD ALI TAHIR

M.B.B.S

MESSAGE FROM PRINCIPAL, AVICENNA MEDICAL COLLEGE



PROF. DR. GULFREEN WAHEED

It is a pleasure to see Avicenna Medical College develop, progress and achieve maximum academic excellence in a short period since its inception in 2009. The institution has live up to its mission of training and producing medical graduates of international standards. We have achieved several milestones since 2009 including the recognition of our College for FCPS training by College of Physicians and Surgeons of Pakistan (CPSP), establishment of College of Nursing and Avicenna Dental College.

As a Principal I am fortunate to take quick decisions and student friendly measures, yet managing the high standards of Medical Education at the campus. The students at Avicenna are provided with an encouraging environment conducive to their learning and growth and are trained on the pattern test concepts and strategies in Medical Education. They are groomed on modern lines with due emphasis on the highest standards of discipline, Medical Professionalism, Medical and Social ethics in conformity to our cultural and religious values. These attributes along with an inclination towards research and development in academics is the focal point of our education system. Beyond this, we provide students with various opportunities to engage in co-curricular activities thus enabling them to bring out their naturally gifted talent. The student committee and clubs at Avicenna Medical College organizes events throughout the academic year which provide an opportunity to the students to enhance their talents and ability for teamwork. As an institution, we feel pride in the fact that we have won the confidence of the parents, who feel satisfied with the conservative yet progressive atmosphere of our Institution, high standards of Medical Education and discipline. Most parents show complete satisfaction once their child joins the 'Avicenna Family'. I welcome the batch of MBBS students to the continuously expanding family of Avicenna Medical College where diligent and devoted faculty members are ready to facilitate eager learners, enabling them to become future professionals and leaders. May Allah bless your endeavors with success and may you bring honors to your Alma Mater. Ameen!

MESSAGE FROM HOD, BIO-CHEMISTRY**AVICENNA MEDICAL COLLEGE**

DR.ZUBAIR.AHMED

(M.B.B.S.,M.PHIL.,F.C.P.S.)

PROFESSOR/H.O.D.

Bio-Chemistry relates to the Chemistry of and relating to Biological Organisms. It acts as a bridge between Biology and Chemistry by demonstrating how chemical reactions and structures give rise to life and life processes. The spacious laboratory has spectrophotometer, colorimeters, photometer analytical, electrophoresis, pH meters, centrifuge machine, electronic balances, microscopes, incubators, water bath, distillation unit, automated pipettes and dispensers, to facilitate the practical demonstration of concepts. The Clinical biochemistry laboratory (clinical lab) at Avicenna Medical College & Avicenna Hospital is also equipped to facilitate the learning of students. It has clinical chemistry analyser, haematology analyser and blood gas analyser to enhance effective student learning and understanding of blood samples and tests. A maximum of 60 students can occupy the huge biochemistry lab at one time. The highlighted equipment is sufficient for qualitative & quantitative analysis of samples for undergraduates.

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WHAT IS A STUDY GUIDE?

- ☐ Inform students how student learning program has been organized according to their learning objectives.
- ☐ Help students organize and manage their studies throughout the course.
- ☐ Guide students on assessment methods, rules and regulations

THE STUDY GUIDE:

- ☐ Communicates information on organization and management of the course. This will help the student to contact the right person in case of any difficulty.
- ☐ Defines the objectives which are expected to be achieved at the end of the course.
- ☐ Identifies the learning strategies such as lectures, small group teachings, clinical skills, demonstration, tutorial and case-based learning that will be implemented to achieve the course objectives.
- ☐ Provides a list of learning resources such as books, computer assisted learning programs, web-links, journals, for students to consult in order to maximize their learning.

STUDENT'S OVERALL PERFORMANCE:

- ☐ Includes information on the assessment methods that will be held to determine every student's

ACHIEVEMENT OF OBJECTIVES:

- ☐ Focuses on information pertaining to examination policy, rules and regulations.

INTRODUCTION TO BIOCHEMISTRY DEPARTMENT

“TODAY'S BIO CHEMISTRY IS TOMORROWS MEDICINE”.

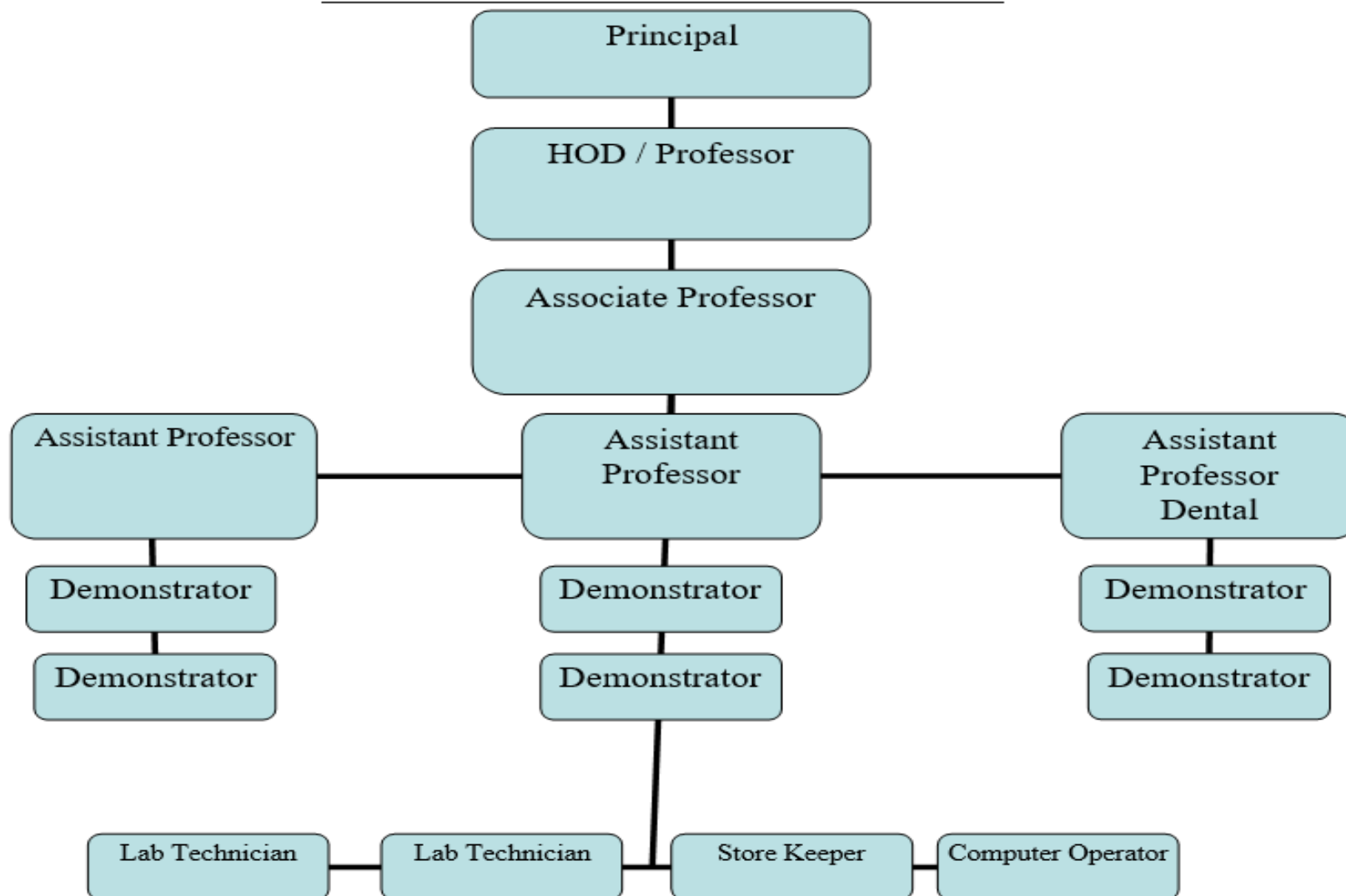
Biochemistry is defined as the chemical basis of all living processes. Key objective of biochemistry is to learn molecular basis of all biochemical process with clinical orientation. Biochemistry encompasses large areas of cell biology, molecular biology, and molecular genetics.

Biochemistry is the language of biology. The tools for research in all branches of medical science are mainly Biochemical nature. Its study is essential to understand basic functions of the human body. It provides information regarding changes occurring at molecular level. It is the most rapidly developing subject in medicine regarding research at molecular and genetic level. It is helpful in devising new techniques, tools to study diseases as well as advancement in cure. Our biochemistry lab is purpose built, well equipped and fills the criteria of PMDC regarding space, tools, furniture machines and IT facilities.

GOALS OF THE DEPARTMENT

- To offer educational opportunities and convey emerging scientific knowledge to the students that contributes to improve personal development and professional fulfillment.
- To maintain the highest standards of ethical and professional conduct.
- To provide the students with a thorough introduction of the metabolism and its effect on characteristics, structure, development, function and clinical significance of the human body.
- To recognize chemical structures, appreciate their medical importance and apply their knowledge to the cases that they will encounter during their clinical training and future careers as medical practitioners.

