Course Content

(Based on Competency Table published by Medical Council of India.Students/Teachers are directed to r
published on MCI Website for details)

Subject: Biochemistry **Year: First MBBS**

Competency No.	Topics & Subtopics
1	**Basic Biochemistry**
1.1 Describe the molecular and functional organization of a cell and its subcellular components.	Molecular and functional organization of cell and its sul
2	**Enzymes**
2.1 Explain fundamental concepts of enzyme, isoenzyme, alloenzyme, coenzyme & co-factors. Enumerate the main classes of IUBMB nomenclature.	Biochemical nature of enzyme, isoenzyme, alloenzyme, IUBMB enzyme classification
2.2 Observe the estimation of SGOT & SGPT	Estimation of SGOT (AST)& SGPT (ALT) with its normal r
2.3 Describe and explain the basic principles of enzyme activity	Mechanism of enzyme action, factors affecting enzyme kinetics with special reference to V_{max} & k_m.
2.4	Enzyme inhibition. Various inhibitors as drugs and poiso

Competency No.	Topics & Subtopics
Describe and discuss enzyme inhibitors as poisons and drugs and as therapeutic enzymes	
2.5 Describe and discuss the clinical utility of various serum enzymes as markers of pathological conditions.	Diagnostic and therapeutic importance of various serum
2.6 Discuss use of enzymes in laboratory investigations (Enzymebased assays)	Analytical uses of Enzymes in laboratory investigations
2.7 Interpret laboratory results of enzyme activities & describe the clinical utility of various enzymes as markers of pathological conditions.	Interpret various serum enzymes of liver & biliary tract, in various disorders
3	**Chemistry & Metabolism of Carbohydrates**
3.1 Discuss and differentiate monosaccharides, di-saccharides and polysaccharides giving examples of main carbohydrates as energy fuel, structural element and storage in the human body	Classification of carbohydrates with examples and funct examples as energy fuel, glycosides and its therapeutic examples and importance, polysaccharides with examp glycogen, structural elements like glycosaminoglycan's starch, glycemic index, and dietary fiber. Clinical import

3.2 Describe the processes involved in digestion and assimilation of carbohydrates and storage. **3.3**	Digestion & absorption, transport and storage of carbo sucrase deficiency disorders

Competency No.	**Topics & Subtopics**
Describe and discuss the digestion and assimilation of carbohydrates from food.	
3.4 Define and differentiate the pathways of carbohydrate metabolism(glycolysis, gluconeogenesis, glycogen metabolism, HMP shunt).	Pathway, energetics, regulation & clinical diseases / dis Rappaport Leubering cycle, Gluconeogenesis, Glycogen pathway , Uronic acid pathway, Galactose & Fructose m
3.5 Describe and discuss the regulation, functions and integration of carbohydrate along with associated diseases/disorders.	
3.6 Describe and discuss the concept of TCA cycle as a amphibolic pathway and its regulation.	TCA cycle Pathway,energetics, regulation & its concepts
3.7 To be clubbed with 3.4 & 3.6 Describe the common poisons that inhibit crucial enzymes of carbohydrate metabolism (eg: fluoride, arsenate)	Common poisons that inhibit crucial enzymes of carboh Iodoacetate, fluoride & arsenite as poisons that inhibit Fluoroacetate, arsenite & malonate as poisons that inhi

3.8 & 3.10 **3.8:** Discuss and interpret laboratory results of analytes associated with metabolism of carbohydrates. (to be clubbed with comp no 11.17- Diabetes Mellitus) **3.10** Interpret the results of blood glucose levels and other Laboratory investigations related to disorders of carbohydrate metabolism.	Interpretation of the results of blood glucose, Glycated guidelines in Diabetes mellitus including gestational dia investigation like urinary glucose, urinary ketone bodies Interpretation of the results of blood & urinary galactos Interpretation of blood G6PD levels

Competency No.	**Topics & Subtopics**
3.9 Discuss the mechanism and significance of blood glucose regulation in health and disease.	Regulation of blood glucose in fed and fasting state in n diabetes mellitus.
4	**Chemistry & Metabolism of Lipids**
4.1 Describe and discuss main classes of lipids (Essential/nonessential fatty acids, cholesterol and hormonal steroids, triglycerides, major phospholipids and sphingolipids) relevant to human system and their major functions.	Definition & classification of lipids including classificatio nomenclature, numbering, functions & biological impor acids, cholesterol , hormonal steroids, triglycerides, ma sphingolipids

