



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A++' Accredited by NAAC

Sector-01, Kamothe, Navi Mumbai -410 209

Tel 022-27432471, 022-27432994, Fax 022 -27431094

E-mail: registrar@mgmuhs.com; Website : www.mgmuhs.com

COMPETENCY BASED MEDICAL EDUCATION (CBME)

(with effect from 2019-2020 Batches)

Curriculum for First M.B.B.S Human Biochemistry

Amended upto AC-50/2024, Dated 27/11/2024

Amended History

1. Approved as per BOM 57/2019 [Resolution no. 3.1.1.13], Dated 26/4/2019
2. Amended upto BOM 62/2020 [Resolution No. 3.2.1.3.i]; Dated 16/09/2020.
3. Amended upto BOM 63/2021 [Resolution No. 4.1.1.2.ii, Resolution No. 4.4.1.5, Resolution No. 4.4.1.6]; Dated 17/02/2021.
4. Amended upto AC-41/2021, [Resolution No. 4.1], [Resolution No. 4.2] [Resolution No. 4.3] , [Resolution No. 4.4], [Resolution No. 4.7], [Resolution No. 4.8], [Resolution No. 4.9], [Resolution No. 4.10]; Dated 27/08/2021.
5. Amended upto AC-42/2022, [Resolution No.3.3], [Resolution No. 3.6] [Resolution No.3.19]; Dated 26/04/2022. (incorporated at the end of Syllabus).
6. Amended upto AC - 48/2023, [Resolution No.5.3], [Resolution No. 5.4], [Resolution No. 5.5], [Resolution No.5.6], [Resolution No.5.7], [Resolution No.5.8], [Resolution No.5.10], [Resolution No.5.11] Dated 12/12/2023.
7. Amended upto AC-50/2024, [Resolution No. 4.4, 4.5, 4.6, 4.7, 4.8, 4.9], [Resolution No. 4.32, 4.33, 4.34], Dated 27/11/2024.

Resolution No. 4.4 of AC-41/2021: Resolved to include “MGMIHS Graduate Attributes” in 1st MBBS Anatomy Physiology and Biochemistry syllabi and cover them in the foundation course, Journals & logbooks, with effect from the batch admitted in 2021-22 onwards

Annexure-23 of AC-41-2021

MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI

GRADUATE ATTRIBUTES

A student graduating from MGM Institute of Health Sciences, Navi Mumbai, should attain the following attributes:

- 1** • Dynamic professionalism
- 2** • Exemplary leadership
- 3** • Effective communication skills
- 4** • Scholarly attitude
- 5** • Element of critical thinking
- 6** • Enthusiasm for research
- 7** • Social commitment
- 8** • Global competencies

Dynamic professionalism:

Abide by professional codes of conduct, demonstrate high personal standards of behaviour, be considerate, trustworthy and honest, act with integrity. Apply effective strategies to maintain their own physical, psychological, social and spiritual well-being. Should be able to apply profession-specific knowledge, clinical skills and professional attitudes in implementation of evidence-based protocols for optimal outcome.

Exemplary leadership:

Focuses on the qualities required to effectively manage a career, as a practitioner or academician, work effectively within a system aiming at quality improvement, fostering a spirit of team-building.

Effective communication skills:

Communicates effectively and humanely with all stakeholders, their families, colleagues, through a variety of means, gathers and conveys information respectfully, in a culturally acceptable and dignified manner.

Scholarly attitude:

Demonstrates a lifelong commitment to reflective learning, strives to maintain professional competence. Committed to learn, disseminate, apply and translate knowledge

Element of critical thinking:

Will develop a habit of inquiry, use the knowledge gained for dealing with complex situations foster an ambience conducive for effective learning with constructive criticism, exercise critical judgement in evaluating sources of information.

Enthusiasm for research:

Develop intellectual curiosity and embark upon opportunities to develop research capabilities. Imbibe the basic principles of research methodology and engage in ethical research.

Social commitment:

Inculcate values of self-awareness, empathy, mutual respect. Understand our obligation to society and foster an ability to work in a diverse cultural setting. Understand how one's actions can enhance the well-being of others.

Global competencies:

Team-building, communication, self-management, collaborative working, openness and respect for a range of perspectives.

Resolution No. 5.5 of Academic Council (AC-48/2023): Resolved to accept distribution of subjects and teaching elements in first professional MBBS from First MBBS 2023-24 batch onwards, as per new CBME guidelines published on 01.08.2023

(As per NMC guidelines letter No. U. 1 4021 1812023-UGMEB dated 01.08.23)

**Distribution of subjects and teaching elements in first professional MBBS from
First MBBS 23-24**

First Professional phase of 12 months including Foundation Course of one week and university exams. It shall consist of - Anatomy , Physiology , Biochemistry , Introduction to Community Medicine , Humanities , Professional development including Attitude , Ethics & Communication (AETCOM) module , family adoption programme through village outreach where-in each student shall adopt minimum of three (03) families and preferably at least five (05) families , Pandemic module and early clinical exposure , ensuring alignment & all types of integration and simulation- based learning.

Resolution No. 5.6 of Academic Council (AC-48/2023): Resolved to accept the final distribution of subject wise teaching hours for first professional MBBS from First MBBS 2023-24 batch onwards, as per new CBME guidelines published on 01.08.2023

Distribution of Subject Wise Teaching Hours for 1 st MBBS

(As per NMC guidelines letter No. U. 1 4021 1812023-UGMEB dated 01.08.23, page No. 69)

Subject	Lecture (Hrs)	SGL (Hrs)	SDL (Hrs)	Total (Hrs)
Foundation Course (FC) will be conducted at the beginning of 1 st MBBS for 01 week				39
Anatomy	210	400	10	620
Physiology	130	300	10	440
Biochemistry *	78	144	10	232
ECE**	27	-	0	27
Community Medicine	20	20	-	40
FAP			27	27
AETCOM ***		26		26
Sports + Extra –curricular activities				10
Formative Examination and Term examinations				60
Total				1521#
*Foundation Course (FC) Remaining 121 hours of FC will be spread throughout year. Thus, FC will be total 160 hours.	Every Saturday			121
Total				1642#

*Including molecular biology

**Early Clinical exposure hours to be divided equally in all three subjects.

*** AETCOM module shall be a longitudinal programme.

includes hours for Foundation course also.

Resolution No. 5.3 of Academic Council (AC-48/2023): Resolved to approve distribution of hours of foundation course of First MBBS 2023-24 batch as per new CBME guidelines published on 01.08.2023 [ANNEXURE-7].

(As per NMC guidelines letter No. U. 1 4021 1812023-UGMEB dated 01.08.23, page No. 69)

Foundation Course

(One Week (39 hrs) + Spread over 6 months at the discretion of college (121 Hrs)

Foundation course Subject/ contents	Teaching_Hours
Orientation	30
Skill module	34
Field visit to community health center	08
Introduction to professional Deployment & AETCOM module	40
Sports, Yoga and extra- curricular activities	16
Enhancement of language/computer skills	32
Total	160

Resolution No. 5.7 of Academic Council (AC-48/2023): Resolved to accept “learner doctor program (Clinical clerkship)” for first professional MBBS from First MBBS 2023-24 batch onwards, as per new CBME guidelines published on 01.08.2023

(As per NMC guidelines letter No. U. 14021 1812023-UGMEB dated 01.08.23)

**Learner-Doctor program (Clinical clerkship) for first professional MBBS from
First MBBS 23-24 batch**

- **Introduction to hospital environment**
- **Early clinical exposure**
- **Understanding perspectives of illness**
- **Family adoption program.**

Annexure – C– III

**Distribution of Teaching Hours for First MBBS Biochemistry as per
CBME curriculum**

Sr.No.	Name of Topic Theory		Hours
1	Distribution of Theory Lectures based on new MCI Competency based Syllabus UG (including Horizontal & Vertical Integration)		80
2	Distribution of Practical hours based on new MCI Competency based UG curriculum Practical Skills assessment	34	150
3	Distribution of Practical hours based on new MCI Competency based UG curriculum: Observation of Use of Equipments / Techniques in Biochemistry Practical	36	
4	Distribution of Practical hours based on new MCI Competency based UG curriculum: Name of Topic for Clinicobiochemical correlation- basis & rational of tests in various conditions	16	
5	PBL/ Tutorial/ Small Group discussion/revision practicals/ integrated teaching	64	
6	SDL		20
	Total		250

Final Distribution of Total Teaching Hours

Subject- Biochemistry	Hours
Lectures	80 hrs
Small Group Teaching/Tutorials/Integrated learning/Practical hours	150 hrs
Self directed learning hours	20 hrs
Total hours	250 hrs
Early Clinical Exposure	30 hrs

Resolution No. 4.4 of Academic Council (AC-50/2024):

Resolved to approve and adopt the distribution of hours of foundation course of First MBBS from 2024-25 batch onwards. [ANNEXURE-24]

Resolution No. 4.32 of Academic Council (AC-50/2024): (ii) It was resolved to approve Changes in: b) Foundation course duration and content (Annexure-48)

Annexure-24 & 48 of AC-50/2024

Foundation Course

(With effect from 2024-2025 batch)

(As per NMC "Guidelines for Competency Based Medical Education (CBME) Curriculum 2024" on 12/09/2024. , page No. 52)

Foundation Course- 2 weeks at start of the course

Subject/ contents	Teaching_Hours
Orientation Module including History of Indian Medicine	15
Skills Module	15
Community orientation module	5
Professional Development and Ethics Module (P&E) including Mental health	20
Enhancement of Language and Computer Skills Module including Clinico -laboratory communication	10
Sports and Extracurricular Activities	15
Total	80

Resolution No. 4.6 of Academic Council (AC-50/2024) Resolved to approve & adopt the distribution of subject wise teaching hours for first professional MBBS from 2024-25 batch onwards as per new CBME guidelines published on 12/09/2024. [ANNEXURE-26]

Resolution No. 4.32 of Academic Council (AC-50/2024): (ii) It was resolved to approve Changes in: a) Distribution of subject wise teaching hrs (Biochemistry) [ANNEXURE-48]

Annexure-26 & 48 of AC-50/2024

Distribution of Subject Wise Teaching Hours for 1 st MBBS

(With effect from batch 2024-2025)

Subject	Lecture (Hrs)	SGL (Hrs)	SDL (Hrs)	Total (Hrs)
Foundation Course (FC) will be conducted at the beginning of 1 st MBBS for 01 week				80
Anatomy	180	430	10	620
Physiology	130	305	10	445
Biochemistry *	82	157	10	249
ECE **	27	-	0	27
Community Medicine	20	20	-	40
FAP			27	27
AETCOM ***		26		26
Sports + Extra –curricular activities				10
Total				1521#

As per NMC "Guidelines for Competency Based Medical Education (CBME) Curriculum 2024" on 12/09/2024. , page No- 53

***Including molecular biology**

****Early Clinical exposure hours to be divided equally in all three subjects.**

***** AETCOM module shall be a longitudinal programme.**

includes hours for Foundation course also.

Resolution No. 4.32 of Academic Council (AC-50/2024):

(i) Resolved to approve the changes in First MBBS Biochemistry syllabus both for Theory and Practical as per new CBME guidelines dated 12/9/24.