DEPARTMENT OF BIOCHEMISTRY



<div>Avicenna Medical College</div> <div>Calendar 2019 - 2020</div> <div>1st Year M-19</div>																												Date: 27 JAN 2020
December 2019								January 2020								February 2020								SESSION START = 23 Dec 2019				SESSION END =
	Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa					
	1	2	3	4	5	6	7	W.V				1	2	3	4	4											1	Wintervacation= 25 Dec 2019 To 5th Jan 2020
	8	9	10	11	12	13	14	1	5	6	7	8	9	10	11	5	2	3 S1 UL	4	5	6	7	8					
	15	16	17	18	19	20	21	2	12	13	14	15	16	17	18	6	9	10 EL 1	11	12	13 GA1	14	15					White Coat Ceremony: 24 JAN 2020 Farewell Final Year: 25 JAN 2020 Sports day = 31 JAN 2020 Funfare: 1 FEB 2020
0	22	23	24	25	26	27	28	3	19	20 GR	21	22	23 Cell	24	25	7	16	17 S2 UL	18	19	20 H1	21	22					Trips and Tours: 2020
W.V	29	30	31					4	26	27 Cell & Tr	28	29	30 Nuc	31		8	23	24 CHO	25	26	27 EL2	28	29					Early Session= 25 Apr 2020 TO 29 Apr 2020
March 2020								April 2020								May 2020								Spring Vacation = 22 Mar 2020 TO 5 Apr 2020				
	Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa					
9	1	2 S3 UL	3	4	5 Prot.	6	7	SP.V				1	2	3	4	15						1	2					Ramadan = 24 April 2020
10	8	9 E1	10	11	12 S4 UL	13	14	12 R	5	6	7	8 Ecm+VV	9ph	10ph	11ph	16	3	4 Heart1	5	6	7 GA2	8	9					
11	15	16 FS UL	17	18	19 N&M	20	21	13 R	12ph	13ph	14bio	15bio	16bio	17bio	18 UL	17	10	11 S1 Thorax	12	13	14	15	16					Mid Session = 28 Aug 20 - 3 Sep 20
SP.V	22	23	24	25	26	27	28	14 ES	19 UL	20 UL	21 UL GA	22 Em	23 Histo	24	25An	18	17	18 Lipid	19	20	21 Heart2	22	23					
SP.V	29	30	31					15 ES	26	27Ph	28	29Bio	30			EID.19	24	25	26	27	28	29	30					Eid-ul-Fitar = 22 May 2020 TO 26 May 2020
																20	31											
June 2020								July 2020								August 2020								Summer Vacation = 19 July 2020 TO 2 Aug 2020				
	Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa					
20		1 Enz	2	3	4 E2	5	6	24				1	2	3	4	S.V							1					
21	7	8 Cir1	9	10	11S2 Thorax	12	13	25	5	6 Vit	7	8	9 Cir 3	10	11	27 R	2	3	4 H3/V	5	6 E3	7ph	8ph					
22	14	15 FS Thorax	16	17	18 Haem	19	20	26	12	13 S2 LL	14	15	16 Resp 1	17	18	28 R	9ph	10ph	11ph	12ph	13bio	14 bio	15bio					Muharram= 28, 29 Aug 2020
23	21	22 H2	23	24	25 Cir 2	26	27	S.V	19	20	21	22	23	24	25	29 R	16bio	17 bio	18 UL	19 UL	20 TH	21 TH	22 LL					
24	28	29 S1 LL	30					S.V	26	27	28	29	30	31		30 MS	23 LL GA	24 Em	25 Histo	26	27 An	28	29					Send up Exam =
																31 MS	30	31Bio										
September 2020								October 2020								November 2020								Prof Date :				
	Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa		Su	Mo	Tu	We	Th	Fr	Sa					
31 MS			1	2	3Ph	4 O	5 O	35					1 E4	2	3		1	2	3	4	5	6	7					
32	6	7 O	8	9	10	11	12	36	4	5 Temp+Va	6	7	8 Nut	9	10		8	9	10	11	12	13	14					
33	13	14 S3 LL	15	16	17 Min	18	19	37	11	12 H4	13	14	15	16	17		15	16	17	18	19	20	21					
34	20	21 Resp 2	22	23	24 S4 LL	25	26	38	18	19	20	21	22	23	24		22	23	24	25	26	27	28					
35	27	28 FS LL	29	30					25	26	27	28	29	30	31		29	30										

AVICENNA MEDICAL COLLEGE									
M-19		1st YEAR	TIME TABLE SESSION 2019 - 2020					WEEK	BASIC
DATE	DAY	8.00-9.00	9.00-10.00	10.00-11.30		11.30-12.00	12.00-1.30		1.30-2.30
	MON	8.00-10.00		10.00-11.30		B R E A K	VIVA	LECTURE GROSS ANATOMY <u>LECTURE HALL 1</u> (12.30- 1.30)	LECTURE BIOCHEMISTRY <u>LECTURE HALL 1</u>
		GRAND TEST EXAMINATION HALL		KEY DISCUSSION & FEED BACK SESSION	TUTORIAL DH GR. ANATOMY/ EMBRYOLOGY PHYSIOLOGY SELF DIRECTED EARNING/ (BIOCHEMISTRY)				
	TUE	LECTURE GEN. EMBRYOLOGY <u>LECTURE HALL 1</u>	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	10:00-11:30			PRACTICAL BATCH A : DH GROSS ANATOMY BATCH B : HISTOLOGY BATCH C : BIOCHEMISTRY BATCH D : PHYSIOLOGY	LECTURE GENERAL ANATOMY <u>LECTURE HALL 1</u>	
				TUTORIAL DH GROSS ANATOMY- BATCH: A PHYSIOLOGY -BATCH: B SELF DIRECTED LEARNING/ (BIOCHEMISTRY) -BATCH: C					
	WED	LECTURE BIOCHEMISTRY <u>LECTURE HALL 1</u>	LECTURE GEN. HISTOLOGY <u>LECTURE HALL 1</u>	10:00-11:30			PRACTICAL BATCH B : DH GROSS ANATOMY BATCH C : HISTOLOGY BATCH D : BIOCHEMISTRY BATCH A : PHYSIOLOGY	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	
				TUTORIAL DH GROSS ANATOMY- BATCH: B PHYSIOLOGY -BATCH: C SELF DIRECTED LEARNING/ (BIOCHEMISTRY) -BATCH: A					
	THU	8.00-10.00		10:00-11:30		12.00-12.45	12.45-1.30	LECTURE PHYSIOLOGY LECTURE HALL 1	
		GRAND TEST <u>EXAMINATION HALL</u>		TUTORIAL DH GROSS ANATOMY- BATCH:C PHYSIOLOGY -BATCH:A SELF DIRECTED LEARNING/ (BIOCHEMISTRY) -BATCH: B		LECTURE SURGERY (33 LEC) RADIOLOGY & ORTHO (7 LEC) LECTURE HALL 1	LECTURE PATHOLOGY (20 LEC)/ OBG (13 LEC) / EYE (7 LEC) <u>LECTURE HALL 1</u>		
	FRI	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	LECTURE GROSS ANATOMY <u>LECTURE HALL 1</u>	10:00-10:45	10:45-11:30	11.30-1:00			
				LECTURE MEDICINE (33+5 LEC) <u>LECTURE HALL 1</u>	LECTURE GEN. EMBRYOLOGY LECTURE HALL 1	PRACTICAL BATCH C : DH GROSS ANATOMY BATCH D : HISTOLOGY BATCH A : BIOCHEMISTRY BATCH B : PHYSIOLOGY			
	SAT	LECTURE PHYSIOLOGY <u>LECTURE HALL 1</u>	LECTURE BIOCHEMISTRY <u>LECTURE HALL 1</u>	10:00-10:45	10.45-11.30	11.30-12.00	PRACTICAL BATCH D : DH GROSS ANATOMY BATCH A : HISTOLOGY BATCH B : BIOCHEMISTRY BATCH C : PHYSIOLOGY		LECTURE GENERAL ANATOMY/ GROSS ANATOMY <u>LECTURE HALL 1</u>
				LECTURE COM. MEDICINE (33 LEC)/ ENT (7 LEC) <u>LECTURE HALL 1</u>	LECTURE ISLAMIYAT/ PAK STUDIES (24 LEC)/ BEH.SCIENCES (7 LEC)/ PAEDS (7 LEC) <u>LECTURE HALL 1</u>	B R E A K			

Prepared by _____

Principal
Prof.Dr.Gulfreem Waheed_____



DEPARTMENT OF MEDICAL EDUCATION

Subject: Biochemistry - 1st Yr MBBS

TABLE OF SPECIFICATION

PMDC Requirement =

Date: 18th Nov. 2019

AVICENNA Curriculum Hour =

Sr. No.	Topic	LEARNING OBJECTIVES	KNOWLEDGE			SKILL	ATTITUDE	TOTAL	Mode of information transfer				TOTAL HOURS	Lecture Topics	References	Practicals
			Cognitive Domain			Psychomotor Domain	Effective Domain	%	MIT							
			C1	C2	C3	P	A		Lecture	Tutorial	Practical	Clinical Rotation	Hour			
1	Cell Biochemistry	Student should be able to:	1%	2%	2%			5%	6		1		1. Biochemical composition and functions of the cell	Cell Notes	Introduction to laboratory technique / equipment	
		1. Give introduction to biochemistry along with an overview of biochemistry and its significance in medicine.														
		2. Describe the Biochemical composition and functions of cell along with composition and difference of eukaryotic and prokaryotic cells (only biochemical aspects).														
		3. Illustrate and detail the Cell membranes (its biochemical composition)														
		4. Define with appropriate examples the membrane phenomena such as Transport of substances across the cell membrane via active (primary and secondary active) transport; diffusion (simple and facilitated), and vesicle - mediated transport (phagocytosis, endocytosis, and exocytosis);														
		5. Explain Gibbs Donnan equilibrium and give its applications.														
		6. Define Osmosis and elaborate the osmotic pressure with its applications.														
		7. Overview about methods of cell signaling.														
		8. Define and give classification of Signaling molecules.														
		9. Define and classify Membrane receptors and other biologically important regulatory and catalytic membrane bound proteins like G protein, adenylyl cyclase, phospholipase (with illustration)														
		10. Define, Principal, Types (if any) and clinical application of Centrifugation, ultracentrifugation, radioimmunoassay, ELISA, chromatography, electrophoresis, spectrophotometry and pH metry.														