4.2 Describe the processes involved in digestion and absorption of dietary lipids and also the key features of their metabolism	Digestion, absorption and transport of lipids along with malabsorption. Metabolism of fatty acids (β-oxidation of even and odd energetics and disorders associated with oxidation of fa ketone bodies, its significance, regulation and associate In brief de novo fatty acid biosynthesis- site & organs, p product formed & regulatory steps. Biosynthesis of triacylglycerol and fate of triacylglycerol its significance and regulation, Metabolic role of adipos transport and storage like fatty liver. In brief Cholesterol biosynthesis- site & organs, precurs & regulatory step, metabolic fate & excretion

Competency No.	**Topics & Subtopics**
4.3 Explain the regulation of lipoprotein metabolism & associated disorders.	Metabolism of various lipoproteins and hyperlipoprotei hypolipoproteinemiasabetalipoproteinemias & Tangier
4.4 Describe the structure and functions of lipoproteins, their functions, interrelations & relations with atherosclerosis	Classification structure and functions of lipoproteins- (T Metabolic interrelationship between various lipoprotei transport of cholesterol and reverse cholesterol transp clubbed with 4.3)

4.5 & 4.7 Interpret laboratory results of analytes associated with metabolism of lipids	Various lipid profile tests with their biological reference results in various disorders like hyper/hypolipoproteine syndrome, disorders of thyroid etc.
4.6 Describe the therapeutic uses of prostaglandins and inhibitors of eicosanoid synthesis.	Various eicosanoid classes (prostaglandins, leukotriene functions. Key features of synthesis of eicosanoids and therapeutic uses of prostaglandins
4.7 Interpret laboratory results of analytes associated with metabolism of lipids.	**Same as 4.5**
5 **5.1** Describe and discuss structural organization of proteins.	**Chemistry and Metabolism of Proteins** General nature of amino acid, classification and importa examples, peptide bond formation, biologically importa protein structure including disulfide & weak bonds with significance.

Competency No.	**Topics & Subtopics**
5.2 Describe and discuss functions of proteins and structurefunction relationships in relevant areas e.g. hemoglobin and selected hemoglobinopathies	Definition, various classifications with examples and fu proteins, structure - function relationship of proteins lik hemoglobin

5.3 Describe the digestion and absorption of dietary proteins.	Digestion, absorption and transport of dietary proteins Hartnup disease, cystinuria & glycinuria.
5.4 Describe common disorders associated with protein metabolism.	Role of transamination & deamination reactions in meta formation of ammonia with their clinical significance. Transport of ammonia, pathway of urea cycle, its signifi disorders associated with urea cycle. Metabolic pathways for Glycine, Phenylalanine & Tyros acids (Methionine, Cysteine & Cystine) and branch chai & Leucine), their role in biosynthesis of variety of speci metabolic disorders For Tryptophan- Only important biomolecules formed &
5.5 Interpret laboratory results of analytesassociated with metabolism of proteins.	Interpret laboratory results of protein metabolism for e Levels of various metabolites in blood or urine in metab disorders, Phenylketonuria, Tyrosinemia, Alkaptonuria, cystinuria & homocystinuria
6	**Metabolism and Homeostasis**
6.1 Discuss the metabolic processes that take place in specific organs in the body in the fed and fasting states.	Integration of carbohydrate, protein and lipid metaboli level with its significance, Metabolic processes with rol and starvation states.

Competency No.	**Topics & Subtopics**

6.2 Describe and discuss the metabolic processes in which nucleotides are involved.	Important steps in de novo biosynthesis of purine and p regulation, enzymes of the nucleotide biosynthesis that salvage pathway for the synthesis of purine nucleotides of purine and pyrimidine nucleotides.
6.3 Describe the common disorders associated with nucleotide metabolism.	Disorder of nucleotide metabolism like gout, Lesch-Nyh diagnostic tests & biochemical mechanism of nutritiona
6.4 Discuss the laboratory results of analytes associated with gout & Lesch-Nyhan syndrome.	Lab results of analytes related with gout & Lesch-Nyhan blood & urine and presence of urate crystals in synovial blood
6.5 Describe the biochemical role of vitamins in the body and explain the manifestations of their deficiency	Sources, biochemical functions, daily requirement and d soluble vitamins (Vitamin A, D, E & K). Sources, biochemical functions and deficiency manifest (Thiamine, Riboflavin, Niacin, Pantothenic acid, Pyridox and vitamin C)
6.6 Describe the biochemical processes involved in generation of energy in cells.	Electron transport chain, mechanism of oxidative phosp theory), substrate level phosphorylation, Uncouplers & chain , shuttle systems for transport of extra-mitochond
6.7 Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these.	Acids, bases and buffers, mechanism of action of buffer normal pH of body fluids. Role of blood buffers, respirat of blood pH. Disorders associated with blood pH (acidosis and alkalo mechanisms, anion gap & its clinical importance.