(ii) It was resolved to approve Changes in: c) Competency numbers for the competencies in Theory and Practical

[ANNEXURE-48]

Annexure-48 of AC-50/2024

**Distribution of Teaching Hours for First MBBS Biochemistry
as per CBME curriculum (NMC 2024 guidelines)**

(Ref: NMC UGMEB letter No. D-11011/500/2024/AC dated 12.09.24)

Sr. No.	Name of Topic Theory		Hours
1	Distribution of Theory Lectures based on new MCI Competency based Syllabus UG (including Horizontal & Vertical Integration)		82
2	Distribution of Practical hours based on new MCI Competency based UG curriculum Practical Skills assessment	34	157
3	Distribution of Practical hours based on new MCI Competency based UG curriculum: Observation of Use of Equipments / Techniques in Biochemistry Practical	36	
4	Distribution of Practical hours based on new MCI Competency based UG curriculum: Name of Topic for Clinico-Biochemical correlation- basis & rational of tests in various conditions	16	
5	PBL/ Tutorial/ Small Group discussion/revision practicals/ integrated teaching	64	
6	SDL		10
	Total		249

Final Distribution of Total Teaching Hours

Subject- Biochemistry	Hours
Lectures	82 hrs
Small Group Teaching/Tutorials/Integrated learning/Practical hours	157 hrs
Self-Directed learning hours	10 hrs
Total hours	249 hrs
Early Clinical Exposure	9 hrs

Theory Syllabus I MBBS CBME Batch 2024 -25 (As per NMC 2024 guidelines)

Theory: 82 hours

Topics for Theory Lectures with Teaching Hours & Competency numbers

Sr. No.	Topics	Competency No	Hours
1.	Cell: Molecular & functional organization of cell & subcellular components	BI 1.1	1
2.	Chemistry & Metabolism of Carbohydrates.	BI 3.1 to BI 3.10	9
3.	Chemistry & Metabolism of Proteins.	BI 5.1 to BI 5.5	9
4.	Chemistry & Metabolism of Lipids.	BI 4.1 to BI 4.7	9
5.	Chemistry & Metabolism of Nucleic acids & related disorders	BI 7.1	4
6.	Enzymes.	BI 2.1 to BI 2.7	5
7.	Biological oxidation.	BI 6.6	2
8.	Chemistry & Metabolism Hemoglobin.	BI 5.2, BI 6.11	4
9.	Integration of metabolism and starvation metabolism	BI 6.1	2
10.	Hormones and Mechanism of hormones action.	BI 6.5, BI 13.5	1
11.	Vitamins (Fat & Water soluble)	BI 6.5	5
12.	Nutrition	BI 8.1 to BI 8.5	3
13.	Molecular Biology	BI 7.1 to BI 7.7, BI 9.3	6
14.	Biochemistry of cancer and carcinogenesis	BI 10.1 to BI 10.2	2
15.	Immunology	BI 10.3 to BI 10.5	3
16.	Oxidative stress & Antioxidants in Health and Diseases	BI 7.6 to BI 7.7	2
17.	Organ Function Tests: Kidney function tests, Thyroid function tests, Liver function tests, Adrenal function test.	BI 6.13 to BI 6.15	4
18.	Mineral Metabolism.	BI 6.9 to BI 6.10	4
19.	Water and Electrolyte Balance.	BI 6.7	2
20.	Acid base balance	BI 6.7 to 6.8	2
21.	ECM	BI 9.1 to 9.2	1
22.	Detoxification mechanisms, Role of xenobiotics in disease	BI7.5	1
23.	Miscellaneous: Biochemical changes in AIDS. Alcohol metabolism and effects of chronic alcoholism. Role of Artificial Intelligence in clinical biochemistry laboratory practice.	BC 13.3,13.4,13.5	1

Practical Syllabus I MBBS CBME Batch 2024 -25 (As per NMC 2024 guidelines)

Total Hours including Practical, LCD, Small group discussion, Tutorials and Seminars: **157 hours.**

Practical Syllabus Topics with Competency numbers

Sr. No	Name of Topics for Practical Skills Assessment	Competency No.	Teaching method
1	Perform Urine analysis to estimate and determine Normal Constituents	11.4	DOAP
2	Perform Urine analysis to estimate and determine Abnormal Constituents	11.4,11.20	DOAP
3	Demonstrate the estimation of blood glucose	11.21	DOAP
4	Demonstrate the estimation of blood urea	11.21	DOAP
5	Demonstrate the estimation of serum creatinine and creatinine clearance	11.7,11.21	DOAP
6	Demonstrate estimation of serum proteins, albumin and A:G ratio	11.8,11.21,11.22	DOAP
7	Demonstrate the estimation of serum total cholesterol and HDL- Cholesterol	11.9	Practical
8	Demonstrate the estimation of Triglycerides and calculation of LDL cholesterol	11.10	Practical
9	Demonstrate estimation of Calcium.	11.11	Practical
10	Demonstrate estimation of Phosphorus.	11.11	Practical
11	Demonstrate estimation of Uric acid.	11.17	Practical
12	Demonstrate the estimation of serum Bilirubin	11.12	Practical
13	Demonstrate the estimation of SGOT and SGPT	2.2,11.13	Practical
14	Demonstrate the estimation of Alkaline phosphatase	11.14	Practical
15	C.S.F. Analysis	11.15	Practical

Lecture Cum Demonstrations Topics with Competency numbers

Total LCD Hours :36 Hours

Sr. No.	Name of Topics	Competency No.	Teaching method
1	Introduction to Biochemistry Laboratory Blood collection and anticoagulants	11.19	LCD
2	Common Laboratory instruments	B.I 11.16,11.19	LCD
3	First aid in Laboratory and Lab hazards	B.I. 11.1	LCD
4	Colorimetry	B.I 11.6	LCD
5	Autoanalyzer	B.I B.I. 11.16	LCD
6	Spectrophotometry	B.I B.I.11.18	
7	pH meter	B.I 11.16	LCD
8	Paper chromatography of amino acid, TLC	B.I. 11.5,11.16	LCD
9	Protein Electrophoresis, PAGE	B.I. 11.16	LCD
10	Electrolyte analysis by ISE and Flame photometry	B.I. 11.16	LCD
11	ABG analyzer	B.I. 11.16	LCD
12	ELISA	B.I. 11.16	LCD
13	Immunodiffusion	B.I. 11.16	LCD
14	Quality control in clinical Biochemistry Lab, LJ charts, Preanalytical, Analytical and Post analytical Errors	BC 14. 20, 21	LCD
15	DNA isolation from blood/ tissue	B.I. 11.16	LCD
16	OGTT, Glucose Challenge test.	B.I. 3.10	LCD
17	Advantages and disadvantages of use of fats in food	B.I.11.24	LCD
18	Calculate energy contents of different food items, identify food items with high and low glycemic index	11.23	LCD
19.	Urine analysis by Dip stick method	BC 14.3	LCD
20.	Estimation of blood glucose using Glucometer	BC 14.7	LCD
21.	Estimation of Glycated Hb (HbA1c) with interpretation.	BC 14.22	LCD

List of SGT/SGDs - Basis and rational of tests in various conditions

Total Hours: 16

Sr. No.	Name of Topic for Clinico-Biochemical correlation	Competency No.	Teaching method
1.	Diabetes mellitus	BC 14.9	Small Group Teaching
2.	Obesity, Dyslipidemia, Myocardial infarction	BC 14.9	Small Group Teaching
3.	Renal failure, Nephrotic syndrome	BC 14.9	Small Group Teaching
4.	Fatty Liver, Jaundice	BC 14.9	Small Group Teaching
5.	Pancreatitis	BC 14.9	Small Group Teaching
6.	Disorders of acid- base balance	BC 14.9	Small Group Teaching
7.	Thyroid disorders	BC 14.9	Small Group Teaching
8.	Gout	BC 14.9	Small Group Teaching
9.	Genetic Disorders	BC 14.9	Small Group Teaching
10.	Nutritional Disorders	BC 14.9	Small Group Teaching
11.	Vitamin Deficiency Disorders	BC 14.9	Small Group Teaching
12.	Disorders of Mineral Metabolism	BC 14.9	Small Group Teaching
13.	Disorders of Electrolyte Metabolism	BC 14.9	Small Group Teaching

I MBBS CBME Biochemistry

Paper wise distribution of Theory topics:

Paper- I (100 marks) 3 hours duration

1. Cell.
2. Enzymes.
3. Chemistry and metabolism of proteins.
4. Chemistry and metabolism of Nucleic Acids and related disorders.
5. Molecular biology: Genetic code, Replication, Transcription, Translation, Regulation of gene expression, Recombinant DNA technology, PCR, DNA repair, gene mutation, Protein sorting & targeting.
6. Chemistry and Metabolism of hemoglobin.
7. Biological oxidation.
8. Immunology, Concept of vaccine development
9. Vitamins
10. Nutrition
11. Miscellaneous

PAPER - II (100 marks) 3 hours duration

1. Chemistry and metabolism of carbohydrates.
2. Chemistry and metabolism of lipids.
3. Mineral metabolism:
4. Water and electrolyte balance & imbalance.
5. Acid base balance and imbalance.
6. Integration of metabolism and Starvation metabolism.
7. Hormones.
8. Organ Function Tests.
9. Detoxification mechanisms, Role of xenobiotics in disease
10. Biochemical basis of cancer and carcinogenesis
11. Oxidative stress & Antioxidants in health & diseases.
12. ECM

Paper wise distribution of Theory Subtopics:

Paper- I (100 marks) 3 hours duration

1. **Cell:** Molecular and functional organization of a cell and its sub-cellular components.

2. **Enzymes.**

General nature, classification & IUBMB nomenclature of enzymes, alloenzyme, coenzyme & co-factors. Specificity and mode of action of enzymes. Basic principles of enzyme activity, factors affecting enzyme activity, Enzyme inhibition (Kinetic not required), Enzyme inhibitors as poisons and drugs, therapeutic enzymes, Clinical utility of enzymes & isoenzymes. Enzymes in lab investigations, Enzymes based assay.

3. **Chemistry and metabolism of proteins.**

Chemistry of proteins General nature and structure of amino acids, various ways of classification of amino acids, biologically important peptides, classification, properties and biological importance of proteins. Structural organization, functions and clinical aspects of proteins, structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies. Plasma proteins - functions, clinical significance of various fractions, methods of separation (only principle). Acute phase proteins.

Protein Metabolism: Biochemical aspects of digestion and absorption of proteins. Fate of amino acid in the body (Deamination, Transamination, Trans-deamination, Decarboxylation), formation, transport, detoxification of ammonia (Urea cycle, glutamine formation), ammonia toxicity and its clinical significance. Metabolism of aromatic amino acids, Sulphur containing amino acids, Glycine, Methionine, branched-chain amino acids, and arginine and their inborn errors. Interpretation of laboratory results of analytes associated with metabolism of proteins. Newborn screening.

4. **Chemistry and metabolism of nucleic acids and related disorders.**

Clinical significance of nucleotides and nucleic acids. Biologically important free nucleotides, Biosynthesis of purines (sources of ring & regulatory steps only, conversion of IMP to GMP & AMP) and salvage pathway, Breakdown of purines and Common disorders associated. Structure and function of DNA and RNA, Genetic code. Wobble hypothesis. Cell cycle. Interpretation of laboratory results of analytes associated with Gout, Lesch- Nyhan Syndrome.

5. **Molecular biology.**

DNA Replication, Transcription, Translation. Types of DNA repair, Gene mutations and associated disorders. Inhibitors of protein biosynthesis. Protein sorting & targeting. Basic mechanism of gene expression & regulation, Lac- operon model. Cell cycle.

Applications of recombinant DNA technology and PCR, role in diagnosis and treatment of diseases. Introduction to microarray, FISH and CRISPR.

6. **Chemistry and Metabolism of Hemoglobin.**

Hemoglobin Metabolism: Chemistry and functions of hemoglobin. Types of hemoglobin's, Hemoglobin derivatives and Variants with physiological and pathological relevance.

Hemoglobin Metabolism: Synthesis and break down of hemoglobin, Porphyrins (in brief), Fate of bilirubin, different types of Jaundice.