11	The extracellular Matrix	Student should be able to: 1. Explain the types and structure of collagen; biosynthesis and degradation of collagen; collagenopathies (Ehlers-Danlos syndrome (EDS) and Osteogenesis imperfecta (OI))	2%	3%	4%								1. Collagen	Lippincot Ch; 4,14 Harper Ch; 50	
		2. Explain the structural characteristics of elastin; role of alpha 1-antitrypsin in elastin degradation;											2. Collagenopathies	Lippincot Ch; 4,14 Harper Ch; 50	
		3. Elaborate the major biochemical differences between collagen and elastin;											3. Elastin, Alpha 1 antitrypsin, Biomedical differences between collagen and elastin	Lippincot Ch; 4,14 Harper Ch; 50	
		4. Describe the genetic disorders associated with elastin like Willain-Beuren syndrome, supravalvular aortic stenosis, pulmonary emphysema, and aging of the skin											4. Genetic disorders associated with elastin	Lippincot Ch; 4,14 Harper Ch; 50	
		5. Explain Fibrillin-1 as a protein of microfibrils; Marfan's syndrome; fibronectin and its role in cell adhesion and migration; lamina as a protein component of renal glomerular and other basal laminas.											5. Fibrillin 1, Marfans syndrome Fibronectin, Laminin	Lippincot Ch; 4,14 Harper Ch; 50	
		6. Describe the structure, classification, functions and distribution of Glycosaminoglycans (GAGs); and diseases associated with enzyme deficiencies of degradation of GAGs (mucopolysaccharidoses - Hunter syndrome and Hurler syndrome)											6. GAGs, mucopolysaccharidoses Structure and functions of proteoglycans	Lippincot Ch; 4,14 Harper Ch; 50	
		7. Describe the structure and functions of proteoglycans													
8	Porphyrins and Haemoproteins	Student should be able to: 1. Explain the chemistry and biosynthesis of heme and other porphyrins including disorders of heme biosynthesis (porphyrias)	2%	3%	4%								1. Chemistry and biosynthesis of heme	Lippincot Ch;3,21 Harper Ch;6,30,31	
		2. Describe the Important hemoproteins found in body along with their principal biological functions;											2. Biological functions of hemoproteins found in body		
		3. Give structure and function of hemoglobin and myoglobin, and types of hemoglobin, HbA1c											3. Hemoglobin		
		4. Oxygen binding capacity of hemoglobin, and factors affecting and regulating the oxygen-binding capacity of hemoglobin. Methemoglobinemia											4. Hemoglobinopathies		
		5. Describe the bilirubin metabolism; Degradation of heme, synthesis, hepatic uptake, conjugation, and excretion of bilirubin and fate of bilirubin in intestine											5. Porphyrins and Porphyrins 1		
		6. Define Hyperbilirubinemia and describe the causes of hyperbilirubinemias along with the acquired and congenital disorders leading to hyperbilirubinemias (jaundice and kernicterus)											6. Porphyrins and Porphyrins 2		
		7. Define hemoglobinopathies;											7. Billirubin Metabolism 1		
		8. Describe in detail the Sick cell anemia (biochemical cause and its clinical manifestation), hemoglobin C disease, hemoglobin SC disease and thalassemia											8. Billirubin Metabolism 2		
													9. Hyperbillirubinemias 1		
													10. Hyperbillirubinemias 2		

2	Water, pH, and Buffers	Student should be able to :	2%	3%	3%							1. Ionization of water, weak acids and bases	Chatterjee 8 Ed; Ch -40	Preparation of solution / normal solution and normal saline
		1. Give compartmental distribution of water in the body.										2. pH and pH scale pKa value, Ka, and titration curve of weak acids		
		2. Define and give common examples of Ionization of water; weak acids and bases.										3. Determination of pH of buffer		
		3. Define pH and give its equation										4. Body buffer systems 1		
		4. Draw and give the importance of pH scale:										5. Body buffer systems 2		
		5. Explain the Concept of pH and related topics (determination of pH), and concept of pI (isoelectric pH)												
		6. Explain pKa value, dissociation constant (Ka), and titration curve of weak acids.												
3	Carbohydrate Chemistry	7. Write the Henderson - Hasselbalch equation and its applications (derivation not required) to determine the pH of buffer.	4%	5%	3%							1. Definition, biochemical functions and classification of carbohydrates	Lippincot Ch; 7 Harper Ch; 15	Qualitative Analysis of Carbohydrate
		8. Explain the biological buffer systems (bicarbonate, ammonia, phosphate and proteins) along with their mechanism of action.										2. Structure, functions and biomedical importance of monosaccharides and their derivatives. Isomerism in carbohydrates		
		Student should be able to:										3. Properties and biomedical importance of disaccharides		
		1. Define, biochemical functions and classification of carbohydrates										4. Biomedical importance of oligosaccharides and their combination with macromolecules		
		2. Define and explain the structure and function of biologically important monosaccharides and their important derivatives (sugar acids, sugar alcohols, sugar amines and glycosides).										5. Structure, functions and biological significance of homopolysaccharides		
		3. Give types and description of Isomerism in carbohydrates, with appropriate examples.										6. Structure and functions of heteropolysaccharides; Mucopolysacchridos		
		4. Define and illustrate the glycosidic linkage with example.												
		5. Enlist and describe the chemical composition of biologically important disaccharides, their properties and their biomedical importance												
		6. Define and enlist the oligosaccharides as well as describe their combination with other macromolecules along with their biomedical importance.												
		6. Define and enlist polysaccharides, also give its classification												
		7. Define and explain homopolysaccharides of biological significance and their structural and functional characteristics.												
		8. Define and explain structural and functional characteristics of heteropolysaccharides including details of glycosaminoglycans (GAGs), proteoglycans, peptidoglycans and mucopolysaccharidosis (types, cause of defect and their clinical features).												

4	Amino Acids and Proteins	Student should be able to:	4%	5%	3%			12%	6		1		1. Biomedical importance and classification of proteins. Structure, functions and properties of amino acids	Lippincot Ch;1,2 Harper 3,4,5,52	Qualitative Analysis of Proteins																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		1. Describe the amino acids with its basic structure, functions and its properties.											2. Classifications and biological importance of standard amino acids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		2. Give classification of amino acids (Standard and non-standard amino acids) along with their biomedical importance.											Functions and biological importance of non standard amino acids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		3. Elaborate the classification of standard (proteinogenic) amino acids (on the basis of structure, side chain character, nutritional value and metabolic fate).											3. Structural organization of proteins																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		4. Enlist biological important non-standard (non-proteinogenic) amino acids and give their principal functions.											4. Dissociation and titration of amino acids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		5. Give nomenclature of amino acids with appropriate examples.											Techniques for separation of proteins																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		6. Define isoelectric point and explain the dissociation and titration of amino acids (determination of pI of amino acids with two and three dissociable groups).											5. Immunoglobulin																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		7. Explain the importance of amino acids in the maintenance of pH; along with mechanism of buffering action of proteins.											6. Plasma proteins																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		5. Describe the structural organization of proteins: Details of four orders of protein structure (primary, secondary, tertiary and quaternary); along with denaturation of proteins; and protein misfolding (amyloidosis and prion disease)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		6. Give and Explain the basic principal, its procedure, types (if any), with appropriate illustration, if any) and clinical applications of important techniques for the separation of proteins (such as electrophoresis, isoelectric focusing, chromatography, filtration, centrifugation and dialysis).																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
7. Define Immunoglobulins; give its basic structure (with illustration), types, classification and their biomedical significance.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					</

Vitamins and Minerals	Student should be able to: 1. Explain the general features of vitamins as essential nutrients. 2. Classify the active vitamins according to their physico-chemical nature and biochemical functions. 3. Describe the important dietary sources and recommended dietary allowances of vitamins. 4. Explain in detail, the intestinal absorption, transport and storage of vitamins. 5. Explain the mechanism of action of vitamins and their biochemical functions in body. 6. Describe disorders associated with vitamin deficiency (hypovitaminoses) and hypervitaminoses. 7. Define and classify minerals; describe the macro-minerals (such as sodium, potassium, chloride, calcium, phosphorus, magnesium and sulfur) and micro-minerals (such as iron, zinc, selenium, iodine, copper, chromium, manganese, cadmium and fluoride) in human nutrition and their sources, absorption, transport, storage, and biochemical functions along with their recommended dietary allowances (RDA).	3%	4%	5%			12%	13		1		1. Introduction to vitamins 2. Fat Soluble Vitamins 1 3. Fat Soluble Vitamins 2 4. Fat Soluble Vitamins 3 5. Water Soluble Vitamins 1 6. Water Soluble Vitamins 2 7. Water Soluble Vitamins 3 8. Water Soluble Vitamins 4 9. Minerals: Sodium, Potassium, Chloride 10. Minerals: Calcium, Phosphorus, Magnesium, Sulphur 11. Trace Elements: Iron, Zinc, Selenium, Iodine 12. Trace Elements: Copper, Chromium, Manganese, Cadmium, Fluoride 13. Overview	Lippincot Ch;28 Harper Ch; 44	Chemical analysis of urine (normal and abnormal specimens)
											Lippincott 7th ed: Ch;29 Harper Ch; 44			
Nutrition	Student should be able to: 1. Explain caloric value of food, specific dynamic action (SDA) of food, respiratory quotient, metabolic rate (determination and factors affecting metabolic rate), basal metabolic rate (BMR) (measurements, calculation, and factors affecting BMR). 2. Describe "Balanced diet". 3. Explain the role of proteins in nutrition: Obligatory nitrogen loss, nitrogen balance, nutritionally essential amino acids and their role in body growth and nitrogen equilibrium, determination of comparative nutritional efficiency and quality of dietary protein, recommended dietary allowance of protein, recommended dietary allowance of proteins, protein energy malnutrition (kwashiorkor and marasmus) 4. Explain the role of Fats and Lipids in nutrition; Fats as a source of energy, role of saturated and unsaturated fats in health and disease, effect of dietary intake of trans-fats on health, and nutritionally essential fatty acids. 5. Explain the role of carbohydrates in human nutrition; Proteins sparing effect of carbohydrates, dietary carbohydrates and blood glucose along with the details of glycemic index, dietary fibers (types and biomedical importance). 6. Calculate the caloric requirement of a person and nutritional requirements in pregnancy, lactation, infancy and old age. 7. Elucidate Obesity and food additives (artificial sweeteners and flavor enhancers).	2%	2%	2%			6%	7				1. Energy metabolism 2. Proteins in nutrition 3. Fats in nutrition 4. Carbohydrates in nutrition 5. Balanced diet Calculation of caloric requirements 6. Obesity 1 7. Obesity 2	Lippincot Ch;26, 27 Harper Ch; 43	

CURRICULUM WITH LEARNING OBJECTIVES

Cell Biochemistry

1. Overview biochemistry and its significance in medicine
2. Discuss the biochemical composition and functions of cell.
3. Biochemical composition and function of cell membrane.
4. Discuss the transport of substances across the cell membrane.
5. Membrane receptors and other biologically important membrane bound proteins like G-proteins, adenylate cyclase & phospholipase
6. Basic methods to study cell biochemistry;
 - Centrifugation
 - Ultracentrifugation
 - Enzyme-linked immunosorbent assay (ELISA)
 - Radioimmunoassay
 - Chromatography
 - Electrophoresis
 - pH meter
 - Spectrophotometry
7. Discuss the ionization of water; weak acid and bases
8. pH & p^H scale and concept of Isoelectric p^H.
9. pK_a value, dissociation constant and titration curve
10. Henderson- Hassel balch equation and its applications
11. Body buffer systems

Chemistry of Carbohydrates

1. Define & Classify carbohydrates along with their biochemical functions.
2. Explain the structure & functions of biologically important monosaccharides.
3. Explain the isomerism of carbohydrates..
4. Define important disaccharides with their biochemical functions .
5. Oligosaccharides, their combinations with other macromolecules.
6. Define Polysaccharides and Classify into their types & biochemical functions.
7. Define Proteoglycans & Mucopolysaccharidosis with their Types.