Competency No.	Topics & Subtopics
	Total body water and its compartmental distribution, va potassium and chloride, their distribution and clinical co level alterations, maintenance of normal water and elec associated with water and electrolyte imbalance.
6.8 Discuss and interpret results of Arterial Blood Gas (ABG) analysis in various disorders.	Interpretation of results of arterial blood gas (ABG) ana
6.9 Describe the functions of various minerals in the body, their metabolism and homeostasis.	Dietary food sources, daily requirement, biochemical fu homeostasis of: Calcium, phosphorus & magnesium, tra iodine, iron, manganese, selenium & zinc)
6.10 Enumerate and describe the disorders associated with mineral metabolism.	Clinical conditions related to plasma level alterations of magnesium Trace elements (copper, fluoride, iodine, ir
6.11 Describe the functions of heme in the body and describe the processes involved in its metabolism and describe porphyrin metabolism	Structure and functions of hemoglobin, role of 2,3-bispl binding and delivery, biosynthesis of heme (iron contai functions in the body, disorders of heme biosynthesis (v catabolism of heme, various types of jaundice

6.12 Describe the major types of hemoglobin and its derivatives found in the body and their physiological/ pathological relevance.	Types of normal human hemoglobin, types of normal & hemoglobin, various hemoglobinopathies: Sickle cell an

Competency No.	**Topics & Subtopics**
6.13 Describe the functions of the kidney, liver, thyroid and adrenal glands.	1. Functions of liver, disorders& liver function tests
6.14 Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands).	2. Functions of kidney, disorders& kidney function tests 3. Functions of Thyroid, disorders& thyroid function test
6.15 Describe the abnormalities of kidney, liver, thyroid and adrenal glands.	4. Functions of Adrenals , disorders& Adrenal function te
7	**Molecular Biology**
7.1 Describe the structure and functions of DNA and RNA and outline the cell cycle	Structure and functions of nucleotides, biologically imp importance, major types of synthetic analogs of nucleo clinical significance, structure and functions of DNA and

7.2 Describe the processes involved in replication & repair of DNA and the transcription & translation mechanisms.	Replication of DNA in Eukaryotes, inhibitors of DNA rep repair systems of DNA Transcription in Eukaryotes and posttranscriptional mo transcription & its significance Genetic code and wobble hypothesis, Translation in Eu protein folding and posttranslational modifications
7.3	Causes and types of genetic mutations with examples. Regulation of Eukaryotic gene expression

Competency No.	**Topics & Subtopics**
Describe gene mutations and basic mechanism of regulation of gene expression **7.4** Describe applications of molecular technologies like Recombinant DNA technology, PCR in the diagnosis and treatment of diseases with genetic basis.	Recombinant DNA technology, restriction endonuclease recombinant DNA and its applications in medicine, DNA southern blotting, northern blotting & western blotting reaction and its application in medical diagnosis and tre
7.5 Describe the role of xenobiotics in disease	Mechanisms of biotransformation of xenobiotics & asso
7.6 Describe the anti-oxidant defense systems in the body.	Enzymatic and non-enzymatic antioxidant defense syste

7.7 Describe the role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and atherosclerosis.	Free radical, biological sources of reactive oxygen speci oxidative stress, roll of oxidative stress in cancer, diabet
8	**Nutrition**
8.1 Discuss the importance of various dietary components and explain importance of dietary fiber.	Importance of carbohydrates, lipids, proteins & vitamin types of dietary fibers and their importance in the diet.
8.2 Describe the types and causes of protein energy malnutrition and its effects.	Protein energy malnutrition, Kwashiorkor and Marasmu

Competency No.	**Topics & Subtopics**
8.3 Provide dietary advice for optimal health in childhood and adult, in disease conditions like diabetes mellitus, coronary artery disease and in pregnancy.	Balanced diet in adult, in childhood and in pregnancy fo diabetes mellitus & coronary heart disease
8.4 Describe the causes (including dietary habits), effects and health risks associated with being overweight/ obesity	Causes, effects and health risk associated with overweig