7. Biological oxidation.

General concept of oxidation and reduction. Role of enzymes and co-enzymes in generation of ATP. Electron transport chain. Substrate level and Oxidative phosphorylation, Role of uncouplers and inhibitors.

8. Immunology.

Cellular and humoral components of the immune system. Structure, functions and disorders of immunoglobulins, Innate and adaptive immune responses, self/non-self-recognition and the central role of T- helper cells in immune responses, Antigens and concepts involved in vaccine development Vitamins and Nutrition.

9. Vitamins: General nature, classification, sources, active forms, daily requirement, Biochemical role, deficiency manifestations and hypervitaminosis.

10. Nutrition: Nutritional Importance of commonly used items of food (fruits and vegetables. (Macromolecules & its importance). Dietary components and importance of dietary fibers, Balance diet for normal adult, Quality of dietary protein, SDA, protein energy malnutrition (Kwashiorkor and Marasmus), Dietary advice for optimal health in childhood and adult, in disease conditions like diabetes mellitus, coronary artery disease and in pregnancy. Causes (including dietary habits), effects and health risks associated with being overweight/ obesity/metabolic syndrome.

11. Miscellaneous:

- a. Biochemical changes in AIDS.
- b. Alcohol metabolism and effects of chronic alcoholism.
- c. Role of Artificial Intelligence in clinical biochemistry laboratory practice.

PAPER - II (100 marks) 3 hours duration

1. Chemistry and metabolism of carbohydrates.

Chemistry of carbohydrates: classification and biochemical importance, chemistry and functions of monosaccharides (excluding isomerism), disaccharides and polysaccharides including Glycosaminoglycans (mucopolysaccharides).

Carbohydrate Metabolism: Biochemical aspects of digestion and absorption of carbohydrates. Synthesis and break down of glycogen, Glycolysis, Rapoport Lumbering cycle, Citric acid cycle, Gluconeogenesis, HMP shunt pathway and its biological significance, Uronic acid pathway (significance only). Metabolism of Galactose and Galactosemia. Mechanism & significance of blood glucose regulation in health & disease , oral GTT and glycosuria, fructose metabolism & disorders Biochemistry of diabetes mellitus. Interpretation of laboratory results of analytes associated with disorders of carbohydrate metabolism. Common poisons that inhibit crucial enzymes of carbohydrate metabolism

2. Chemistry and metabolism of lipids.

Chemistry of Lipids: classification and biological importance of triacyl glycerol, phospholipids, glycolipids, fatty acids (PUFA), prostaglandin, steroids and lipoproteins structure, interrelation with atherosclerosis. Biological role and therapeutic application of eicosanoids and their inhibitors.

Lipid Metabolism: Biochemical aspects of digestion and absorption of Lipids and its disorders. Beta oxidation, biosynthesis of saturated fatty acids only, cholesterol and triglyceride metabolism, Lipoprotein metabolism, Ketogenesis, Ketolysis and Ketosis. Adipose tissue metabolism, Lipolysis and re-esterification, fatty liver and atherosclerosis. Cholelithiasis and obesity. Interpretation of lab results associated with metabolism of lipids

3. Mineral metabolism:

Dietary Sources, absorption, transport, RDA, functions, metabolism and associated disorders of Calcium, iron, copper. Functions and clinical significance of magnesium, zinc and phosphorous. Functions of trace elements.

4. Water and electrolyte balance and imbalance

Water distribution & regulation of water. Disorders of water balance.

Electrolyte distribution & regulation. Disorders of electrolytes.

5. Acid base balance and imbalance.

Maintenance of normal pH, mechanism of blood pH- buffer system, respiratory mechanism, renal mechanism. Disorders of Acid base balance. Interpretation of results of Arterial Blood Gas (ABG) analysis in various disorders

6. Integration of metabolism and Starvation

Integration of various metabolic processes. Metabolic interrelationship of carbohydrates, lipids and proteins metabolism. Metabolic changes during starvation

7. Hormones

Mechanism of hormone action: General characteristics and Mechanism of hormone action group I and group II hormones. Second messenger system.

Hormones of reproductive health and their clinical interpretation- LH, FSH, prolactin, Beta-HCG, Progesterone, testosterone and AMH. Importance of prenatal screening.

8. Organ Function tests

Functions and associated abnormalities of the kidney, liver, thyroid and adrenal glands. Components and Interpretation of Lab reports of Liver function tests, Kidney function tests, Thyroid function tests and Adrenal function tests.

9. Detoxification mechanisms

Role of xenobiotics in health and disease. (Bio-transformation) oxidation, reduction, conjugation, hydrolysis.

10. Biochemical basis of cancer and carcinogenesis

Cancer initiation, promotion, oncogenes & oncogene activation. Causes of Cancer, carcinogens, p53 & apoptosis. Biochemical changes in cancerous cells. Various biochemical tumor markers and the biochemical basis of cancer therapy.

11. Oxidative stress & Antioxidants in health & diseases.

Role of oxidative stress in health and disease, cancer, diabetes mellitus and atherosclerosis. Anti-oxidant defense systems in the body.

12. ECM

Functions and components of the extracellular matrix (ECM). Role of ECM components in health and disease.

Theory Syllabus I MBBS Batch 2020-2021 (As per CBME)

Theory: 80 hours

Topics For Theory Lectures with Teaching Hours & Competencies

Sr. No.	Topics	Competency No	Hours
1.	Molecular & functional organization of cell & subcellular components	BI 1.1	1
2.	Chemistry & Metabolism of Carbohydrates.	BI 3.1 to BI 3.10	9
3.	Chemistry & Metabolism of Proteins.	BI 5.1 to BI 5.5	9
4.	Chemistry & Metabolism of Lipids.	BI 4.1 to BI 4.7	9
5.	Chemistry & Metabolism of Nucleo proteins & cell cycle	BI 7.1	4
6.	Enzymes.	BI 2.1 to BI 2.7	5
7.	Biological oxidation.	BI 6.6	2
8.	Chemistry & Metabolism Hb.	BI 5.2, BI 6.11	4
9.	Integration of metabolism and starvation metabolism	BI 6.1	2
10.	Mechanism of hormones action.	BI 6.5 , BI 13.5	1
11.	Vitamins (Fat & Water soluble)	BI 6.5	5
12.	Nutrition	BI 8.1 to BI 8.5	3
13.	Molecular Biology	BI 7.1 to BI 7.7, BI 9.3	6
14.	Biochemistry of cancer.	BI 10.1 to BI 10.2	2
15.	Immunology	BI 10.3 to BI 10.5	3
16.	Oxidative stress & antioxidants	BI 7.6 to BI 7.7	2
17.	Kidney function tests, Thyroid function tests, Liver function tests, Adrenal function tests	BI 6.13 to BI 6.15	4
18.	Mineral Metabolism.	BI 6.9 to BI 6.10	4
19.	Water and Electrolyte Balance.	BI 6.7	2
20.	Acid base balance	BI 6.7 to 6.8	2
21.	ECM	BI 9.1 to 9.2	1
22.	Detoxification mechanisms, Role of xenobiotics in disease	BI 7.5	1
23.	*Biochemical Laboratory Biomarkers alterations in patients of Covid 19		1

Practical Syllabus with Teaching Hours & Competencies

- 1. Total Number of Practical hours including LCDS , Small group discussion, including tutorials and integrated teaching, revision practicals : 150 hours.**

List of Practicals, LCDs, Small group discussions etc.

First MBBS Practical Topics Total hours :34

SR NO	Name of Topic for Practical Skills assessment	Competency No.	Teaching method
1	Perform urine analysis to estimate and determine normal Constituents	11.4	DOAP
2	Perform urine analysis to estimate and determine abnormal Constituents	11.4,11.20	DOAP
3	Demonstrate the estimation of blood glucose	11.21	DOAP
4	Demonstrate the estimation of blood urea	11.21	DOAP
5	Demonstrate the estimation of serum creatinine and creatinine clearance	11.7,11.21	DOAP
6	Demonstrate estimation of serum proteins, albumin and A:G ratio	11.8,11.21,11.22	DOAP
7	Demonstrate the estimation of serum total cholesterol and HDLcholesterol	11.9	PRACTICAL
8	Demonstrate the estimation of triglycerides	11.10	PRACTICAL
9	Demonstrate estimation of calcium .	11.11	PRACTICAL
10	Demonstrate estimation of phosphorus .	11.11	PRACTICAL
11	Demonstrate estimation of Uric acid .	11.17	PRACTICAL
12	Demonstrate the estimation of serum bilirubin	11.12	PRACTICAL
13	Demonstrate the estimation of SGOT and SGPT	2.2,11.13	PRACTICAL
14	Demonstrate the estimation of alkaline phosphatase	11.14	PRACTICAL
15	C.S.F. Analysis	11.15	PRACTICAL

List of Lecture cum Demonstrations

C	Lecture cum Demonstrations		
SR NO	Name of Topic for Observation of Use of Equipments/ Techniques in Biochemistry Practical	Competency No.	Teaching method
1	Introduction to Biochemistry Laboratory Blood collection and anticoagulants	11.19	LCD
2	Common Laboratory instruments	B.I 11.16,11.19	LCD
3	First aid in Laboratory and Lab hazards	B.I. 11.1	LCD
4	Colorimetry	B.I 11.6	LCD
5	Autoanalyser	B.I B.I. 11.16	LCD
6	Spectrophotometry	B.I B.I.11.18	
7	pH meter	B.I 11.16	LCD
8	Paper chromatography of amino acid ,TLC	B.I. 11.5,11.16	LCD
9	Protein electrophoresis , PAGE	B.I. 11.16	LCD
10	Electrolyte analysis by ISE and Flammephotometry	B.I. 11.16	LCD
11	ABG analyzer	B.I. 11.16	LCD
12	ELISA	B.I. 11.16	LCD
13	Immunodiffusion	B.I. 11.16	LCD
14	Quality control	B.I. 11.16	LCD
15	DNA isolation from blood/ tissue	B.I. 11.16	LCD
16	GTT	B.I. 3.10	LCD
17	Advantages and disadvantages of use of fats in food	B.I.11.24	LCD
18	Calculate energy contents of different food items , identify food items with high and low glycemic index	11.23	LCD

Total Hours :36 Hours

List of SGDs - Basis and rational of tests in various conditions

Sr no	Name of Topic for Clinicobiochemical correlation – basis and rational of tests in various conditions	Competency No.	Teaching method
1	Diabetes mellitus	B.I.11.17	Small Group Discussion
2	Dyslipidemia, Myocardial infarction	B.I.11.17	Small Group Discussion
3	Renal failure,- proteinuria,- nephrotic syndrome	B.I.11.17	Small Group Discussion
4	Jaundice,- liver diseases	B.I.11.17	Small Group Discussion
5	Oedema , pancreatitis	B.I.11.17	Small Group Discussion
6	Disorders of acid- base balance	B.I.11.17	Small Group Discussion
7	Thyroid disorders	B.I.11.17	Small Group Discussion
8	Gout	B.I.11.17	Small Group Discussion

TOTAL HOURS : 16

Resolution No. 5.4 of Academic Council (AC-48/2023): Resolved to approve AETCOM competencies distribution from First MBBS 2023-24 batch onwards, as per new CBME guidelines published on 01.08.2023.

AETCOM Competencies Distribution for Biochemistry First MBBS from 23-24 batch onwards

(Ref: NMC letter No. U. 1 4021 1812023-UGMEB dated 01.08.23)

Subject	Competency Number	Competency
Biochemistry	Module 1.1,	Enumerate and describe the role of a physician in health care system
	Module 1.1	Describe and discuss the commitment to lifelong learning as an important part of physician growth.