Chemistry Of Lipids & Fatty acids

1. Define & Classify Lipids with their biological functions.
2. Define & Classify fatty acids along with their properties.
3. Define Nutritionally essential fatty acids and their functions.
4. Briefly discuss the eicosanoids & their biologic functions.
5. Briefly discuss the structure & biological functions of phospholipids, glycolipids, sulpholipids & gangliosides.
6. Explain the structure & biological role of Cholesterol & bile acids.
7. Define lipids peroxidation & its significance

Chemistry of Amino acids and Proteins

1. Define & classify the Amino acids along with examples.
2. Differentiate between standard and non-standard amino acids.
3. Briefly discussed the functions of Amino acids.
4. Importance of amino acids in maintenance of p^H.
5. Define & Classify Proteins along with their biomedical functions & Properties.
6. Explain the structural organization of Proteins.

7. Briefly discuss the denaturation of proteins & protein misfolding related to (Amyloidoses& Prion disease)
8. Define Immunoglobulin their types, structure & biological importance.
9. Define Plasma proteins their types & biomedical importance.
10. Define glycoproteins, components of glycoprotein with their role.
11. Briefly discuss the important Techniques for separation of proteins.

Extracellular Matrix

1. Discuss the Collagen its types & structure, biosynthesis& degradation as well as collagenopathies.(Ehlers-Danlos syndrome & Osteogenesis imperfecta.
2. Elastin their structural characteristics & role along with genetic disorder.
3. Explain fibrillin as a role of microfibrills, fibronectin & Laminin.
4. Define glycosaminoglycans their structure & classification.
5. Define Proteoglycans with their structure & functions.

Chemistry of Nucleic acid & Nucleotides

1. Define purine & pyrimidines with their structure & Types.
2. Explain the structure & functions of nucleotides & nucleosides.
3. Structure functions & types of Nucleic acids.
4. Briefly explain the natural & synthetic derivatives of purine & pyrimidines& their biochemical role.

Enzymes

1. Define, introduce & classify the enzymes along with their properties.
2. Define coenzymes & cofactors & classify them.
3. Briefly explain the mechanism of enzyme action and kinetics of enzymes.
4. Discuss the factors affecting the enzyme activity.
5. Define enzyme inhibition, classify them into their types with examples.
6. Allosteric enzymes with their biological significance
7. Define isoenzymes & their clinical significance.
8. Briefly explain the regulation of enzyme activity.
9. Briefly explain the diagnostic importance of enzymes in diseases. (Clinical enzymology).
10. Discuss the therapeutic uses of enzymes

Vitamins

1. Elaborate the general features of vitamin.
2. Define vitamins & classify according to their chemical nature & biochemical functions.
3. Important dietary sources & recommended dietary allowances of vitamins.
4. Briefly explain their intestinal absorption, transport & storage of vitamins.
5. Briefly explain the mechanism of action of vitamins.
6. Explain the disorders associated with vitamin deficiency & Hypervitaminosis

Minerals & Trace Elements

1. Define & Classify the minerals
2. Briefly explain the role of minerals in human nutrition
3. Explain the sources & recommended dietary allowances (RDA) of minerals.
4. Briefly explain their absorption, transport, and storage & biochemical function of minerals.
5. Briefly explain their deficiency manifestations along with their clinical aspects.

Nutrition

1. Define Energy metabolism, Caloric value of food, Specific dynamic action of food (SDA).
2. Define Respiratory quotient, Metabolic rate, Basal metabolic rate.
3. Determination of metabolic rate & factors affecting the metabolic rate.
4. Define balance diet & their importance in health & diseases.
5. Discuss proteins in nutrition; Obligatory nitrogen loss, nitrogen balance.
6. Explain the role of essential amino acids in body growth.
7. Briefly discuss the protein energy malnutrition (Kwashiorkor & Marasmus)
8. Briefly explain the role of lipids & fats in nutrition.
9. Define glycemic index & dietary fibers their types & biochemical importance.
10. Calculate the caloric requirement of a person & nutritional requirements in pregnancy, lactation infancy & old age.
11. Briefly discuss obesity & food additives.

Porphyryns and Hemoproteins

1. Discuss the Chemistry & biosynthesis of heme & other porphyrins including disorders of heme biosynthesis. (porphyrias)
2. Explain the structure & functions of Hemoglobin & myoglobin & types of Hemoglobin.
3. Explain the oxygen binding capacity of hemoglobin.
4. Explain the bilirubin metabolism.
5. Define Hyperbilirubinemias & their causes
6. Define jaundice and their types and kernicterus.
7. Define Hemoglobinopathies; Sickle cell anemia, Thalassemia, Hemoglobin C disease & Hemoglobin SC disease.

UHS SYLLABUS

SYLLABUS MBBS FIRST PROF. PART-I **BIOCHEMISTRY**

Teaching objectives (Biochemistry Part-I):

The general objectives and overall aims of the teaching course include:

1. To teach sufficient biochemistry to give the student a basic understanding of life processes at the molecular level.
2. To provide an understanding of the normal biochemical processes in the human body in which the function of the various organs and tissues are integrated.
3. To undertake practical classes that would familiarize the student with the various chemical methods which are used in the qualitative analysis of carbohydrates, lipids, amino acids/proteins, and biological fluids (urine, etc)
4. To familiarize the students with laboratory instruments / equipment used in biochemistry laboratory.
5. To undertake practical classes that would familiarize the student with the various chemical methods by which normal and abnormal constituents of urine are detected along with the interpretation of presence of these constituents in urine.

Learning objectives (Part-I)

At the end of the Part-I course, the student should be able to demonstrate his knowledge and understanding on the subject with following learning objectives:

1. Molecular and functional organization of a cell, and sub-cellular components.
2. In-depth knowledge of structure, function and interrelationship of biomolecules and consequences of deviation from normal.
3. Delineating, learning and understanding the chemistry of biomolecules of biologic significance. In order to accomplish this, the student will learn the basic chemical aspects of the biomolecules (carbohydrates, lipids, amino acids, polypeptides, nucleic acids).
4. Description of mechanisms involved in maintenance of body fluid & pH and the related homeostatic processes.
5. Recognizing homeostatic dynamics through the concepts of human nutrition and be familiar with the biochemical role of micro- and macro-nutrients like vitamins, minerals, and electrolytes along with their clinical implications of their dietary use.
6. Having a clear understanding of the fundamental aspects of enzymology & clinical applications along with regulation of enzyme activity.
7. Developing skills as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant literature in order to have a comprehensive understanding and knowledge of biochemistry.

1- Cell Biochemistry

- a) Introduction to biochemistry: An overview of biochemistry and its significance in medicine.
- b) Biochemical composition and functions of cell: Organization and composition of eukaryotic and prokaryotic cells (only biochemical aspects)
- c) Cell membranes (biochemical composition)
- d) Membrane phenomena: Transport of substances across the cell membrane via active (primary and secondary active) transport; diffusion (simple and facilitated), and vesicle-mediated transport (phagocytosis, endocytosis, and exocytosis); Gibbs-Donnan equilibrium, osmosis and osmotic pressure
- e) Membrane receptors and other biologically important regulatory and catalytic membrane-bound proteins like G-proteins, adenylate cyclase, phospholipase.
- f) Basic methods to study cell biochemistry: Centrifugation, ultracentrifugation, radioimmunoassay, ELISA (enzyme-linked immunosorbent assay); chromatography; electrophoresis, spectrophotometry, and pH metry.

2- Water, pH and buffers

- a) Ionization of water; weak acids and bases
- b) pH and pH scale: Concept of pH and related topics (determination of pH), and concept of pI (isoelectric pH)
- c) pKa value, dissociation constant (K_a), and titration curve of weak acids
- d) Determination of pH of buffer: Henderson-Hasselbalch equation and its applications (derivation not required).
- e) Body buffer systems (bicarbonate, ammonia, phosphate, and proteins) and their mechanism of action.

3- Carbohydrates

- a) Definition, biochemical functions and classification of carbohydrates.
- b) Structure and function of biologically important monosaccharides and their important derivatives (sugar acids, sugar alcohols, sugar amines, and glycosides)
- c) Isomerism in carbohydrates (types and description)
- d) Biologically important disaccharides, their properties and their biomedical importance
- e) Oligosaccharides, their combination with other macromolecules and their biomedical importance
- f) Homopolysaccharides of biologic significance and their structural and functional characteristics
- g) Structural and functional characteristics of heteropolysaccharides including details of glycosaminoglycans; proteoglycans, peptidoglycans; and mucopolysaccharidoses.