8.5 Summarize the nutritional importance of commonly used items of food including fruits and vegetables (macro-molecules & its importance)	Nutritional importance of commonly used items of food fish, fruits and vegetables and their normal dietary requ
9	**Extracellular Matrix**
9.1 List the functions and components of the extracellular matrix (ECM).	Types & functions of the extracellular matrix (ECM), Co proteoglycans, glycoproteins & major proteins of ECM
9.2 Discuss the involvement of ECM components in health and disease.	Disorders associated with components of ECM like Oste Syndrome , Mucopolysaccharidoses, Scurvy & Menkes
9.3 Describe protein targeting & sorting along with its associated disorders(It is non-core: N)	Types of protein targeting and sorting, disorders due to targeting signals and defects in peroxisomal matrix prot
10	**Oncogenesis and Immunity**

Competency No.	**Topics & Subtopics**
10.1 Describe the cancer initiation, promotion oncogenes & oncogene activation. Also focus on p53 & apoptosis	Characteristics of cancer cell, molecular basis of cancer carcinogens and initiator, promoter of carcinogens, onc tumor suppressor genes (retinoblastoma, RB and p53), physiologic and pathologic conditions .

10.2 Describe various biochemical tumor markers and the biochemical basis of cancer therapy.	Biochemical tumor markers, biochemical basis of chem therapy, targeted drug therapy and immunotherapy.
10.3 Describe the cellular and humoral components of the immune system & describe the types and structure of antibody	Cells of the Immune System, types of immune systems humoral components of innate and adaptive immune s the formation of antibodies, types, structure and mech (Immunoglobulins), primary and secondary response
10.4 Describe & discuss innate and adaptive immune responses, self/non-self-recognition and the central role of T-helper cells in immune responses	Innate and adaptive immune systems, immunological m development, role of helper T cells (CD4+ T cells) and cy cells in immune responses, Brief concept of MHC Disorders – Immunodeficiency, autoimmunity & hypers
10.5 Describe antigens and concepts involved in vaccine development.	Antigens, concept involved in vaccine development and
11	**Biochemical Laboratory Tests**
11.1 Describe commonly used laboratory apparatus and equipments, good safe laboratory practice and waste disposal.	Common lab equipments and apparatus like test tubes, auto pipettes, centrifuge, balances, oven, water bath g management of needle stick injury & latest guidelines c

Competency No.	**Topics & Subtopics**

11.2 Describe the preparation of buffers and estimation of pH.	Preparation of buffer –acidic and alkaline. Measuremer
11.3 Describe the chemical components of normal urine.	Chemical constituents of normal urine
11.4 & 11.20 **11.4:** Perform urine analysis to estimate and determine normal and abnormal constituents. **11.20:** Identify abnormal constituents in urine; interpret the findings and correlate these with pathological states.	Physical characteristics and organic constituents of urin Collection of random & 24 hour urine sample Urine Report: Physical characteristics and abnormal cor Interpretation of Urine Abnormalities
11.5 Describe screening of urine for inborn errors & describe the use of paper chromatography. Club Paper chromatography of amino acid & TLC from competency no 11.16	Urine: Screening of inborn errors. Paper chromatograph
11.6 Describe the principles of colorimetry. (Club spectrophotometry from competency no **11.18**)	Colorimeter- Principle, Beer and Lambert's law & applic of spectrophotometry.
11.7,11.8, 11.21 & 11.22 **11.7-** Demonstrate the estimation of serum creatinine and creatinine clearance **11.8**- Demonstrate estimation of serum proteins, albumin and A:G ratio **11.21**- Demonstrate estimation of glucose, creatinine, urea and total protein in serum. **11.22**- Calculate albumin: globulin A:G ratio and creatinine clearance	Estimation of serum creatinine, urine creatinine and calc their clinical interpretation. Estimation of serum proteins, albumin and calculation o interpretation. Estimation of plasma glucose, serum urea and their clin
11.9	Estimation of serum total cholesterol and HDL choleste interpretation.