One Brief Answer AETCOM question of 3 marks will be asked in paper 1 and paper 2 each.

(Ref: NMC letter No. U. 1 4021 1812023-UGMEB dated 01.08.23)

Resolution No. 5.8 of Academic Council (AC-48/2023)

Answer AETCOM question in Anatomy, Physiology and Biochemistry theory question paper I & II

Subject	Questions
Anatomy	Module 1.5 & 1.1 1. Physician role and responsibility to society and community that he serves 2. Duties of doctor 3. "Cadaver as our first teacher" Justify 4. Write a note on importance handling of biological tissues. 5. Need for biomedical waste management 6. Enumerate drum/bag colors used with the types of biomedical waste to be disposed in them. 7. Write note on things you will do & not do in dissection hall to show your respect for cadaver. 8. Enumerate different locations in medical colleges and hospitals where biomedical waste disposal
Physiology	Module 1.2, 1.3, 1.4 1. Empathy in patient care. 2. Rights of patients, 3. Responsibilities of patients 4. Write dos and don'ts of doctor-patient verbal communication. 5. Boundaries of the doctor-patient relationship 6. Essentials elements of communication skill 7. Barriers of communication. 8. Methods of communication
Biochemistry	Module 1.1 1. Enumerate and briefly describe the roles of IMG (physician) as per MCI. 2. Describe the role of a physician in health care system 3. Describe professional qualities of a physician. 4. Describe role of a physician in patient care 5. Outlook & Expectations of patient from physician 6. Effective listening 7. Nonverbal communication 8. Human dignity

Resolution No. 4.34 of Academic Council (AC-50/2024): Resolved to approve changes in First MBBS Biochemistry AETCOM Module 1.1 in theory as per new guidelines dated 12/ 9/24. It was also resolved to allot 6 hrs to Biochemistry AETCOM module 1.1 out of total 26 hrs. **[ANNEXURE-50]**

Resolution No. 4.32 of Academic Council (AC-50/2024): (iii) It was resolved to allot 6 hrs for biochemistry AETCOM 1.1 Module and redistribute questionnaire in Paper 1 and 2. **[Annexure-48]**

Annexure - 50 & 48 of AC-50/2024

**AETCOM Competencies Distribution for Biochemistry First MBBS from
2024-25 batch onward**

(Ref: NMC UG MED letter No. D-11011/500/2024/AC dated 12.09.24)

Subject	Paper	Module
Biochemistry	Paper -1	Module 1.1 <ul style="list-style-type: none"> Enumerate and describe professional qualities and the role of a physician. Describe and discuss commitment to lifelong learning as an important part of Physician growth
	Paper -2	Module 1.1 <ul style="list-style-type: none"> Describe and discuss the role of physician in Health care system Identify and discuss physician's role and responsibility to society and the community that he/she serves

One Brief Answer AETCOM question of 5marks will be asked in paper1 and paper2 each.

Subject	Paper	Module (Questionnaire)
Biochemistry	Paper -1	Module 1.1 <ul style="list-style-type: none"> Enumerate and describe the role of a (IMG) physician. Describe professional qualities of a physician. Effective listening Human dignity Describe and discuss commitment to lifelong learning as an important part of Physician growth
	Paper -2	Module 1.1 <ul style="list-style-type: none"> Describe and discuss the role of physician in Health care system Describe the role of physician in patient care Outlook and expectations of patients from physician Physician's role and responsibility to society and the community that he/she serves Duties of doctor

MGMIHS
1st year MBBS. CBME
Format for Internal assessment examinations

Sr. No.	Exam	Theory	Practical
1.	Internal assessment examinations	200	100
2.	Preliminary examination	200	100
Total		400	200

- Preliminary examination pattern will be as per University examination
- Respective colleges/ departments will conduct internal assessment examinations and maintain records of the same.

I MBBS (Anatomy, Physiology & Biochemistry)

Time – 3 hrs. **Preliminary / University examination**

(* Applicable from 2020-21 Batch onwards)

Each subject – 2 papers (I / II) – 100 X 2 = **Total 200 Marks**

Each paper –

- **Section A** – MCQ – 20 X 1 mark = **20 Marks**
 - **10% MCO i.e. 2 in each paper must be clinical based**

- **Section B** -

Q1. Answer any 5 out of 6 (BAQ) (5X3 marks =15 marks)

Q2. Answer any 3 out of 4 (SAQ) (3X5 marks =15 marks)

- 1 SAQ will be clinical application based
- 1 SAQ will be from **AETCOM modules (in Paper I)**

Q3. Answer any 1 out of 2(LAQ) (1X10 marks =10marks)

- LAQ should be structured (With defined marks distribution)

- **Section C** –

Q1. Answer any 5 out of 6 (BAQ) (5X3 marks =15marks)

Q2. Answer any 3 out of 4 (SAQ) (3X5 marks =15 marks)

Q3. Answer any 1 out of 2 (LAQ) (1X10 marks =10marks)

➤ LAQ should be structured (With defined marks distribution)

PRACTICAL EXAM PATTERN

(Formative Assessment)

Pattern	Marks
Q1- Long Quantitative Experiment	15
Q2- Urine Analysis	15
Q3- Spotting	10
Q4- Viva	10
Total	50

(Summative Assessment)

***Pattern of Preliminary/University Examination Biochemistry Practical:**

Total100 marks

Pattern	Marks
Q.A Long quantitative experiments	30
Q.B Urine Analysis	20
Spotting Q.C Quality Control Q.D .Interpretation of laboratory reports Q.E Interpretation of special techniques	25
Q.F communication Skill	05
Q.G Viva	20
Total	100

Internal assessment calculation

Sr. No.	Criteria	Theory	Practical
1.	*All internal assessment examinations including preliminary examination	25	10
	Day to Day assessment		

Resolution No. 4.8 of AC-41/2021: Resolved to approve the change in the pattern of Internal Assessment calculation, to be implemented from current batch of 1st MBBS (CBME) (i.e. AY- 2020-21) onwards

Annexure-27C of AC-41-2021

MGM Medical College, Navi Mumbai & Aurangabad

1st year MBBS CBME

INTERNAL ASSESSMENT CALCULATION

Sr. No.	Criteria	Theory	Practical
1.	*All internal assessment examinations including preliminary examination	50	50
2.	Day to Day assessment		
	➤ Day to Day assessment (PBL/ TBL/ Seminar/ MCQ test etc)	30	
	➤ Day to Day assessment (Viva/ Spotters/ OSPE / OSVE etc)		30
3.	Logbooks (Foundation Course, AETCOM, Competency logbook, SDL – each 5 marks)	20	
	Journals + ECE Logbook		20
Total		100	100

FORMAT FOR INTERNAL ASSESSMENT EXAMINATIONS

Sr. No.	Exam	Theory	Practical
1.	Internal assessment examinations (Midterm + Terminal)	200 (100 + 100)	100 (50 + 50)
2.	Preliminary examination	200	100
3.	Additional examination for students who have missed any of 3 internal assessment exams or are not qualifying	200	100

***Internal assessment examinations marks conversion to internal assessment marks -**

Student's internal assessment examinations scores [Midterm, Terminal, Preliminary and additional (where applicable)] will be converted to 50 marks each for theory and practical internal assessment.

Resolution No. 5.8 of Academic Council (AC-48/2023):

i. Resolved to approve internal assessment pattern of theory and practical for first professional MBBS from First MBBS 2023-24 batch onwards, as per new CBME guidelines published on 01.08.2023.

MGM Institute of Health Sciences, Navi Mumbai

Name of Institute:

Department of Anatomy/Physiology/Biochemistry

Faculty: MBBS	year/Phase1		Date: / /
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		Formative Assessment Theory			Continuous Internal assessment Theory						
Roll No.	Name of Student	1st PCT Theory	2 nd PCT Theory	Prelims Theory paper 1 & 2	Home Assignment	Continuous class test (LMS)	Seminar	Museum Study	Library Assignment	Attendance Theory	Total
							Self Directed Learning				
		100	100	200	15	30	15	15	15	10	500

Professor & Head

Department of _____

Name of Institute:

MGM Institute of Health Sciences, Navi Mumbai
Name of Institute:
Department of Anatomy/Physiology/Biochemistry

Faculty:MBBS				year/Phase1		Date: / /					
		Formative Assessment Practical			Continuous Internal assessment Practical						
Roll No.	Name of Student	1 st PCT Practical Exam	2 nd PCT Practical Exam	Prelims Practical Exam	Log Book (150)				Journals (Record book/ Portfolio)	Attendance Practical	Total
					Certifiable skill-based competencies (Through OSPE/OSCE/ Spots/Exercise/ other	AETCOM Competencies	SVL Lab Activity	Research			
		100	100	100	60	30	40	20	40	10	500

Professor & Head
Department of _____
Name of Institute

Resolution No. 4.7 of Academic Council (AC-50/2024):

Resolved to approve the structured format of internal assessment for all the subjects of first MBBS 2024-25 onwards. [ANNEXURE-27]

Annexure-27 of AC-50/2024

Internal Assessment Pattern for Theory and Practical

Phase -1 MBBS- (2024-25 CBME)

**FORMAT FOR INTERNAL ASSESSMENT EXAMINATION IN
ANATOMY, PHYSIOLOGY, BIOCHEMISTRY**

Sr. No.	Exam	Theory	Practical
1.	Internal assessment examinations	200	200
2.	Preliminary examination	200	100
Total		400	300

- Preliminary examination pattern will be as per University examination
- Respective colleges/ departments will conduct internal assessment examinations and maintain records of the same.

Sr. No.	Exam	Theory	Practical
1.	Internal assessment examinations (Midterm + Terminal)	200 (100 + 100)	200 (100 + 100)
2.	Preliminary examination	200	100
3.	<ul style="list-style-type: none">• Additional examination for students missing any of the three Internal Assessment exams / not qualifying for University Exam.• Marks to be computed as per the missed Exam / low score exam for non-qualifying students.	200/100	100

***Internal assessment examinations marks conversion to internal assessment marks -**
Student's internal assessment examinations scores [Midterm, Terminal, Preliminary and additional (where applicable)] will be converted to 50 marks for theory and 50 marks for Practical internal assessment.

INTERNAL ASSESSMENT CALCULATION (THEORY)

Sr. No.	Criteria	Theory
1.	*All internal assessment examinations including preliminary examination	50
2.	Day to Day assessment	
	Continuous class test (Minimum two – one in each term of 30 marks) (MCQ /SAQ/LAQ/BAQ/Home assignment etc.)	30
3.	Self-Directed Learning (SDL) (Seminar/ Case presentation/ PBL/ TBL)	15
4	Attendance	05
Total		100

INTERNAL ASSESSMENT CALCULATION (PRACTICAL)

Sr. No.	Criteria	Practical
1.	*All internal assessment examinations including preliminary examination	50
2.	Certifiable competencies assessment (Viva/ Spotters/ OSPE) & logbook (Minimum two – one in each term of 25 marks)	25
3.	AETCOM	10
4.	Journals +ECE	10
5	Attendance	05
Total		100

Mark Distribution for Attendance for Theory and Practical

Attendance in Percentage	Marks (Out of 5)
75 -80	2.5 -3
81- 85 %	3.1- 3.5
86 – 90 %	3.6- 4.0
91 – 95 %	4.1-4.5
96 – 100 %	4.6-5.0

In spite of all (Attendance of theory + practical, IA and Certifiable competency) measures, if student is still not meeting the criteria to be eligible for regular exam he shall be detained and offered remedial for same batch supplementary exam. For attendance, he will be allowed remedial measures only if attendance is more than 60% for each component.