4- Amino acids and Proteins

- a) Biomedical importance and classification (biologic functions; nutritional value; and overall shape of molecule) of proteins.
- b) Structure, functions and properties of amino acids
- c) Classification of standard (proteinogenic) amino acids (based upon side chain structure, polarity of side chain, nutritional, and metabolic end-products), biologically important non-standard (non-proteinogenic) amino acids and their principal functions.
- d) Dissociation and titration of amino acids; determination of pI of amino acids with two and three dissociable groups; importance of amino acids in the maintenance of pH; and mechanism of buffering action of proteins.
- e) Structural organization of proteins: Details of four orders of protein structure (primary, secondary, tertiary, and quaternary); denaturation of proteins; and protein misfolding (amyloidoses and prion disease)
- f) Important techniques for separation of proteins (electrophoresis, isoelectric focusing, chromatography, filtration, centrifugation, and dialysis).
- g) Immunoglobulins; their types; structure, and biomedical significance.
- h) Plasma proteins (viz, prealbumin, albumin, haptoglobin, ceruloplasmin, alpha1-anti-trypsin; alpha 2-macroglobulin and transferrin) and their principal biologic functions along with their clinical significance. Alpha fetoprotein and clinically important acute phase proteins (alpha 1-acid glycoprotein, C-reactive protein).
- i) Glycoproteins: components of glycoproteins (overview of linkages between proteins and carbohydrates, N- and O-linked oligosaccharides).

5- Nucleotides and nucleic acids

- a) Chemistry of purines and pyrimidines; their types and structure
- b) Structure and functions of nucleotides and nucleosides (EXCLUDING metabolism of nucleotides).
- c) Natural and synthetic derivatives of purines and pyrimidines and their biomedical role.
- d) Structure, functions and types of nucleic acids (EXCLUDING metabolism)

6- Lipids and fatty acids

- a) Classification of lipids and their general biological functions.
 - b) Fatty acids: Definition; nomenclature; classification; chemical and physical properties; isomerism in fatty acids; role of saturated and unsaturated fatty acids in health and disease; role of trans fatty acids (*trans*-fats) in coronary heart disease; omega-3 and omega-6 fatty acids and the importance of their dietary use.
 - c) Nutritionally essential fatty acids and their functions
 - d) Eicosanoids and their biologic functions along with their significance in health and disease.
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- d) Bilirubin Metabolism: Degradation of heme, synthesis, hepatic uptake, conjugation, and excretion of bilirubin and fate of bilirubin in intestine.
- e) Hyperbilirubinemias: Causes of hyperbilirubinemias along with the acquired and congenital disorders leading to hyperbilirubinemias; jaundice and kernicterus.
- f) Hemoglobinopathies: Sickle cell anemia (biochemical cause and its clinical manifestations), haemoglobin C disease, haemoglobin SC disease and thalassemias.

9- Vitamins and Minerals

- a) General features of vitamins as essential nutrients
- b) Classification of vitamins according to their physico-chemical nature and biochemical functions
- c) Important dietary sources and recommended dietary allowances of vitamins.
- d) Intestinal absorption, transport and storage of vitamins.
- e) Mechanism of action of vitamins and their biochemical functions in body.
- f) Disorders associated with vitamin deficiency and hypervitaminoses.
- g) Minerals (sodium, potassium, chloride, calcium, phosphorus, magnesium, and sulfur) and trace elements (iron, zinc, selenium, iodine, copper, chromium, manganese, cadmium and fluoride) in human nutrition and their sources, absorption, transport, storage, and biochemical functions along with their recommended dietary allowances (RDA).

10- Nutrition

- a) Energy metabolism: Caloric value of food, Specific dynamic action (SDA) of food, respiratory quotient, metabolic rate (determination and factors affecting metabolic rate), basal metabolic rate (BMR) (measurement, calculation, and factors affecting BMR)
 - b) Balanced diet
 - c) Proteins in nutrition: Obligatory nitrogen loss, nitrogen balance, nutritionally essential amino acids and their role in body growth and nitrogen equilibrium, determination of comparative nutritional efficiency and quality of dietary protein, recommended dietary allowance of protein, protein energy malnutrition (kwashiorkor and marasmus).
 - d) Fats and lipids in nutrition: Fats as a source of energy, role of saturated and unsaturated fats in health and disease, effect of dietary intake of trans fats on health, and nutritionally essential fatty acids.
 - e) Carbohydrates in human nutrition: Protein sparing effect of carbohydrates, dietary carbohydrates and blood glucose along with the details of glycemic index, dietary fibers (types and biomedical importance).
 - f) Calculation of caloric requirement of a person and nutritional requirements in pregnancy, lactation, infancy, and old age.
 - g) Obesity and food additives (artificial sweeteners and flavor enhancers)
-

11- The Extracellular Matrix

- a) Collagen: Types and structure of collagen; biosynthesis & degradation of collagen; collagenopathies (Ehlers-Danlos syndrome (EDS) and Osteogenesis imperfecta (OI))
- b) Elastin: Structural characteristics of elastins; role of alpha1-antitrypsin in elastin degradation; major biochemical differences between collagen and elastin; genetic disorders associated with elastin like Williams-Beuren syndrome, supravalvular aortic stenosis, pulmonary emphysema, and aging of the skin.
- c) Fibrillin-1 as a protein of microfibrills; Marfan syndrome; fibronectin and its role in cell adhesion and migration; laminin as a protein component of renal glomerular and other basal laminas.
- d) Glycosaminoglycans (GAGs): Structure, classification, functions and distribution of GAGs; diseases associated with enzyme deficiencies of degradation of GAGs (mucopolysaccharidoses – Hunter syndrome & Hurler syndrome)
- e) Structure and functions of proteoglycans

Laboratory Experiments

- Introduction to use of laboratory facilities / equipment including safety measures
- Preparation of solutions:
 - ✦ Preparation of solutions (molar and normal) from various kinds of laboratory chemicals (solid and liquids);
 - ✦ Preparation of various kinds of buffer solutions;
 - ✦ Basic methods of laboratory calculations;
- Introduction and conversion of conventional and SI measuring units.
- Demonstration of buffer action, and determination of pH (by using indicators and pH meter).
- Qualitative analysis of carbohydrates and proteins.
 - ✦ Tests to detect monosaccharides of biomedical significance ---- glucose, fructose and Galactose (Benedict's test, Selivanoff's test, and Osazone test)
 - ✦ Tests to detect proteins / peptides / amino acids (Heat coagulation test, sulphosalicylic acid test, Heller's Ring test and Ninhydrin test)
- Collection and storage of urine samples for laboratory analysis, and physical and chemical analysis of urine to detect normal and abnormal constituents.
- Writing a urine report and interpretation of results of urine analysis.

SOURCE OF KNOWLEDGE

RECOMMENDED BOOKS

- Harper's Illustrated Biochemistry by Murrar RK, Granner DK and Rodwell VW, latest edition, McGraw Hill
- Lippincott's Illustrated Reviews: Biochemistry by Harvey R and Ferrier D, Latest edition, published by Lippincott Williams & Wilkins
- Marks' Basic Medical Biochemistry – A Clinical Approach, by Smith C, Marks AD, and Lieberman M. Latest edition, published by Lippincott Williams & Wilkins
- Practicals and Viva in Medical Biochemistry by Dandekar SP and Rane SA, latest edition, published by Elsevier.

REFERENCE BOOKS

- Textbook of Biochemistry with Clinical Correlations by Devlin TM, latest edition, published by Wiley-Liss
- Biochemistry by Berg JM, Tymoczko JL, and Stryer L, latest edition, published by W.H. Freeman and Company
- Clinical Chemistry and Metabolic Medicine by Martin A. Crook, latest edition, Edward Arnold (Publishers) Ltd
- Lehninger Principles of Biochemistry by David L Nelson and Michael M. Cox
- Tietz Textbook of Clinical Chemistry by Burtis CA and Ashwood ER published by Saunders.
- Fundamentals of Biochemistry Life at Molecular Level by Donald Voet, Judith G Voet and Charlotte W. Pratt

POLICY & GUIDELINES OF LEARNING STRATEGIES & STUDY SKILLS FOR MEDICAL STUDENTS

This document is a Summary written for the purpose of the study guides. For details refer to the document "A HANDBOOK OF POLICY & GUIDELINES OF LEARNING STRATEGIES & STUDY SKILLS FOR MEDICAL STUDENTS" available for the students at website, Bookshop and the Department of Medical Education.

STEPS TO STRATEGIC LEARNING:

1. Set realistic learning goals.

These goals serve as the driving force to generate and maintain the motivation, thoughts, and behaviour necessary to succeed. Set and use long-term occupational goals (you want to be a doctor) and short-term learning goals (you want to understand this new material).

2. Types of knowledge needed to be a strategic learner:

- Know yourself as a learner (learning preferences, talents, best times of day to study, ability to match study skills to learning task) this knowledge helps you set realistic yet challenging learning goals.
- Knowing the nature and requirements of different types of educational tasks.
- Knowing a variety of study skills and learning strategies and how to use them.
- Knowing the contexts in which what is being learned can be used now or in the future.

3. Use a variety of learning strategies:

- Manage your study environment,
- Coordinate study and learning activities,
- Keep your motivation for learning clear,
- Generate positive behaviours toward learning,
- Make new information meaningful to you,
- Organize and integrate new information with existing knowledge, or Re-organize existing knowledge to fit the new understanding and information.
- Place new information in a present or future context.