Competency No.	Topics & Subtopics
Demonstrate the estimation of serum total cholesterol and HDL cholesterol	
11.10 Demonstrate the estimation of triglycerides	Estimation of serum triglycerides and their clinical inter
11.11 Demonstrate estimation of calcium and phosphorous	Estimation of serum calcium and phosphorus their clini
11.12 Demonstrate the estimation of serum bilirubin	Estimation of serum bilirubin: Total, direct and indirect,
11.13 & 2.2 **11.13-** Demonstrate the estimation of SGOT/ SGPT	Estimation of SGOT (AST)/ SGPT(ALT) and their clinical i
11.14 Demonstrate the estimation of alkaline phosphatase	Estimation of serum ALP and their clinical interpretatio
11.15 Describe & discuss the composition of CSF	Physical characteristics and chemical composition of CS

11.16 & 11.19 **11.16-** Observe use of commonly used equipment's/techniques in biochemistry laboratory including: •pH meter •Paper chromatography of amino acid •Protein electrophoresis •TLC, PAGE •Electrolyte analysis by ISE •ABG analyzer •ELISA •Immunodiffusion •Autoanalyser •Quality control	Principle, application and working of following lab equip paper chromatography of amino acids, protein electrop analysis by ISE, ABG analyzer, ELISA, immunodiffusion, a DNA isolation from blood/tissue (Paper chromatography of amino acid ,TLC clubbed with

Competency No.	**Topics & Subtopics**
·DNA isolation from blood/ tissue **11.19** Outline the basic principles involved in the functioning of instruments commonly used in a biochemistry laboratory and their applications.	

11.17 Explain the basis and rationale of biochemical tests done in the following conditions: - diabetes mellitus, - dyslipidemia, - myocardial infarction, - renal failure, gout, - proteinuria, - nephrotic syndrome, - edema, - jaundice, - liver diseases, pancreatitis, disorders of acid- base balance, thyroid disorders.	Basis and rational of biochemical tests required in the f - Diabetes mellitus-blood & urine glucose, microa glycated hemoglobin – (Club with 3.8 & 3.10) - Dyslipidemia-lipid profile (Club with 4.5 & 4.7) - Myocardial infarction –CK, LDH, Troponin (Club - Renal failure & nephrotic syndrome, – BUN, Cre cholesterol (Club with 3.8 & 3.10) - Gout- serum uric acid, synovial fluid analysis (Club with 6.3 & 6.4) - liver diseases & Jaundice- LFTs (Club with 6.1) Pa lipase (Club with 2.5& 7 2.7) Disorder of acid base balance- ABG analysis for pH, pO_2 base excess (BE) (Club with 6.7,6.8) - Thyroid disorder – serum free and total T3 & T4
11.18 Discuss the principles of spectrophotometry. **(Clubbed with 11.6)**	Spectrophotometer –principle & use
Competency No.	**Topics & Subtopics**

11.19 Outline the basic principles involved in the functioning of instruments commonly used in a Biochemistry laboratory and their applications. **(Clubbed with & 11.6 & 11.16)**	Instruments commonly used in Biochemistry laboratory
11.20 Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states. **(Clubbed with 11.4)**	
11.21 Demonstrate estimation of glucose, creatinine, urea and total protein in serum. **(Clubbed with 11.7, 11.8)**	
11.22 Calculate albumin: globulin (A/G)ratio and creatinine clearance **(Clubbed with 11.7, 11.8)**	
11.23 Calculate energy content of different food items, identify food items with high and low glycemic index and explain the importance of these in the diet.	Energy contents of lipids, carbohydrates & proteins in c
11.24 Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food.	Advantages of unsaturated fats, disadvantages of satura

Paper wise distribution of topics
Year: First MBBS Subject: Biochemistry

Paper	Section	Topics	Competency nos. BI
I	A	MCQs on all topics of the paper I	
	B & C	Basic Biochemistry	1.1
		Enzymes	2.1-2.7
		Chemistry & metabolism of carbohydrates	3.1-3.10
		Chemistry & metabolism of lipids	4.1-4.7
		Biological oxidation	6.6
		Xenobiotics	7.5
		Antioxidants &defence system	7.6-7.7
		Nutrition	8.1-8.5
		Extracellular matrix	9.1-9.3
		Oncology , oncogenesis & immunity	10.1-10.5
		Biomedical waste	11.1
		Physical characteristics and chemical composition of CSF	11.15
		Energy contents of lipids, carbohydrates & proteins in common food items, Advantages of unsaturated fats. Disadvantages of saturated and trans fats in food	11.23 & 11.24
		AETCOM- 1.4	
	For long answer question and scenario based / application questions, topics will not be repeated.		
II	A	MCQs on all topics of the paper II	
	B & C	Chemistry & metabolism of proteins	5.1-5.5
		Integration & starvation	6.1
		Nucleic acid metabolism	6.2-6.4
		Vitamins	6.5
		Water electrolyte balance & acid base balance	6.7-6.8
		Mineral metabolism	6.9-6.10
		Haemoglobin chemistry and metabolism	6.11-6.12