Resolution No. 4.9 of Academic Council (AC-50/2024):

Resolved to approve the criteria of attendance in the pattern of eligibility to appear for professional examinations from First MBBS 2024-25 batch as per new CBME guidelines published on 12/09/2024.
[ANNEXURE-29]

Annexure-29 of AC-50/2024

The criteria of attendance of students for eligibility to university examination.

(Government of India National Medical Commission Letter no D-11011/500/2024-Academic Cell e- 8284443- UGMEB Dated 12/09/2024 page 39,40 and 42, 43)

I. Eligibility to appear for Professional examinations

The performance in essential components of training are to be assessed, based on Following three components:

Attendance

Internal Assessment

Certifiable Competencies Achieved:

(a) Attendance

There shall be a minimum of 75% attendance in theory and 80% attendance in practical /clinical for eligibility to appear for the examinations in that subject. In subjects that are taught in more than one phase - the learner must have 75% attendance in theory and 80% attendance in practical in each phase of instruction in that subject. There shall be a minimum of 75% attendance in AETCOM and minimum of 80% attendance in family visits under Family adoption 40 programme. Each student shall adopt minimum 3 families/ households and preferably five families. The details shall be as per Family Adoption Program guidelines.

o If an examination comprises more than one subject (for e.g., General Surgery and allied branches), the candidate must have a minimum of 75% attendance in each subject including its allied branches, and 80% attendance in each clinical posting. Learners who do not have at least 75% attendance in the electives will not be eligible for the Third Professional - Part II examination/ NExT.

Remedial measures:

A student whose has deficiency(s) in any of the 3 criteria that are required to be eligible to appear in university examination, should be put into remedial process as below:

During the course: If Internal assessment (IA) or attendance is less or/and certifiable competencies not achieved and marked in log book in quarterly/ six monthly monitoring, the students/parents must be intimated about the possibility of being detained much before the final university examination, so that there is sufficient time for remedial measures. These students should be provided remedial measures as and when needed to improve IA. Any certifiable competency/ IA marks deficiency should be attended with planned teaching/tests for them. Student should complete the remedial measures and it should be documented.

In spite of all above measures, if student is still not meeting the criteria to be eligible for regular exam he shall be offered remedial for the same batch supplementary exam. **For attendance, he will be allowed remedial measures ONLY IF attendance is more than 60% for each component.** At the end of phase: If Internal assessment (IA) or attendance is less or/and certifiable competencies not achieved and marked in log book at the end of regular classes in a phase, the student is detained to appear in regular university examination of that batch.

Resolution No. 5.8 of Academic Council (AC-48/2023): SOP for conduction of continuous internal assessment pattern of theory and practical including Attendance marks distribution tabular format for Anatomy, Physiology and Biochemistry [ANNEXURE-13]

**SOP for conduction of Continuous Internal Assessment for preclinical
Departments - Anatomy , Physiology and Biochemistry**

(As per NMC guidelines letter No. U. 1 4021 1812023-UGMEB dated 01.08.23)

SOP for conduction of Continuous Internal Assessment Theory/ Practical

1. Continuous Internal Assessment Theory : Total marks 100

A. Home assignment (15 marks) :

Minimum 03 assignments to be submitted by student as per following schedule.

- 1 st home assignment (5 marks): Before Ist PCT i.e. Midterm examination .
- 2nd home assignment (5 marks): Before II nd PCT i.e. First term examination.
- 3 rd home assignment (5 marks) : Before III rd PCT i.e. Prelim examination .

B. Continuous class tests (LMS 30 marks):

Minimum 03 class tests MCQ/SAQ/BAQ/LAQ to be conducted throughout the year for total 30 marks.

C. Self directed learning (45 marks): 10 hours

a. Seminar (15 marks) : 04 hours

- Each seminar to be given in group of 10-20 students as per directions of HOD of respective department .
- Total time allotted for presentation will be of 8-10 minutes followed by question answer session (maximum 02 min)
- Minimum 10 seminar topics should be completed throughout the year in allotted 04 hours for all students per subject i.e. 05 seminars of 10 min duration per hour.

b. Museum study (15 marks): 03 hours

- Minimum 01 specimen/model/ poster/ chart /graph/ lab instrument etc relevant to that particular subject should be given as museum study assignment .
- If museum is not available in the department or the relevant study material is available in museum of other department then collaboration can be done with that particular department where museum facility is available .
- 01 Hour will be allotted for 01 assignment .
- The students should submit assignments preferably as per given timeline or as decided by concerned HOD before Prelim examination .

c. Library assignment (15 marks):

- Minimum 01 library assignment of 03 hours duration per subject to be completed by student in library which will be given by Anatomy, Physiology and Biochemistry departments.
- The students should submit assignment preferably as per given timeline or as decided by concerned HOD before Prelim examination.

- Students should write assignment preferably on following topics which will be distributed amongst three departments i.e. 01 topic per department should be given to student.
 - Working of Central library, Various facilities available in library and library research tools, E-resources / e-Database available in library eg proquest, Uptodate, MUHS Digital library, NDL etc
 - How to use library resources for better research, Concept of textbook, journals, reference books, e- library.
 - SWAYAM, Shodhganga, E-Shodhsindhu and Antiplagiarism software

Attendance (Theory) : 10 marks

Every 10 % attendance in Theory will be given 01 mark.

Students having 75 % attendance in theory and 80 % attendandance in practical will only be eligible to appear for University examination.

Sr. No.	Attendance % (Theory)	Marks
1.	75-80	7.5-8.0
2.	81-85	8.1-8.5
3.	86-90	8.6-9.0
4.	91-95	9.1-9.5
5.	96-100	9.6-10.0

2. Continuous Internal Assessment Practical : Total marks 200

- Logbook : 150 marks
- Journal : 40 marks
- Attendance : 10 marks

A. Logbook : Logbook will have four sections as per following mark distribution.

*Section I : Certifiable skill based competencies

- Total marks : 60
- Assessment by OSPE/OSCE/Spots/exercises/Others etc evenly distributed throughout year.

*Section II :AETCOM Competencies (30 marks) to be assessed as per MGMIHS guidelines and evenly distributed throughout year.

*Section III :SVL Lab activity (40 marks): Minimum 01 activity one per term .

*Section IV :Research (20 marks) : Students shall do minimum 02 activity /department evenly distributed throughout year like

- Participation in Student induction program on Research.
- Visit to Central Research facilities .
- Small Group Discussion : Students will discuss topic related to research in group of maximum 20 students under supervision of teacher.
- Data Collection
- Simple audit.
- Participation in Poster presentation activity on topics related to Research. One topic can be given to a group of maximum 20 students.
- Any other.

B. Journal :40 marks

Ist PCT Journal marks : 10

II nd PCT Journal marks :10

Prelim Journal marks: 20

Journal marks will be counted under independent head other than formative practical assessment .

C. Attendance practical : 10 marks

Every 10 % attendance in practical will be given 01 mark.

Sr. No.	Attendance % (Practical)	Marks
1.	75-80	7.5-8.0
2.	81-85	8.1-8.5
3.	86-90	8.6-9.0
4.	91-95	9.1-9.5
5.	96-100	9.6-10.0

Formative assessments (Theory): 400 marks

- Ist PCT i.e. Midterm examination to be conducted preferably after completing first three months of academic calender or as per MGMIHS academic calender : 100 marks.
- II nd PCT i.e. First term examination to be conducted preferably after completing six months of academic academic calender or as per MGMIHS academic calender: 100 marks.
- III rd PCT i.e. Prelim examination to be conducted preferably after completing eight months of academic academic calender or as per MGMIHS academic calender : 200 marks.

Formative assessments (Practical): 300 marks

- Ist PCT i.e. Midterm examination to be conducted preferably after completing first three months of academic calender or as per MGMIHS academic calender : 100 marks.
- II nd PCT i.e. First term examination to be conducted preferably after completing six months of academic academic calender or as per MGMIHS academic calender: 100 marks.
- III rd PCT i.e. Prelim examination to be conducted preferably after completing eight months of academic academic calender or as per MGMIHS academic calender : 100 marks.

Note : Students should attend all internal examinations. If student is unable to attend any exam due to unavoidable circumstances/medical reasons, he will have to take permission of Head of the institution to appear for only one additional examination which will be conducted after prelim exam.

***Resolution No. 4.7 of AC-41/2021:** Resolved to approve the distribution of the MCQs marks system/topic wise for Theory Paper I & II of 1st MBBS (CBME) Physiology and Biochemistry, effect from the batch admitted in 2020-21 onwards

Annexure-26B of AC-41-2021

MGMIHS

I MBBS CBME Biochemistry

MCQs Mark Distribution for University Theory Examination

Biochemistry Paper-I

Total marks 20

Sr. No.	Topic	MCQs (20)
1	Cell	01
2	Enzymes	03
3	Chemistry and metabolism of proteins	02
4	Chemistry and metabolism of purines and pyrimidines and related disorders.	02
5	Molecular Biology	05
6	Chemistry and Metabolism of hemoglobin.	02
7	Biological oxidation.	01
8	Immunology	01
9	Vitamins	02
10	Nutrition	01
11	Biochemical laboratory, Biomarkers alteration in patients of COVID-19	00

Biochemistry Paper-II

Total marks 20

Sr. No.	Topic	MCQs
1	Chemistry and metabolism of carbohydrates	02
2	Chemistry and metabolism of lipids	02
3	Mineral metabolism	02
4	Acid base balance and imbalance.	02
5	Water and electrolyte balance & imbalance.	01
6	Integration of various aspects of metabolism and their regulatory pathways.	01
7	Starvation metabolism	01
8	Mechanism of hormone action.	01
9	Organ Function Tests	03
10	Detoxification mechanisms.	01
11	Biochemical basis of cancer and carcinogenesis.	02
12	Oxidative stress and Antioxidants in Health and Disease	01
13	Extracellular Matrix	01

Annexure-49 of AC-50/2024

Phase -1 MBBS, CBME (2024-25)

FORMAT FOR EXAM PATTERN (THEORY AND PRACTICAL)

Preliminary / University examination Pattern (Theory)

Paper I & II – 100 X 2 = Total 200 Marks

Each paper –

❖ **Section A – MCQ – 20 X 1 mark = 20 Marks**

(Scenario based MCQs shall be accorded a weightage of 10 % of the total marks (100) i.e. 10 Marks in each theory paper)

Section B -

Q.1. Answer any 5 out of 6 (BAQ) - 5 X 3 =15 marks

(2 BAQs will be as reasoning question in Paper I & II)

Q.2. Answer any 3 out of 4 (SAQ) - 3 X 5=15 marks

(1 SAQ will be clinical application based in paper I&II excluding integrated topics)

(1 SAQ will be from AETCOM modules in Paper I & II)

Q.3. Answer any 1 out of 2(LAQ) - 1 X 10 =10 marks

LAQ should be structured (With defined marks distribution)

❖ **Section C –**

Q.1. Answer any 5 out of 6 (BAQ) - 5 X 3 =15 marks

(2 BAQs will be as reasoning question in Paper I & II)

Q.2. Answer any 3 out of 4 (SAQ) - 3 X 5=15 marks

(2 SAQs will be on integrated topics in paper I&II)

Q.3. Answer any 1 out of 2(LAQ) - 1 X 10=10 marks

LAQ should be structured (With defined marks distribution)

Integrated topics for Biochemistry

Sr. No.	Integrated topics
1	Cell membranes and organelles and ECM
2	Clinical Enzymology
3	Disorders related to Carbohydrate, Protein and Lipid chemistry and metabolism
4	Hemoglobin chemistry and metabolism and disorders
5	Vitamins
6	Nutrition
7	Acid base balance and imbalance
8	Water and Electrolyte balance and imbalance
9	Purine and Pyrimidine metabolism
10	Molecular Biology
11	Organ Function tests
12	Oncology
13	Mineral metabolism
14	Reproductive hormones, Prenatal and Newborn screening
15	Free radicals, Antioxidants and Xenobiotics