ACADEMIC HOURS BREAKDOWN AS PER PMDC REGULATIONS

TABLE OF SPACING AND HOURS OF SUBJECTS IN MBBS COURSE

SUBJECT	1 st year	2 nd year	3 rd year	4 th year	5 th year	Total Hours
BEHAVIOURAL SCIENCES	5 Hrs.	5 Hrs. 5 Hrs.		5 Hrs.	5 Hrs.	25 Hrs.
ISLAMIC & PAKISTAN STUDIES	15 Hrs.	15 Hrs. 10 Hrs.		10 Hrs.	-	50 Hrs.
ANATOMY	250 Hrs.	250 Hrs.	-	-	-	500 Hrs.
PHYSIOLOGY	250 Hrs.	250 Hrs.	-	-	-	500 Hrs.
BIOCHEMISTRY	100 Hrs.	100 Hrs.	-	-	-	200 Hrs.
PHARMACOLOGY	-	-	300 Hrs.	-	-	300 Hrs.
PATHOLOGY	15 Hrs.	25Hrs.	260 Hrs	200 Hrs	-	500 Hrs.
* FORENSIC MEDICINE	-	-	100 Hrs	-	-	100 Hrs.
** COMMUNITY MEDICINE	25 Hrs	25 Hrs	50 Hrs	150 Hrs	-	250 Hrs.
MEDICINE & Allied	25 Hrs.	30 Hrs.	120 Hrs	265 Hrs.	360Hrs	800 Hrs.
NUCLEAR MEDICINE	-	10 Hrs.	-	10 Hrs	-	20 Hrs.
EMERGENCY MEDICINE	-	-	-	-	-	-
MEDICINE ELECTIVE, *** PSYCHIATRY, DERMATOLOGY AND GENERAL PRACTICE	-	-	-	-	-	-
PAEDIATRIC MEDICINE	5 Hrs.	10 Hrs.	15 Hrs	50 Hrs	70 Hrs	150 Hrs.
SURGERY & ALLIED	25 Hrs.	30 Hrs.	120 Hrs	265 Hrs	360 Hrs	800 Hrs.
**** RADIOLOGY ORTHOPAEDICS, PAED.SURGERY, NEUROSURGERY, SURGERY ELECTIVE, EMERGENCY SURGERY & ANAESTHESIA	5 Hrs.	10 Hrs.	-	10 Hrs	15 Hrs	40 Hrs.
OBSTETRICS & GYNAECOLOGY	10 Hrs.	10 Hrs.	50 Hrs	100 Hrs	130 Hrs.	300 Hrs.
OPHTHALMOLOGY	5 Hrs.	10 Hrs.	15 Hrs	70 Hrs	-	100 Hrs.
OTORHINOLARYNGOLOGY(E.N.T.)	5 Hrs.	10 Hrs.	15 Hrs	70 Hrs	-	100 Hrs.
CLINICO-PATHOLOGICAL CONFERENCE	-	-	-	60 Hrs	-	60 Hrs.
Total	740 Hrs	790 Hrs	1060 Hrs	1265Hrs	940Hrs	4795Hrs

- * Bioethics will be taught in the Forensic Medicine.
 ** Biostatistics will be taught in Community Medicine.
 *** Behavioral Sciences will be taught in Psychiatry.
 **** Biophysics will be taught in Radiology.

Distribution of subjects Instructional contents into Theory and Practical learning.

Type of subject	Theory Content	Practical Skills Content
All Basic Sciences	50%	50%
Pre-Clinical Sciences (Pharmacology and Therapeutics, Forensic Medicine, Community Medicine, Pathology)	40%	60%
Clinical Sciences	30%	70%
Internship/House Job	0%	100%

Time Allocation To Curriculum Content= 7493 hours

Subject specified competencies	General competencies
80% 5994	20% 1499

Time Allocation To the Study Design(5184)

Instructions	Self Study
80% 4795	20% 1198

Time Allocation to Site of Study(4147)

Institution Based	Community Oriented
80% 3836	20% 959

Distribution of Marks in Evaluation

University Examination	Internal Assessments
90%	10%

Examination of Subject Based MBBS Curriculum

Total 100%

Internal Assessment 20%

University Examination 80%

Internal Assessment Theory	Internal Assessment Practical	University Assessment Theory	University Assessment Practical	Total
10%	10%	40%	40%	100%

Generic Competencies

Total Hours = 1499

Compulsory

- Pakistan Studies
- Islamiyat

ACADEMIC HOURS BREAKDOWN (ACMC)

CURRICULUM						
1ST YEAR MBBS M-19 ACADEMIC YEAR 2020						
S#	Subjects	PMDC Req. Study Hours	Lecture Hours	Tutorial Hours	Practical Hours	TOTAL STUDY HOURS
1	ANATOMY	250/ 503.5	1.5 x38= 57 45min x 38.5= 28.5 190+57+28.5= 275.5	1.5 x38= 57 57 x 2= 114	1.5 x 38= 57 57 x 2= 114	503.5
2	PHYSIOLOGY	250/304	5 x38= 190	1.5 x38= 57 57 x 1=57	1.5 x 38= 57 57 x 1=57	304
3	BIOCHEMISTRY	125/171	3 x 38= 114	1.5 x 20= 30	1.5 x 18= 27	171
4	ISLAMIYAT/ PAK. STUDIES	15/ 18	45 min x 24= 18	0	0	18
5	BEH. SCIENCES	5/5	45 min x 7= 5.25	0	0	5
6	PATHOLOGY	15/ 15	45 min x 20= 15 hrs	0	0	15
7	COM.MEDICINE	25/ 25	45min x 38= 28.5	0	0	25
8	MEDICINE & ALLIED	25/ 28.5	45min x 38= 28.5	0	0	28.5
9	PAEDS	5/5	45min x 7 = 5 hrs	0	0	5
10	SURGERY & ALLIED	25 / 25	45min x 33= 25	0	0	25
11	RADIOLOGY & ORHO	5/5	45min x 7=5 hrs	0	0	5
12	OBG	10/10	45min x 13=10 hrs	0	0	10
13	EYE	5/5	45min x 7=5 hrs	0	0	5
14	ENT	5/5	45min x 7=5 hrs	0	0	5
15	SELF DIRECTED LEARNING (SDL)	500 IN 5 YEAR	0	1.5 x38= 57	0	57
	TOTAL HOURS:	765/1182	729.75	258	198	1182 hrs

UHS TABLE OF SPECIFICATIONS

CONTENTS	SEQs	MCQs
1. Biochemistry of the cell, cell membrane, and membrane phenomena, water, pH and buffers	0.5	3
2. Extracellular matrix	0.5	2
3. Chemistry of carbohydrates	1.0	4
4. Chemistry of lipids	1.0	5
5. Chemistry of proteins and amino acids; plasma proteins including immunoglobulins	1.0	6
6. Chemistry of nucleotides and nucleic acids	0.5	3
7. Enzymes	1.0	5
8. Vitamins	1.5	7
9. Nutrition	0.5	2
10. Minerals and trace elements	0.5	4
11. Heme metabolism, porphyrins, porphyrias, jaundice, hemoglobin & myoglobin, hemoglobinopathies	1.0	4
Total items	09 SEQs	45 MCQs
Total Marks (5 marks for each SEQ and 1 mark for each MCQ)	45 marks	45 marks

25% of MCQs and SEQs should be clinically oriented or problem-based.

10% marks are allocated for "Internal Assessment"

Total Marks for Theory Paper: SEQ+ MCQ+ Internal Assessment=
45+ 45+ 10=100 Marks

Oral and Practical Examination carries 100 marks

Examination Component	Marks
A- Internal Assessment	10
B- Practical Notebook/Manual (Internal Examiner)	05
C- Viva voce a. External examiner: 25 Marks b. Internal Examiner: 25 Marks	50
D- OSPE a. Observed stations (6 Marks): There are two observed stations; 3 marks for each station – time allowed is 3 minutes for each observed station) b. Non-observed stations (16 Marks): There are eight non-observed stations; 2 marks for each station – time allowed is 2 minutes for each non-observed station.	22
E- Practical a. Principle, supposed calculation, etc: 4 Marks (External Examiner) b. Performance of the experiment: 4 Marks (Internal Examiner) c. Structured table viva: 5 Marks (External Examiner)	13

FORMAT OF PRACTICAL EXAM

Total Marks: 100

Total marks allocated to Oral and Practical Examination are 100

Internal Assessment: 10 Marks

General Viva (Theory Viva): 50 Marks

25 Marks are allocated to internal examiner and 25 marks to external examiner.

Practical Examination: 40 Marks

Practical examination comprises three components i.e. Yearly Workbook, OSPE and Experiment.

A- Yearly Workbook: 5 Marks (Internal Examiner)

B- OSPE: 22 Marks

OSPE comprises 10 stations (two observed stations carrying 3 marks each and 8 non-observed stations 2 marks each)

Observed Stations (3 minutes for each station)

- i. Tests for carbohydrates and proteins/ peptides / amino acids of clinical importance: 1 station
- ii. Test for normal constituents and abnormal constituents of urine: 1 station

List of Tests for Observed Stations:

- i. Benedict's Test.
- ii. Selivanoffs Test.
- iii. Identification of osazones of monosaccharides.
- iv. Biuret Test.
- v. Ninhydrin test.
- vi. Heller's ring test.
- vii. Sulphosalicylic acid test.
- viii. Heat Coagulation Test.
- ix. Rothras Test.
- x. Hays Test.

Non-Observed Stations (2 minutes for each station)

- i. Carbohydrate chemistry, biologic significance of carbohydrates and clinical implications of carbohydrates.
- ii. Chemistry of proteins & amino acids, plasma proteins, and clinical implications of proteins.
- iii. Chemistry of lipids, biologic significance of lipids, and clinical implications of lipids and lipoproteins.
- iv. Interpretation of normal and abnormal constituents of urine.
- v. Laboratory equipment/techniques (pH meter and laboratory glassware).
- vi. Preparation of solutions.

C- Experiment: 13 marks

- Principle/supposed calculations of the experiment: 4 Marks (External Examiner)
- Performance of experiment. 4 Marks (Internal Examiner)
- Table Viva: 5 Marks (External Examiner)

INTERNAL ASSESMENT POLICY

The assessment policy of Avicenna Medical College clearly reflect that the assessment must covers knowledge, skills and attitude to be acquired by a medical student at the end of the each Professional Year and the entire MBBS Course.

- Theoretical knowledge is assessed by means of MCQs, SEQs, Structured Viva, CBD Tutorials and Pre-Test Tutorials.
- Professional and Clinical Skills are assessed through OSPE, OSCE, Practical Exams and Long and Short Cases.
- Attitudes are assessed through OSPE, OSCE, Practical Exams, Long Cases, Short Cases and Vivas

Assessment Procedures

Performance of students will be assessed as follows:

a. Programmatic Assessment During Academic Year: Grand Tests and Revision Test

It will incorporate both formative and summative assessment for all academic years.