	Organ function test	6.13-6.15
	Molecular biology	7.1-7.3
	Genetic engineering	7.4
	Urine: Screening of inborn errors.	11.5
	Principle, application and working of following lab equipments/techniques: pH meter, paper chromatography of amino acids, protein electrophoresis, TLC, PAGE, Electrolyte analysis by ISE, ABG analyzer, ELISA, immunodiffusion, auto analyzer, quality control, DNA isolation from blood/tissue	11.16
For long answer question and scenario based / application questions, topics will not be repeated.		

Internal Assessment

Biochemisry

Applicable w.e.f August 2019 onwards examination for batches admitted from Ju

S	I-Exam (December)			II-Exam (March)		
	Theory	Practical (Including 05 marks For Journals And Log Book)	Total Marks	Theory	Practical (Including 05 marks For Journals And Log Book)	
1	100	50	150	100	50	

	Preliminary Examinations				Remedial internal assessme	
	III-Exam (July)				**Non - eligible** st	
					October	
	Theory	Practical Including 10 Marks for Journal & Log Book	Total Marks		Theory	Practical Inclu 10 Marks Journal & Book
	200	100	300		200	100

1. There will be 3 internal assessment examinations in the academic year. The structure of Preliminar should be similar to the structure of University examination.

2. There will be only one additional examination for absent students (due to genuine reason) after ap Committee Constituted for the same. It should be taken after preliminary examination and before su internal assessment marks to the University.

3. First internal assessment examination will be held in December, second internal assessment examin in March and third internal assessment examination will be held in July.

4. Internal assessment marks for theory and practical will be converted to out of 40. Internal assessme Conversion, should be submitted to university by 7th of August.

5. The student must secure at least 50% marks for total marks (combined in theory and practical / clini 40% marks in theory and practical separately) assigned for internal assessment in a particular subject i eligible for appearing at the final university examination of that subject. Internal assessment marks wi separate head of passing at the summative examination.

6. **Remedial internal assessment examination for Non - eligible students**: Student who were not eligi than 50% combined or less than 40% in any theory or practical, will re appear as repeater student for I which will be conducted before Supplementary Exam. His/her internal assessment will be calculated o this Examination marks only. Students who will not be eligible in this Examination will appear with reg repeater student.

7. The internal assessment marks of the remedial examination alone shall be considered and conve

8. Conversion **Formula for calculation of marks in internal assessment examinations**

	First IA	Second IA	Third IA (Prelim)	Total	Internal assessment marks: Conversion formula (out of 40)	Eligibility to appear for (after conversion out o (40% Separately in The Combined)	
Theory	100	100	200	400	$\frac{\text{Total marks obtained}}{10}$	16 (minimum)	To
Practical	50	50	100	200	$\frac{\text{Total marks obtained}}{5}$	16 (minimum)	M

9. Conversion formula for calculation of marks in Remedial internal assessment examination

	Remedial Exam (Prelim)	Int. Assess. marks conversion formula (out of 40)	Eligibility to appear Exam. (after conver (40% Separately in The 50% Combined)	
Theory	200	$\frac{\text{Total marks obtained}}{5}$	16 (minimum)	
Practical	100	$\frac{\text{Total marks obtained}}{2.5}$	16 (minimum)	

While preparing Final Marks of Internal Assessment, the rounding-off marks shall done as illustrated in f

Internal Assessment Marks	Final rounded marks
15.01 to 15.49	15
15.50 to 15.99	16

First Year MBBS Practical Mark's Structure Internal Assessment Examinations I & II (Applica
in M.B.B.S Course from Academic Year 2019-20 & onwards)

Biochemistry					
Practical					Oral/V
Seat No.	Quantitative Experiment	Quantitative Experiment/Urine organic/Urine Report/Quality Control/Interpolation of lab Report /Interpolation of Special Technique	Spots	Journal/ Logbook	
	A	B	C	D	E
Max. Marks	15	15	5	5	10

First Year MBBS Practical Marks Structure (Prelir

(Applicable w.e.f August 2019 onwards examination for batches admitted from June 201