- **Pattern of Theory PCT I and II is same as above**

Suggested Phase-I Alignment Table (Anatomy, Physiology & Biochemistry) (Topics written here are indicative and can be adjusted if required)			
Month	Anatomy	Physiology	Biochemistry
1	-General Anatomy -Lower Limb (LL)	General Physiology, Blood	Cell membrane and organelles, extracellular matrix, Chemistry of carbohydrates, amino-acid & proteins, Lab Safety and Biomedical Waste Management and Chromatography (Demo)
2	-LL/UL -General Embryology & Histology	Blood, N-M	Plasma protein, immunoglobulins, Enzymes, Hemoglobin structure and Hemoglobinopathies, Electrophoresis (Demo), Heme synthesis, Porphyria's, Hemecatabolism, iron metabolism (mineral) Bilirubin formation, Jaundice, colorimetry (Demo)
3	UL -General Embryology & Histology	ANS, CVS	Clinical Enzymology, Chemistry of lipids, and lipoprotein metabolism, carbohydrate metabolism, vitamins, Estimation of Protein and albumin
4	-Abdomen -Related Systemic Embryology & Histology	GIT, Renal	Vitamins, Nutrition, Liver Function Tests, Renal Function Tests, acid-base balance and its disorders, water and electrolyte normal and abnormal analysis of urine(DOAP), Estimation of Urea, creatinine
5	-Abdomen,Pelvis -Related Systemic Embryology & Histology	GIT (contd.), Repro.	Metabolism of proteins and their metabolic disorders, Metabolism of carbohydrates and their metabolic disorders, Diabetes mellitus, Electron transport chain and oxidative phosphorylation, Xenobiotics, Estimation of Glucose.
6	-Thorax -Related systemic Embryology & Histology	Repro (contd.), RS	Metabolism of lipids (remaining) and disorders, Metabolism of proteins, minerals, vitamins, Reproductive Hormones, Prenatal screening, new born screening.
7	H & N-I -Related Systemic Embryology & Histology, Genetics	Endocrine (Neck region), CNS	Hormone Biochemistry; Tumour markers and, Thyroid Function Tests, Adrenal Function tests, Free radicals, and antioxidants
8	H & N-II -Related Systemic Embryology & Histology, Genetics	CNS contd , Special senses	Purine and pyrimidines metabolism, gout, purine salvage pathway, replication, DNA damage and repair mechanism, transcription, translation, post-translational modifications, protein synthesis inhibitors, genetic code, and mutations, estimation of uric acid
9	- Neuroanatomy -Related Systemic Embryology & Histology	CNS (Contd.) Integrated physiology	Molecular biology techniques and Miscellaneous.

Pattern for Internal examination PCT I & II (Practical)

Pattern	Marks
Q.A) Case based Long quantitative experiments	30
Q.B) Urine Analysis and Interpretation	20
Q.C) Spot test /OSPE	30
Q.E) Viva	20
Total	100

Pattern for Preliminary & University Examination (Practical)

Pattern	Marks
Q.A) Case based Long quantitative experiments	30
Q.B) Urine Analysis and Interpretation	20
Spotting/OSPE Q.C) Quality Control Q.D) Interpretation of laboratory reports Q.E) Interpretation of special techniques/Laboratory Instruments	30
Q.G) Viva	20
Total	100

MGMIHS
I MBBS CBME
UNIVERSITY EXAMINATION PATTERN

I MBBS – BIOCHEMISTRY

Part of exam	Marks
Theory Paper I	100 Marks
Theory Paper II	100 Marks
Practical	100 Marks
Total	300 Marks

INTERNAL ASSESSMENT CALCULATION

Sr. No.	Criteria	Theory	Practical
1.	*All internal assessment examinations including preliminary examination	50	50
2.	Day to Day assessment		
	➤ Day to Day assessment (PBL/ TBL/ Seminar/ MCQ test etc)	30	
	➤ Day to Day assessment (Viva/ Spotters/ OSPE / OSVE etc)		30
3.	Logbooks (Foundation Course, AETCOM, Competency logbook, SDL – each 5 marks)	20	
	Journals + ECE Logbook		20
Total		100	100

FORMAT FOR INTERNAL ASSESSMENT EXAMINATIONS

Sr. No.	Exam	Theory	Practical
1.	Internal assessment examinations (Midterm + Terminal)	200 (100 + 100)	100 (50 + 50)
2.	Preliminary examination	200	100
3.	Additional Exam <ul style="list-style-type: none"> For students missing any of the three Internal Assessment exams / not qualifying for University Exam. Marks to be computed as per the missed Exam / low score exam for non qualifying students. 	200	100

Total	400	200
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***Internal assessment examinations marks conversion to internal assessment marks -**

Theory – Total 400 marks will be converted to 50

Practical – Total 200 marks will be converted to 50

BLUEPRINT OF UNIVERSITY QUESTION PAPER

I.THEORY EXAMINATION PATTERN

1. 1. Theory Question Paper Pattern:

Two papers each of 3 hours duration and carrying 100 marks each.

1.2. Marks distribution for each paper:

Type of question	Numbers X Marks	Total marks
Multiple Choice Questions	20 X 1	20
Long Answer Questions (LAQ)	2 X 10	20
Short Answer Questions (SAQ)	6 X 5	30
Brief Answer Questions (BAQ)	10 X 3	30
Total		100

Each Paper is divided into 3 sections:

Section A: MCQ 20 marks

Section B: 40 marks: BAQ 5/6 x 3= 15; SAQ 3/4 x 5= 15; LAQ 1/2 x 10 = 10

Section C: 40 marks: BAQ 5/6 x 3= 15; SAQ 3/4 x 5= 15; LAQ 1/2 x 10 = 10

1.3. Paper I & Paper II Contents

1.3.a. Paper I

- Cell
- Enzyme.
- Chemistry and metabolism of proteins.
- Chemistry and metabolism of purines and pyrimidines and related disorders
- Molecular biology
- Chemistry and Metabolism of hemoglobin.
- Biological oxidation.
- Immunology, Concept of vaccine development
- Vitamins
- Nutrition
- Biochemical laboratory, Biomarkers alteration in patients of COVID-19
- AETCOM – 1 SAQ (Module – 1.4)

1.3.b. Paper II

- Chemistry and metabolism of carbohydrates.
- Chemistry and metabolism of lipids.
- Mineral metabolism: Water and electrolyte balance & imbalance.
- Acid base balance and imbalance.
- Integration of various aspects of metabolism and their regulatory pathways.
- Starvation metabolism.
- Mechanism of hormone action.
- Liver function tests, Kidney function tests, Thyroid function tests, Adrenal function tests.
- Detoxification mechanisms, Role of xenobiotics in disease
- Biochemical basis of cancer and carcinogenesis, Apoptosis

- Oxidative stress & Antioxidants in health & diseases.
- ECM

1.4. Note to exam paper setters (Ref.: GMER 2019- Assessment)

1.4.A Multiple Choice Questions (MCQs) (20X1=20 Marks)		
<ul style="list-style-type: none"> • 10 % of MCQ marks should be from clinically based questions (Any 2) 		
1.4. B Brief Answer Questions (BAQs) (10X3=30 Marks)		
Various Levels of Cognitive Domain must be considered as follows:		
Level of cognitive domain	Number of questions	Marks
Knowledge	3	3X3=9
Comprehension	3	3X3=9
Application	2	2X3=6
Analysis	2	2X3=6
Synthesis	1	1X3=3
Evaluation	1	1X3=3
1.4. C Short Answer Questions (SAQs) (6X5=30 Marks)		
1 SAQ will be clinical application based (In section B)		
1 SAQ will be from AETCOM modules (In Paper I)		
Various Levels of Cognitive Domain must be considered as follows:		
Level of cognitive domain	Number of questions	Marks
Knowledge	2	2X5=10
Comprehension	2	2X5=10
Application	1	1X5=5
Analysis	1	1X5=5
Synthesis	1	1X5=5
Evaluation	1	1X5=5
1.4.D Long Answer Question (LAQ) (2X10=20 Marks)		
<ul style="list-style-type: none"> • Long Answer Questions (LAQ) in both Papers I & II must be structured, covering various levels of cognitive domain. 		

1.4.E Percentage of marks allotted to various levels of cognitive domains:

Level of cognitive domain	Marks (Total = 76)	Percentage (%)
1. Knowledge	19	25
2. Comprehension	19	25
3. Application	11	15
4. Analysis	11	15
5. Synthesis	8	11
6. Evaluation	8	10

1.4.F Verbs in various levels in Knowledge domain.

Level	Suggested Verbs
Knowledge (Remember)	Define, describe, Draw, Find, Enumerate, Cite, Name, Identify, List, Label, Match, Sequence, Write, State
Comprehension (Understand)	Discuss, Conclude, Articulate, Associate, Estimate, Rearrange, Demonstrate understanding, Explain, Generalise, Identify, Illustrate, Interpret, Review, Summarise
Application (Apply)	Apply, Choose, Compute, Modify, Solve, Prepare, Produce, Select, Show, Transfer, Use
Analysis (Analyze)	Analyse, Characterise, Classify, Compare, Contrast, Debate, Diagram, Differentiate, Distinguish, Relate, Categorise
Synthesis (Create)	Compose, Construct, Create, Verify, Determine, Design, Develop, Integrate, Organise, Plan, Produce, Propose, Rewrite
Evaluation (Evaluate)	Appraise, Assess, Conclude, Critic, Decide, Evaluate, Judge, Justify, Predict, Prioritise, Prove, Rank

(Reference GMER-2019, Assessment Module Page no.17& Revised Bloom's Taxonomy by Anderson, L.W. et al in (2001))

1.5. Topic wise weightage of marks

Paper I

Sr. No.	Topic	MCQs (20)	LAQ/SAQ/BAQ
1	Cell	01	5
2	Enzymes	03	15
3	Chemistry and metabolism of proteins	02	20
4	Chemistry and metabolism of purines and pyrimidines and related disorders.	02	15
5	Molecular Biology	05	15
6	Chemistry and Metabolism of Hemoglobin.	02	10
7	Biological oxidation.	01	10
8	Immunology	01	5
9	Vitamins	02	15
10	Nutrition	01	6
11	Biochemical laboratory, Biomarkers alteration in patients of COVID-19	00	00

Paper II

Sr. No.	Topic	MCQs	LAQ/ SAQ/ BAQ
1	Chemistry and metabolism of carbohydrates	02	20
2	Chemistry and metabolism of lipids	02	20
3	Mineral metabolism	02	10
4	Acid base balance and imbalance.	02	10
5	Water and electrolyte balance & imbalance.	01	5
6	Integration of various aspects of metabolism and their regulatory pathways.	01	5
7	Starvation metabolism	01	9
8	Mechanism of hormone action.	01	5
9	Organ Function Tests	03	10
10	Detoxification mechanisms.	01	5
11	Biochemical basis of cancer and carcinogenesis.	02	7
12	Oxidative stress and Antioxidants in Health and Disease	01	5
13	Extracellular Matrix	01	5

BLUEPRINT OF UNIVERSITY QUESTION PAPER.

THEORY EXAMINATION PATTERN

1. 1. Theory Question Paper Pattern:

Two papers each of 3 hours duration and carrying 100 marks each.