1) Formative Assessments:

These are Conducted throughout the academic year. These are low stake examinations with feedback to improve student learning, leading to better performance in summative assessments and the UHS Professional Examinations. At Avicenna Medical College the formative assessment is in the form of Grand Tests, Revision Tests, Research, Tutorials, Assignments, Long Cases and Short Cases presentations etc.

2) Summative Assessments:

These are conducted at the end of each term, consisting of Session Examinations conducted on the pattern of UHS annual Prof Exams. These consist of One best type of MCQs and SEQs which has two to three parts require written short essay responses from the students. The MCQs, the SEQs are mostly clinical and scenario based and designed to test the concepts.

b. End of Term Assessment

This will be summative carried out at the end of each academic year.

Assessment Tools:

Various tools selected are as follows according to UHS guidelines.

a. Written Assessment

1) Multiple Choice Question (MCQ)

MCQs are extensively used for in both formative and summative assessment owing to their ability to offer a broad range of examination items that incorporate several subject areas. They are the one best type of MCQs and designed to test factual knowledge, understanding and clinical reasoning.

A multiple choice item consists of a problem, known as the stem, and a list of suggested solutions, known as the choices. The choices consist of one correct or best choice, which is the answer, and incorrect or alternatives, known as distractors. Each MCQ carries one mark. The number of MCQs vary in the Grand Tests, Revision Test and the Session Exams as needed.

2) Short Essay Questions (SEQs)

Written assessment formats are the most widely used assessment methods in medical education. Learning outcomes which are mainly based on cognitive domains (knowledge) can be assessed by them.

The SEQs have a statement or clinical scenario followed by two to three questions, which require application of concepts and are thought provoking.

b. Assignments and Presentations

Every month in various departments, topics of clinical significance are given to the students for assignment and presentations for small group discussions (SGD) sessions. These will be a part of formative assessment. Clinico- Basic and Clinico-Pathological Conferences (CPC) are held for preclinical and clinical years, respectively.

c. Practical/Clinical Assessment

1) Objective Structured Practical Exam (OSPE)

A formative OSPE will be held during terms and summative at the end of year. It will consist of laboratory-based and practical questions related to the learning objectives covered in the course. The students will be given feedback after formative assessment.

2) Objective Structured Clinical Exam (OSCE):

A formative OSCE will be held during the term and summative at the end of year. It will consist of clinical and practical questions related to the learning objectives covered in the course. The students will be given feedback after formative assessment.

3) Long Case

At the end of fourth and final year each subject will be assessed by a long case. Daily encountered problems will be the case scenarios for which students will be trained during formative assessment in clinics.

4) Structured Viva

At the end of examination an integrated viva will be taken in which relevant specialists will sit and ask questions. There will be guidelines for examiners to follow.

5) Log Books

In case of log books, required entries will be countersigned by observer. It will be criterion referenced whereas the students will have to fulfill the following criteria: for example assignments, case presentations in wards, departmental log books.

6) Observation

Internal Assessment

The progress report from teachers will have separate column about behavior and attitude of students in each term in addition to academic record with minimum pass of 50%.

Internal Assessment

The progress report from teachers will have separate column about behavior and attitude of students in each term in addition to academic record with minimum pass of 50%.

The question papers are prepared in secrecy and approved by the Principal. The department then gets sufficient copies made in secrecy and submits the same to the directorate of Medical Education 24 hours before the scheduled test / exam. On the day of the examinations these papers along with the answer sheets are collected from the DME and taken straight to the examination hall where they are opened and are distributed to the students for attempting the question.

After the papers have been solved, the MCQs are marked immediately and the SEQs marked and submitted within two days (except for revision tests where the results have to be submitted within 24 hours) from here, the assessment system as envisaged in the earlier paragraphs is applied.

Every test / examination is supported by keys both for MCQs and SEQs. Adequate time is air marked for key discussion in which the member of the faculty explains to the class how in fact they should have attempted the MCQs and SEQs. This gives an opportunity to the class to make the assessment of how they have attempted the paper and what mistakes they have made and how not to repeat them in future.

Avicenna Medical College endeavors to implement the assessment system of the UHS subject based curriculum as it is in vogue at present by implementing the curriculum with the basic ingredients of assessment implementation as follows:

- a. Grand Test
- b. Revision Test
- c. Session Examinations
- d. OSPE
- e. OSCE
- f. Viva
- g. Log books / Copies
- h. Assignments
- i. Research work
- j. Tutorials
- k. Long case
- l. Short case

Practical Assessments

The regulations for the preparation and conduct of practical assessments vary between subject areas. Where regulations have not been specified they have to be put up to the Academic Committee.

Clinical Assessment

The clinical assessment is carried out in the following forms:

- Scenario based Clinical Oriented MCQs
- Scenario/Clinical based SEQs/SAQs
- On-Patient training viva
- Ward tests
- OSPE
- OSCE

Assessment Framework

The framework for assessment involves the University guideline of:

- Pass marks 50%
- Equal marks for theory and for practical
- Internal Assessment 10% to be awarded by the college
- Allocation of marks as under

Allocation of Marks

Sr.	Subject	Marks Theory	Marks Practical / OSPE / OSCE	Remarks
1	Anatomy	100	100	Internal assessment 10%
2	Physiology	100	100	Internal assessment 10%
3	Biochemistry	100	100	Internal assessment 10%
4	Islamiyat & Pak Studies	100	-	
5	Pathology	150	150	Internal assessment 10%
6	Pharmacology	150	150	Internal assessment 10%
7	Forensic Medicine	100	100	Internal assessment 10%
8	Community Medicine	150	150	Internal assessment 10%
9	Special Pathology	150	150	Internal assessment 10%
10	ENT	100	100	Internal assessment 10%
11	Ophthalmology	100	100	Internal assessment 10%
12	Medicine	200	300	Internal assessment 10%
13	Surgery	250	250	Internal assessment 10%
14	Gynae	150	150	Internal assessment 10%
15	Paeds	100	100	Internal assessment 10%
16	Behavioral Sciences	100	100	Internal assessment 10%

Grand Test: The syllabus of each subject for which the table of specification has been formulated in detail is divided into various topics and grand tests are held after the topic has been covered in theory, practical and in tutorial classes. The grand test is the first exposure of the students towards assessment of his/her knowledge and skills and is held once only for each topic covered as the syllabus goes along. The grand test has the following ingredients:

- | | |
|----------------|-----------|
| a. MCQs | 45% marks |
| b. SEQs | 45% marks |
| c. Viva / Copy | 10% marks |

Note: The DME maintains a record of all grand tests along with the keys to the MCQs and SEQs and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills.

Revision Test: The revision tests are designed to precede every session exam and they are aimed at breaking up the syllabus and covering the same in small bits so that the students can have exhaustive study of the portion of the syllabus to be tested upon. The schedule of revision test is decided jointly by the Assessment Committee and the students' class representatives so that the student input is brought into consideration. In this case the students' representatives include the weak students, the average ones and good students. And this mix ensures that adequate time is provided to weak students to do exhaustive studies.

Depending upon the syllabus covered. 8 to 10 revision tests are held in preparation for the session exams. The contents of the revision tests are:

- | | |
|--------------|----------|
| a. MCQs (30) | 30 marks |
| b. SEQs (6) | 30 marks |

Note: The DME maintains a record of all grand tests along with the keys to the MCQs and SEQs and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Four sets of revision tests are held annually. One each before the early session, mid-session, late session and/or send-up examination.

Session Examination: As per the annual planner and schedule, three session exams are held every year and these are generally held in March, June and August each year. The late session examination is held in August and as an extra opportunity for the students to qualify the send-ups for the border line cases is only held one month before the prof exam. The following session exams are held:

- | | |
|------------------------------|-----------------|
| a. Early Session Examination | 50% of syllabus |
| b. Mid-Session Examination | 85% syllabus |
| c. Late Session Examination | 100% syllabus |

d. Send-up Examination

For the very weak

The details of the session examination are as under

a. Theory - 50% marks divided as under

- | | |
|--------------------|---------------------|
| 1) MCQs | 45% of theory marks |
| 2) SEQs | 45% of theory marks |
| 3) Log book / copy | 10% of theory marks |

b. OSPE/OSCE/Viva - 50% marks

Note: The DME maintains a record of all session exams along with the keys to the MCQs and SEQs and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Four sessions examinations are held annually.

OSPE (Objective Structured Practical Examination): This depicts the scenario based clinical setting and various stations are arranged. The student has to go from one station to the other to answer the question or to display his practical skill. This is aimed at assessing both the knowledge and skills of the student. The format and the standard of the scenario based problems/questions are in line with the standards prescribed by the University of Health Sciences.

Note: The DME maintains a record of all OSPEs along with the keys to the OSPE and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Sample OSPE paper is attached as **Annexure-B**. Since OSPE is a part of session exams therefore four sessions of OSPE are held each year.

OSCE (Objective Structured Clinical Examination): This depicts the scenario based clinical setting and various stations are arranged. The student has to go from one station to the other to answer the question or to display his clinical skills. This is aimed at assessing both the knowledge and skills of the student. The format and the standard of the scenario based problems/questions are in line with the standards prescribed by the University of Health Sciences.

Note: The DME maintains a record of all OSCEs along with the keys to the OSCE and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Sample OSCE paper is attached as **Annexure-C**. Since OSCE is a part of session exams therefore four sessions of OSCE are held each year.

Viva: This is an oral examination to which the student is subject to be examined by two members of the Faculty one acting as the internal examiner and the other acting as the external examiner. The

student is grilled in these oral questioning sessions. The student is asked on various clinical aspects to ascertain his knowledge.

Note: The DME maintains a record of all Viva and the results. These results are used for the calculation and assessment of each student in terms of their acquisition of knowledge and skills. Since Viva is a part of session exams therefore four sessions are held each year.

Copies and Log Books: Whereas copies are maintained in 1st 2nd and 3rd year of the basic sciences, the log books are maintained for the 4th year and the final year for the clinical subjects. The completion of the copies and the log books is mandatory and these have to be produced before the internal and the external examiner on all session examinations and annual Prof exam. Copies and log books carry 10 marks and are a valid record for the purpose of assessment besides being a record of the students' clinical exposure.