Biochemistry

Seat No	Case Based Quantitative Estimation	Urine Report/ Quantitative estimation	Quality Control	Interpretation of lab Reports & special techniques (Minimum 2 Interpretation)	Spots	Journal & Logbook	Practical Total	V
	A	B	C	D	E	F	G	
Max. Marks	25	15	10	20	10	10	90	

(Please Note - The above examination pattern will be applicable to the students admitted from Academic Year 2019-20 and on
Colleges vide University letter No MUHS /X-1 /UG /1692 /2020 Date: 28/02/2020)

First Year MBBS Practical Marks Structure (MUHS E

(Applicable w.e.f August 2019 onwards examination for batches admitted from June 201

Biochemistry

Seat No	Case Based Quantitative Estimation	Urine Report/ Quantitative estimation	Quality Control	Interpretation of lab Reports & special techniques (Minimum 2 Interpretation)	Spots	Practical Total	Viva Voce/ Oral
	A	B	C	D	E	F	G
Max. Marks	25	15	10	20	10	80	20

(Please Note - The above examination pattern will be applicable to the students admitted from Academic Year 2019-20 and onw
Colleges vide University letter No MUHS /X-1 /UG /1692 /2020 Date: 28/02/2020)

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK
FORMAT / SKELETON OF QUESTION PAPER

1. Course and Year	: **First MBBS** *(applicable w.e.f. Sept. 2020& onwards examinations)*					2. Subject Code	: ***Appendix - a***
3. Subject (PSP)	: **Anatomy / Physiology / Biochemistry**						
(TT)	:						
4. Paper :	: ***I***	5. Total Marks	: **100**	6. Total Time	: **3 Hrs.**	7. Remu. (PS)	: **Rs. 300/-**
						8. Remu. (PM)	: **Rs. 350/-**
9. Web Pattern	: [ ]	10. Web Skeleton	: [ ]	11. Web Syllabus	: [ ]	12. Web Old QP	: [ ]

Instructions:

SECTION "A" MCQ

1) *Fill ● (dark) the appropriate empty circle below the question number once only.*
2) *Use **blue/black** ball point pen only.*
3) *Each Question carries **One mark.***
4) *A student will not be allotted any marks if he/she overwrites, strikes out or puts white ink on the circle once filled (darkened)*
5) *Do not write anything on the blank portion of the question paper if written anything, such type of act will be considered as an attempt to resort to unfair means.*

SECTION "A" MCQ (20 Marks)

Q1. Multiple Choice Questions (Total 20 MCQ of One mark each) ***(4 MCQ Should be clinical application based)*** (20x1=20)

a) b) c) d) e) f) g) h) i) j)
k) l) m) n) o) p) q) r) s) t)

SECTION "B"

Instructions:

1) *Use **blue/black** ball point pen only.*
2) ***Do not** write anything on the **blank portion of the question paper**. If written anything, such type of act will be considered as an attempt to resort to unfair means.*
3) ***All** questions are **compulsory**.*
4) *The number to the **right** indicates **full** marks.*
5) *Draw diagrams **wherever** necessary.*
6) *Distribution of syllabus in Question Paper is only meant to cover entire syllabus within the stipulated frame. The Question paper pattern is a mere guideline. Questions can be asked from any paper's syllabus into any question paper. Students cannot claim that the Question is out of syllabus. As It is only for the placement sake, the distribution has been done.*
7) *Use a common answerbook for all sections.*

SECTION "B" (80 Marks)

2. Brief answer questions (Any Ten out of Eleven) (10x 2= 20)

a) b) c) d) e) f) g) h) i) j) k)

3. Short Answer Questions (Any Eight out of Nine) (8x5= 40)

One SAQ has to be on AETCOM Module ***(For Anatomy 1.1, 1.5, For Physiology 1.2,1.3&For Biochemistry, 1.4) &*** Minimum 2 SAQs should be Case Based Questions/ Clinically applied Questions.

a) b) c) d) e) f) g) h) i)

4. Long Answer Questions (Any Two out of Three) (2x 10= 20)

a) b) c)

Note: All questions should be structured .Wherever necessary; split up of marks should be specified.