1.2. Marks distribution for each paper:

Type of question	Numbers X Marks	Total marks
Multiple Choice Questions	20 X 1	20
Long Answer Questions (LAQ)	2 X 10	20
Short Answer Questions (SAQ)	6 X 5	30
Brief Answer Questions (BAQ)	10 X 3	30
Total		100

Each Paper is divided into 3 sections:

Section A: MCQ 20 marks

Section B: 40 marks: BAQ 5/6 x 3= 15; SAQ 3/4 x 5= 15; LAQ 1/2 x 10 = 10

Section C: 40 marks: BAQ 5/6 x 3= 15; SAQ 3/4 x 5= 15; LAQ 1/2 x 10 = 10

1.3. Paper I & Paper II Contents

1.3.a. Paper I

- Cell
- Enzyme.
- Chemistry and metabolism of proteins.
- Chemistry and metabolism of purines and pyrimidines and related disorders
- Molecular biology
- Chemistry and Metabolism of hemoglobin.
- Biological oxidation.
- Immunology, Concept of vaccine development
- Vitamins
- Nutrition
- Biochemical laboratory, Biomarkers alteration in patients of COVID-19
- AETCOM – 1 BAQ (Module – 1.1)

1.3.b. Paper II

- Chemistry and metabolism of carbohydrates.
- Chemistry and metabolism of lipids.
- Mineral metabolism: Water and electrolyte balance & imbalance.
- Acid base balance and imbalance.
- Integration of various aspects of metabolism and their regulatory pathways.
- Starvation metabolism.
- Mechanism of hormone action.
- Liver function tests, Kidney function tests, Thyroid function tests, Adrenal function tests.
- Detoxification mechanisms, Role of xenobiotics in disease
- Biochemical basis of cancer and carcinogenesis, Apoptosis
- Oxidative stress & Antioxidants in health & diseases.
- ECM
- AETCOM – 1 BAQ (Module – 1.1)

1.4. Note to exam paper setters (Ref.: GMER 2019- Assessment)

1.4.A Multiple Choice Questions (MCQs) (20X1=20 Marks)		
<ul style="list-style-type: none">10 % of MCQ marks should be from clinically based questions (Any 2)		
1.4. B Brief Answer Questions (BAQs) (10X3=30 Marks)		
<ul style="list-style-type: none">2 BAQs will be from AETCOM module 1.1 will be there in each paper		
Various Levels of Cognitive Domain must be considered as follows:		
Level of cognitive domain	Number of questions	Marks
Knowledge	3	3X3=9
Comprehension	3	3X3=9
Application	2	2X3=6
Analysis	2	2X3=6
Synthesis	1	1X3=3
Evaluation	1	1X3=3
1.4. C Short Answer Questions (SAQs) (6X5=30 Marks)		
1 SAQ will be clinical application based (In section B)		
Various Levels of Cognitive Domain must be considered as follows:		
Level of cognitive domain	Number of questions	Marks
Knowledge	2	2X5=10
Comprehension	2	2X5=10
Application	1	1X5=5
Analysis	1	1X5=5
Synthesis	1	1X5=5
Evaluation	1	1X5=5
1.4.D Long Answer Question (LAQ) (2X10=20 Marks)		
<ul style="list-style-type: none">Long Answer Questions (LAQ) in both Papers I & II must be structured, covering various levels of cognitive domain.		

1.4.E Percentage of marks allotted to various levels of cognitive domains:

Level of cognitive domain	Marks (Total = 76)	Percentage (%)
1. Knowledge	19	25
2. Comprehension	19	25
3. Application	11	15
4. Analysis	11	15
5. Synthesis	8	11
6. Evaluation	8	10

1.4.F Verbs in various levels in Knowledge domain.

Level	Suggested Verbs
Knowledge (Remember)	Define, describe, Draw, Find, Enumerate, Cite, Name, Identify, List, Label, Match, Sequence, Write, State
Comprehension (Understand)	Discuss, Conclude, Articulate, Associate, Estimate, Rearrange, Demonstrate understanding, Explain, Generalise, Identify, Illustrate, Interpret, Review, Summarise
Application (Apply)	Apply, Choose, Compute, Modify, Solve, Prepare, Produce, Select, Show, Transfer, Use
Analysis (Analyze)	Analyse, Characterise, Classify, Compare, Contrast, Debate, Diagram, Differentiate, Distinguish, Relate, Categorise
Synthesis (Create)	Compose, Construct, Create, Verify, Determine, Design, Develop, Integrate, Organise, Plan, Produce, Propose, Rewrite
Evaluation (Evaluate)	Appraise, Assess, Conclude, Critic, Decide, Evaluate, Judge, Justify, Predict, Prioritise, Prove, Rank

(Reference GMER-2019, Assessment Module Page no.17& Revised Bloom's Taxonomy by Anderson, L.W. et al in (2001))

1.5. Topic wise weightage of marks

Paper I

Sr. No.	Topic	MCQs (20)	LAQ/SAQ/BAQ
1	Cell	01	5
2	Enzymes	03	15
3	Chemistry and metabolism of proteins	02	20
4	Chemistry and metabolism of purines and pyrimidines and related disorders.	02	12
5	Molecular Biology	05	15
6	Chemistry and Metabolism of Hemoglobin.	02	10
7	Biological oxidation.	01	10
8	Immunology	01	5
9	Vitamins	02	15
10	Nutrition	01	6
11	Biochemical laboratory, Biomarkers alteration in patients of COVID-19	00	00
12	AETCOM - module 1.1	00	03

Paper II

Sr. No.	Topic	MCQs	LAQ/ SAQ/ BAQ
1	Chemistry and metabolism of carbohydrates	02	20
2	Chemistry and metabolism of lipids	02	20
3	Mineral metabolism	02	10
4	Acid base balance and imbalance.	02	10
5	Water and electrolyte balance & imbalance.	01	5
6	Integration of various aspects of metabolism and their regulatory pathways.	01	5
7	Starvation metabolism	01	6
8	Mechanism of hormone action.	01	5
9	Organ Function Tests	03	10
10	Detoxification mechanisms.	01	5
11	Biochemical basis of cancer and carcinogenesis.	02	7
12	Oxidative stress and Antioxidants in Health and Disease	01	5
13	Extracellular Matrix	01	5
14	AETCOM module 1.1	00	03

Resolution No. 4.8 of Academic Council (AC-50/2024):

Resolved to approve changes in format of university & preliminary examination pattern for Theory paper I & II for all the three subjects- Anatomy, Physiology & Biochemistry as per new CBME guidelines dated 12/9/24 with inclusion of 10 scenario based MCQ, reasoning questions in BAQ and clinical as well as integrated topics in SAQ.
[ANNEXURE-28]

Annexure-28 of AC-50/2024

Phase -1 MBBS, CBME (2024-25)

Preliminary / University examination Pattern (Theory)

Paper I & II – 100 X 2 = Total 200 Marks

Each paper – Time – 3 hrs.

Total- 100 Marks

❖ **Section A – MCQ – 20 X 1 mark = 20 Marks**

(Scenario based MCQs shall be accorded a weightage of 10 % of the total marks (100) i.e. 10 Marks in each theory paper)

❖ **Section B -**

Q.1. Answer any 5 out of 6 (BAQ) - 5 X 3 =15 marks

(3 BAQ will be as reasoning question in Paper I & II)

Q.2. Answer any 3 out of 4 (SAQ) - 3 X 5=15 marks

(1 SAQ will be clinical application based in paper I&II excluding integrated topics)

1 SAQ will be from AETCOM modules in Paper I & II)

Q.3. Answer any 1 out of 2 (LAQ) - 1 X 10 =10 marks

LAQ should be structured (With defined marks distribution)

❖ **Section C –**

Q.1. Answer any 5 out of 6 (BAQ) - 5 X 3 =15 marks

(3 BAQ will be as reasoning question in Paper I & II)

Q.2. Answer any 3 out of 4 (SAQ) - 3 X 5=15 marks

(2 SAQ will be on integrated topic in paper I&II)

Q.3. Answer any 1 out of 2 (LAQ) - 1 X 10=10 marks

LAQ should be structured (With defined marks distribution)

Integrated topics: anemia, ischemic heart disease, diabetes mellitus, tuberculosis, hypertension and thyroid.

- **Pattern of Theory PCT I and II is same as above**

2. PRACTICAL EXAMINATION PATTERN

2.1. Total Practical Marks

100 marks

Pattern	Marks
Q. A long Quantitative Experiment	30
Q. B Urine Analysis	20
Spotting Q. C Quality Control Q. D Interpretation of Laboratory results Q. E Interpretation of special Techniques	25
Q. F communication skills	5
Q.G Viva (Paper I & Paper II)	20
Total	100

Eligibility to appear for university exams	
Internal Assessment (Theory + Practical)	50% [combined Theory and Practical] [Theory - minimum 40% Practical- minimum 40%]
Criteria for pass in university exams	
Theory	50% Aggregate (Paper I + Paper II) [Each Paper minimum 40%]
Practical	50%

Resolution No. 5.10 of Academic Council (AC-48/2023): Resolved to accept University passing criteria as per CBME guidelines published on 01.09.2023 from First MBBS 2023-24 batch onwards (Ref F.No. U/14021/8/2023-UGMEB Corrigendum Amended Page 58 guidelines) [ANNEXURE-18].

Criteria of passing in subject

(Reference No: U/14021/8/2023-UGMEB 2023)

<p>In subjects that have two papers, the learner must secure minimum 40% of marks in aggregate (both papers together) to pass in the said subject.</p>
<p>Criteria for passing in a subject: A candidate shall obtain 50% marks in aggregate and 60: 40 (minimum) or 40:60 (minimum) in University conducted examination separately in Theory and in Practical (practical includes; practical/clinical and viva voce) in order to be declared as passed in that subject.</p>

Model Question Paper For University Theory Exam

Department Of Biochemistry

Ist MBBS CBME

Annexure No 29C of AC-41/2021

Resolution No. 4.10 of AC-41/2021

effective from 2021-22 onwards and to be revised

as per question paper blue printing format

as per 4.9 of AC-41/2021 in next BOS

Paper-I

Section B

Q.1 Answer any 5 out of 6 (SAQ)

5 x 3 = 15 Marks

- a) Causes and clinical features of Pellagra
- b) Structure and functions of Mitochondria
- c) Write any six biologically important peptides with functions
- d) Inhibitors of translation
- e) Enlist the specialized products formed from tyrosine
- f) Enzyme pattern in myocardial infarction

Q.2 Answer any 3 out of 4 (BAQ)

3 x 5 = 15 Marks

- a) Role of a physician in health care system
- b) Lac Operon concept of gene expression
- c) Cell mediated immunity
- d) A ten year old boy from rural area was brought to OPD for complaints of diminished vision in dim light. His cornea was ulcerated and there were white patches on conjunctiva.
 - I) Name vitamin deficient (1 Mark)
 - II) Give its RDA (1 Mark)
 - III) Explain it's biochemical role (3 Mark)

Q.3 Answer any 1 out of 2 (LAQ)

1 x 10 = 10 Marks

- a) Describe the pathway for biosynthesis of urea from ammonia. Add a note on metabolic disorders of urea cycle. (6 +4= 10 Marks)
- b) Describe various complexes of Electron Transport Chain. State sites of ATP synthesis. Add a note on inhibitors and uncouplers. (5 +2 + 3= 10 Marks)

Section C

Q.1 Answer any 5 out of 6 (SAQ)

5 x 3 = 15 Marks

- a) Functions of plasma proteins
- b) Denaturation
- c) Coenzymes-definition and any 3 biochemical reactions
- d) Genetic code
- e) Purine salvage pathway
- f) Role of fibers in diet

Q.2 Answer any 3 out of 4 (BAQ)