Assignments: These are normally generated by the Community Medicine and the Department of Medicine in which the departments give assignments for the students to be completed in their own time. Assignments are included as a part of practical assessment and left to the discretion of the Head of Department.

Research work: The Department of Community Medicine as a part of its Curriculum train the students in carrying out research. These research projects are covered in Standard 12 – Research & Scholarship and research records are available in the Department of Community Medicine. Research works are included as a part of practical assessment and left to the discretion of the Head of Department.

Tutorials: These are held before every grand test to clear the concepts of the students on the subject. The performance of the students in the tutorials is included in the viva assessment.

Long Case and Short Case: This system of OSPE and OSCE is to ascertain the clinical acumen of the student. These are held with the session examinations and form of a part of the practical/clinical assessment.

Notification of Results

The Assessment Committee will display result on notice board as well as the results are sent through SMS to the father of the student.

Results as hard copy will also be sent to parents after each term.

Conducting Examinations and Assessments

Conducting Examinations and Assessments According to University of Health Sciences Guidelines. In all examinations and assessments, the conditions underpinning the examination or assessment shall be displayed on concerned department notice boards to students prior to the examination or assessment taking place.

***Note:** Any requests for special assistance example reader/writer are to be made prior to the examination or assessment.*

- g. Introducing students to the system of simulated and standardized patients

Response to Parents:

Parents are kept informed about the result of each student. The results are dispatched as follows:

- | | |
|--------------------------|---|
| a. Grand Test: | by SMS |
| b. Revision Test: | by SMS |
| c. Session Examinations: | as a report containing the results of all grand tests of all subjects for that class. Three session exam reports are sent. Reports of each session for each class are attached as Annexure-I . |
| d. OSPE | Included in the session result |
| e. OSCE | Included in the session result |
| f. Viva | Included in the session result |
| g. Log books / Copies | Included in the session result |
| h. Assignments | Included in the session result |
| i. Research work | Included in the session result |
| j. Tutorials | Included in the session result |
| k. Long case | Included in the ward test / clinical test |
| l. Short case | Included in the ward test / clinical test |

Avicenna Medical College								
2nd Term Test Schedule 1st Year MBBS M- 19								
Week	No. Of Test	Date	Day	Time	Subject	Test	Topic	Reference
16th	19	4-May-20	Mon	8.00-10.00	Physiology-5	Grand Test	Heart - 1	Guyton ch : 9,10 Ganong ch : 30,31
16th	20	7-May-20	Thur	8.00-10.00	Gen. Anatomy-2	Grand Test	Whole syllabus of Gen. Anatomy	Whole syllabus
17th	21	11-May-20	Mon	8.00-10.00	Gross Anatomy-1	Thorax 1st Substage	Thoracic wall, pleura, Lungs,Breast	KLM pg: 72-127
17th		14-May-20	Thur	8.00-10.00	All Subject	Time divided	Lecture	
18th	22	18-May-20	Mon	8.00-10.00	Biochemistry-6	Grand Test	Lipid Chemistry	Lippincot Ch:16 pg: 181-182, CH: 17 pg:201-203,208,209,210,213,215 Lippincot Ch:18 pg:
18th	23	21-May-20	Thur	8.00-10.00	Physiology-6	Grand Test	Heart - 2	Guyton ch : 9-13 Ganong ch : 29,30
Eid-ul-Fitar Holidays: 22-May -20 To 26-May-20								
19th		28-May-20	Thur	8.00-10.00	All Subject	Time divided	Lecture	
20th	24	1-Jun-20	Mon	8.00-10.00	Biochemistry-7	Grand Test	Enzymes	Lippincot Ch:5 Harper Ch 7,8,9
20th	25	4-Jun-20	Thur	8.00-10.00	Gen. Embryology-2	Grand Test	4th-8th week, Fetal Period, Placenta and Fetal membranes	KLM CH. : 5, 6, 7
21st	26	8-Jun-20	Mon	8.00-10.00	Physiology-7	Grand Test	Circulation-1	Guyton ch : 14, 15, 16 Ganong ch : 31,32
21st	27	11-Jun-20	Thur	8.00-10.00	Gross Anatomy-2	Thorax 2nd Substage	Mediastinum, Heart, Great vessels	KLM p: 127-179
22nd	28	15-Jun-20	Mon	8.00-10.00	Gross Anatomy-3	Final Stage	THORAX Whole Syllabus	KLM pg: 291-403
22nd	29	18-Jun-20	Thur	8.00-10.00	Biochemistry-8	Grand Test	Heme & porphyria	Lippincot Ch:3,21 Harper Ch. 6 ,31
23rd	30	22-Jun-20	Mon	8.00-10.00	Gen Histology-2	Grand Test	CVS, Muscle, Connective Tissue, Respiratory	Laiq p: 5,6,7,8,10,13,17 Janqeiaara: 96-153, 179-84, 182-202
23rd	31	25-Jun-20	Thur	8.00-10.00	Physiology-8	Grand Test	Circulation-2	Guyton ch : 17, 18 ,19 Ganong ch :32
24th	32	29-Jun-20	Mon	8.00-10.00	Gross Anatomy-4	LL 1st Substage	Ant & Med Comp of Thigh, Hip bone, Femur	KLM p: 666-676,684-685,691,704-721
24th		2-Jul-20	Thur	8.00-10.01	All Subject	Time divided	Lecture	
25th	33	6-Jul-20	Mon	8.00-10.00	Biochemistry-9	Grand Test	Vitamins	Lippincot Ch:28 Harper Ch; 44
25th	34	9-Jul-20	Thur	8.00-10.00	Physiology-9	Grand Test	Circulation-3 : Cardiac Failure, Heart valve, Shock, Exercise	Guyton ch : 20,21,22 Ganong ch : 32
26th	35	13-Jul-20	Mon	8.00-10.00	Gross Anatomy-5	LL 2nd Substage	Gluteal region, Post Thigh, Hip Joint, Popliteal fossa	KLM pg :721-743,744-746,763,785-792,818-820
26th	36	16-Jul-20	Thur	8.00-10.00	Physiology-10	Grand Test	Respiration 1 : Pulmonary circulation, Pulmonary Ventilation	Guyton ch : 23,24,38 Ganong ch : 34
Summer Vacation : 19 July 20 To 2-Aug-20								
27th		3-Aug-20	Mon	8.00-10.01	All Subject	Time divided	Lecture	
27th	37	4-Aug-20	Tue	8.00-10.00	Gen Embryology-3	Grand Test	Skeletal, Muscular, Development oflimbs	KLM Embryo: Chapter 14, 15, 16
27th	38	6-Aug-20	Thur	8.00-10.00	General Histology-3	Grand Test	Nervous System, Integumentary System, Lymphoid	Laiq:ch : 11,14,15 Janqeuaara: 226-48, 161-74, 182, 185-7, 316-31
Mid Session Exam : Start From 28-Aug-20 to 3-Sep-20								
30th	1	27-Aug-20	Thur	8.00-11.00	MSE	ANATOMY	Entire Syllabus Covered	
31st	2	31-Aug-20	Mon	8.00-11.00	MSE	BIOCHEMISTRY	Entire Syllabus Covered	
31st	3	3-Sep-20	Thur	8.00-11.00	MSE	PHYSIOLOGY	Entire Syllabus Covered	
End Of 2nd Term								

<div> <div>Avicenna Medical College</div> <div>Prof Gulfireen Waheed</div> </div>								
3rd Term Test Schedule 1st Year MBBS M- 19								
Week	No. Of Test	Date	Day	Time	Subject	Test	Topic	Reference
31st		4-Sep-20	Fri	8.00-10.00	OSPE IN 3 BATCHES			
31st		5-Sep-20	Sat	8.00-10.00	OSPE IN 3 BATCHES			
32nd		7-Sep-20	Mon	8.00-10.00	OSPE IN 3 BATCHES			
32nd		10-Sep-20	Thur	8.00-10.00	All Subject	Time divided	Lecture	
33rd	39	14-Sep-20	Mon	8.00-10.00	Gross Anatomy-6	LL 3rd Substage	Ant, post, lat. comp of Leg, Knee joint, Sup Inf TF Joints, Tibia, Fibula	KLM pg :-748-767,793-806
33rd	40	17-Sep-20	Thur	8.00-10.00	Biochemistry-10	Grand Test	Minerals	Lippincot Ch: 29 Harper Ch: 44
34th	41	21-Sep-20	Mon	8.00-10.00	Physiology-11	Grand Test	Respiration 11 :	Guyton ch : 39-43 Ganong ch : 34,35
34th	42	24-Sep-20	Thur	8.00-10.00	Gross Anatomy-7	LL 4th Substage	Foot, Ankle joint, joints of foot, Cutaneous nerve supply, Venous & Lymphatic drainage of LL, Radiology, Surface anatomy	KLM pg : 681-683,688-689,691-703,768-784,806-817,825-827
35th	43	28-Sep-20	Mon	8.00-10.00	Gross Anatomy-8	Final Stage LL	Whole Lower Limb	KLM p: 666-827
35th	44	1-Oct-20	Thur	8.00-10.00	Embryology-4	Grand Test	Integumentary, Teratogenesis	KLM CH. : 19, 20
36th	45	5-Oct-20	Mon	8.00-10.00	Physiology-12	Grand Test	varied environments + skin body temp ture + sport physiology	Guyton Ch : 44,45,74,85
36th	46	8-Oct-20	Thur	8.00-10.00	Biochemistry-11	Grand Test	Nutrition & Obesity	Lippincot Ch:26-27 Harper Ch: 43
37th	47	12-Oct-20	Mon	8.00-10.00	General Histology-4	Grand Test	Whole syllabus of histology	Whole syllabus
End Of Third Term								
Late Session Exam								
					Late Session Exam	ANATOMY		Entire Syllabus Covered
					Late Session Exam	PHYSIOLOGY		Entire Syllabus Covered
					Late Session Exam	BIOCHEMISTRY		Entire Syllabus Covered
Send Up								
End Of Third Term								
Prof Exam								