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK
FORMAT / SKELETON OF QUESTION PAPER

1.	Course and Year	:	**First MBBS** *(applicable w.e.f. Sept. 2020& onwards examinations)*						2.	Subject Code	: ***Appendix - a***
3.	Subject (PSP)	:	**Anatomy / Physiology / Biochemistry**								
	(TT)	:									
4.	Paper :	:	***II***	5.	Total Marks	: **100**	6.	Total Time	: **3 Hrs.**	7. Remu. (PS)	: **Rs. 300/-**
										8. Remu. (PM)	: **Rs. 350/-**
9.	Web Pattern	: [ ]		10.	Web Skeleton	: [ ]	11.	Web Syllabus	: [ ]	12. Web Old QP	: [ ]

Instructions:

SECTION "A" MCQ

1) *Fill ● (dark) the appropriate empty circle below the question number once only.*
2) *Use **blue/black** ball point pen only.*
3) *Each Question carries **One mark.***
4) *A student will not be allotted any marks if he/she overwrites, strikes out or puts white ink on the circle once filled (darkened)*
5) *Do not write anything on the blank portion of the question paper if written anything, such type of act will be considered as an attempt to resort to unfair means.*

SECTION "A" MCQ (20 Marks)

1. Multiple Choice Questions (Total 20 MCQ of One mark each) ***(4 MCQ Should be clinical application based)*** (20x1=20)

a) b) c) d) e) f) g) h) i) j)
k) l) m) n) o) p) q) r) s) t)

SECTION "B"

Instructions: 1) *Use **blue/black** ball point pen only.*
2) ***Do not** write anything on the **blank portion of the question paper**. If written anything, such type of act will be considered as an attempt to resort to unfair means.*
3) ***All** questions are **compulsory**.*
4) *The number to the **right** indicates **full** marks.*
5) *Draw diagrams **wherever** necessary.*
6) *Distribution of syllabus in Question Paper is only meant to cover entire syllabus within the stipulated frame. The Question paper pattern is a mere guideline. Questions can be asked from any paper's syllabus into any question paper. Students cannot claim that the Question is out of syllabus. As It is only for the placement sake, the distribution has been done.*
7) *Use a common answer book for all sections.*

SECTION "B" (80 Marks)

2. Brief answer questions (Any Ten out of Eleven) (10x 2= 20)

a) b) c) d) e) f) g) h) i) j) k)

3. Short Answer Questions (Any Eight out of Nine) (8x5= 40)

Minimum 2 SAQs should be Case Based Questions/ Clinically applied Questions.

4. a) b) c) d) e) f) g) h) i) (2x 10= 20)

Long Answer Questions (Any Two out of Three)

a) b) c)

Note: All questions should be structured .Wherever necessary, split up of marks should be specified.

MUHS

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK

MARKLIST FOR PRACTICAL / ORAL / VIVA VOCE

(Summer / Winter – 20...Exam (MBBS UG Courses)

(Applicable for batch admitted in M.B.B.S Course from Academic Year 2019-20 & onwards)

Course : FIRST MBBS
Subject : Biochemistry
CENTRE :
Marks : (Practical = Practical/Clinical + Viva) Min. 50 Max. 100
Date : / /20
Batch :

Practical							Oral/Viva	Total
Seat No.	Case Based Quantitative Estimation	Urine Report/ Quantitative estimation	Quality Control	Interpretation of lab Report & special techniques (Minimum 2 interpretations)	Spots	Practical (Total)	Viva Voce/Oral Total	Practical/Viva Total Marks
	A	B	C	D	E	F	G	H
Max. Marks	25	15	10	20	10	80	20	100

Note : Both Examiners should jointly conduct practical examination for each student.

Verified above entries from Answerbooks and we hereby certify that the marks entered against each Seat Number are found correct.

	NAME OF EXAMINER	COLLEGE	SIGNATURE WITH DATE	
1			Convenor	
2			Internal	
3			External	
4			External	

BOOKS RECOMMENDED:
TEXT BOOKS ;

1. Medical Biochemistry - U.Satyanarayan.
2. Biochemistry for Medical students by D.M.Vasudevan & Shree Kumari.
3. Medical Biochemistry by M.N. Chatterjea and Rana Shinde.
4. Text Book of Medical Biochemistry by Ramakrishnan, Prasannan & Rajan.
5. Medical Biochemistry by Debajyoti Das.
6. Biochemistry by A.C.Deb.

REFERENCE BOOKS:

1. Biochemistry by Pankaja Naik
2. Harper's Biochemistry.
3. Medical Biochemistry by N.V.Bhagwan.
4. Biochemistry by L.Stryer.
5. Biochemistry by Orten & Neuhans.
6.Text Book of Biochemistry for Medical Student-8th Edition-16 By- DM Vasudevan