3 x 5 = 15 Marks

- a) Sickel cell anemia
- b) 42 years old male presented with complaints of severe pain in right toe and knee joint. Laboratory analysis revealed elevated serum Uric acid levels.
 - I. Name the disease (1 Mark)
 - II. Name metabolism affected (1 Mark)
 - III. What is probable cause (2 Mark)
 - IV. Name any two drugs used in treatment of above disease . (1 Mark)
- c) Describe Wald's visual cycle
- d) Applications of recombinant DNA technology

Q.3 Answer any 1 out of 2 (LAQ)

1 x 10 = 10 Marks

- a) Define enzyme inhibition. List various types of . enzyme inhibition . Describe competitive inhibition in detail with examples .(1 +2 + 7= 10 Marks)
- b) Describe the sources, RDA, biochemical functions and deficiency manifestations of Vitamin B 12 . (1 +1 + 4 + 4= 10 Marks)

Model Question Paper For University Theory Exam

Department Of Biochemistry

Ist MBBS CBME

Paper-II

Section B

Q.1 Answer any 5 out of 6 (SAQ)

5 x 3 = 15 Marks

- a) Role of calcitonin in regulation of calcium homeostasis
- b) Phase II reactions of detoxification
- c) Causes and clinical features of Wilson's disease,
- d) Structure and function of Elastin
- e) Liver function tests based on detoxification and excretory function.
- f) Write any three Glucose transporters with functions

Q.2 Answer any 3 out of 4 (BAQ)

3 x 5 = 15 Marks

- a) Metabolic interrelationship among adipose tissue, liver and extrahepatic tissue.
- b) Explain briefly on storage and absorption iron from intestine.
- c) What are the functional and therapeutic role of prostaglandins.
- d) A patient was brought to the hospital in state of coma. Acetone could be smelled on his breath. His investigation revealed following findings- Physical findings showed dehydration. Blood sugar- 270 mg/ dL, urine Benedict's test- Positive, urine Rothera's test – Positive, Blood pH-0.75

- I. What is probable diagnosis? (1 Mark)
- II. What does Positive Rothera's test indicate ? (1 Mark)
- III. Why is patient's Blood pH lower than normal ? (2 Marks)
- IV. What possible treatment should the patient be given ? (1 Mark)

Q.3 Answer any 1 out of 2 (LAQ)

1 x 10 = 10 Marks

- a) Define gluconeogenesis. Describe how glucose is synthesized from alanine and add a note on its regulation. (2 +6 + 2= 10 Marks)
- b) Discuss in detail the mechanism by which kidney maintains the blood pH. What is meant by metabolic acidosis and how it is compensated. (1 +6 + 3= 10 Marks)

Section C

Q.1 Answer any 5 out of 6 (SAQ)

5 x 3 = 15

- a) Regulation of cholesterol synthesis
- b) Write the enzyme defect and clinical features of Galactosemia
- c) Oncogenes in carcinogenesis
- d) Biochemical changes within 48 hrs of starvation.
- e) Mechanism of hormone action at nuclear level.
- f) Enumerate thyroid function tests and normal values T3 and T4

Q.2 Answer any 3 out of 4 (BAQ)

3 x 5 = 15

- a) Discuss the regulation of glycogen metabolism
- b) Function of phospholipids.
- c) Name the ketone bodies. Describe the process of ketogenesis. List the condition that lead to ketoacidosis
- d) Free radical scavenger mechanism.

Q.3 Answer any 1 out of 2 (LAQ)

1 x 10 = 10

- a) Name the site where beta oxidation of fatty acid occurs. Describe the steps involved in beta oxidation of fatty acids. Explain how much energy is released in beta oxidation of one molecule of palmitic acid. (1 + 6 + 3 = 10 Marks)
- b) Define Kreb's cycle. Describe the reactions of Kreb's cycle. Add a note on its energetics and significance. (1 + 6 + 1 + 2 = 10 Marks)

Resolution No. 5.11 of Academic Council (AC-48/2023): Resolved to accept revised books of list for Anatomy, Physiology and Biochemistry from first MBBS 2023-24 Batch onwards

LIST OF BIOCHEMISTRY BOOKS FOR FIRST MBBS-2023-24

(UNDERGRADUATE COURSE /POSTGRADUATE COURSE)

A. TEXT BOOKS

S.N.	Name of the book	Name of the Author
1	Biochemistry for Medical student	D M Vasudevan & Shree Kumari
2	Text Book of Medical Biochemistry	U Satanarayan
3	Textbook of Biochemistry	M. Rafi
4	Medical Biochemistry	Pankaja Naik

B. PRACTICAL BOOKS

S.N.	Name of the book	Name of the Author
1	Manual of practical Biochemistry	M. Rafi
2	Biochemistry Review	U Satanarayan
3	Manual of practical Biochemistry	D M Vasudevan & Shree Kumari
4	Manual of practical Biochemistry	Dr. S. K. Gupta

C.REFERENCE BOOK

S.N.	Name of the book	Name of the Author
1	Harper's illustrated Biochemistry	Robert K Murray
2	Lipponcott's illustrated Reviews	Richard A Harvey
3	Biochemistry	Dinesh Puri
4	Biochemistry	Devlin
5	Biochemistry	Lubert. Stryer
6	Medical Biochemistry	N V Bhagwan
7	Text Book Of Biochemistry	Chaterjee, R. Shinde

Resolution No. 4.13 of AC-41/2021: Resolved to approve the two books - Communication skills & Early clinical Exposure, as reference books for Medical College Library and departments

1. Communication Skills in Clinical Practice - KR Sethuraman
2. Textbook of Early clinical Exposure Setting and Planning - Dr. Motilal C Tayade

Resolution No. 3.3 of Academic Council (AC-42/2022): Resolved to approve SLOs of competencies from BI 1.1 to B.I. 10.5 of Biochemistry theory and B.I.11.1-11.24 of practical curriculum as per CBME curriculum in the programme First MBBS Biochemistry for theory and Practical with effect from the batch admitted in academic year 21-22. [ANNEXURE-5]

Complete finals MBBS Competencies and SLOs 09.03.2022 (Link)

[Biochemistry CBME Syllabus](#)

Resolution No. 3.6 of Academic Council (AC-42/2022): Resolved to continue the existing method for additional exam for Ist MBBS (CBME) as per guidelines given by NMC in First MBBS Anatomy/Physiology/Biochemistry for theory/Practical.

Resolution No. 3.19 of Academic Council (AC-42/2022): It is resolved to approve all the suggestions given by NMC Undergraduate board as per NMC Notification dated 31.03.2022 related to First MBBS Anatomy/Physiology/ Biochemistry except Point No. 7 in relation to Oath ceremony, with effect from the batch admitted in academic year 21-22. [ANNEXURE- 16]

दूरभाष/Phone : 25367033, 25367035, 25367036
 फेक्स/Fax : 0091-11-25367024
 ई-मेल/E-mail : ug@nmc.org.in,

पॉकेट -14, सेक्टर-8, द्वारका, फेस-1, नई दिल्ली-77
 Pocket- 14, Sector- 8, Dwarka,
 Phase - 1, New Delhi-77

राष्ट्रीय आयुर्विज्ञान आयोग

~~Annex-15~~

National Medical Commission
(Undergraduate Medical Education Board)

No. U.11026/1/2022-UGMEB

Dated the 31st March, 2022

Circular

Subject : Implementation of new Competency Based Medical Education for Undergraduate Course Curriculum.

The new Competency Based Medical Education for Undergraduate Course Curriculum was discussed in detail in the 6th meeting of National Medical Commission, which was held on 24th March, 2022 at New Delhi.

2. After detailed discussion and deliberation, it has been unanimously decided in the said meeting of the Commission to implement new Competency Based Medical Education for Undergraduate Course Curriculum from the current batch of MBBS students i.e. 2021-22, admitted in the month Feb-March 2022.

3. The new Competency Based Medical Education for Undergraduate Course Curriculum would be implemented with the objective of covering all three domains of learning (Cognitive, Affective & Psychomotor). The new course curriculum introduced in August 2019 enriches the medical student with a sound base and balanced approach to overall aspect with the introduction of foundation course which includes Family Adoption Programme, Yoga, meditation, Local Language adaptation and skills.

4. All State Governments/UTs, universities and medical colleges/institutes are requested to take immediate necessary steps to implement the new Competency Based Medical Education for Undergraduate Course Curriculum from the current batch of MBBS students i.e. 2021-22, admitted in the month Feb-March 2022.

Shamshir

(Dr. Aruna V. Vanikar)
President

Encl:

- (i) Guidelines for implementation of new CBME Course curriculum.
- (ii) Academic Calendar for MBBS Batch
- (iii) Month-wise schedule of new CBME Course
- (iv) Curriculum for Family Adoption Programme
- (v) Brief modified transliteration of Maharshi Charak Shapth

Guidelines for implementation of new CBME Course curriculum for MBBS

batch 2021-22 admitted in Feb-March 2022

1. The said guidelines are for the UG CBME **2021 (admitted in 2022)** batch.
2. The curriculum of UG CBME 2021 will begin from **14th Feb 2022** in all medical colleges across the country. The basic framework and inclusions of CBME will not be disturbed as they are vital components of outcome-based education. It is mainly the **redistribution of hours** in view of COVID-19 pandemic within the time frame that needs consideration for 2021-'22 (admitted in Feb. 2022) batch.
3. Redistribution with timeline of professional years for 2021-'22 (admitted in Feb. 2022) is provided in slides herewith.

Since the duration for 1st professional has been reduced from 14 months to 12 months, the period can be adjusted by :

- a. Having one week of Foundation Course at the beginning of the academic calendar and then spreading remaining three weeks of Foundation Course in first six months beyond curricular hours
 - b. Allocating Sports & Extracurricular hours for regular teaching
 - c. Reducing duration of vacation (1 week in Summer & 1 week in Winter, at the discretion of University and college)
 - d. Final, 1st exams will be for Forensic Medicine, Toxicology and Community Medicine
 - e. All clinical subjects will be taught as per curriculum parallel and exams will be covered under NEXT.
4. **Early clinical exposure and Integration** retained since they are all teaching-learning methods/strategies for addressing identified competencies.

5. **Self directed learning (SDL):** Some SDL hours can be reduced, specifically from Phase-I subjects like Anatomy (there are 40 hours), Physiology (20 hours). Some SDL hours can go beyond office hours if required (as such also students may be required to do certain things for SDL beyond regular hours).

6. **Electives** promote academic flexibility and may be offered onsite based on student's need and choice. One month of Electives (Block A & B, 15 days each) can be adjusted for this batch, wherein Block A (pre/para clinical electives) can have electives along with clinical postings and Block B (clinical electives) without clinical posting.

7. **Family adoption** program is recommended as a part of curriculum of Community Medicine and should begin from 1st professional year and remain throughout the curriculum. The orientation towards the same may be a part of foundation course under the theme of 'Field visit to community health centre' (8 hrs) which is already allocated to foundation course in GMER 2019.

The family adoption shall include villages not covered under PHC adopted by medical college, and if travel time from college to site is more than 2 hours on week-ends, in such situation, bastis / jhuggis/ towns or on outskirts of cities may be adopted.

7. Modified 'Maharshi CharakShapath' is recommended when a candidate is introduced to medical education.

8. Yoga training is recommended to be initiated during foundation course, (1 hour, preferably in the morning in orientation week). Yoga practices shall be for maximum 1 hour every day during the period of 10 days beginning from 12th June every year to be culminated on International Yoga day, i.e. 21st June, to be celebrated in all medical schools across the country. These may be practiced by all batches of MBBS. Yoga module will be made available to all

colleges by UGMEB- NMC. However colleges may adopt their own modules. Yoga unit may be inducted under PMR department or any other department of all colleges at their discretion.

9. **Assessment:** A robust continuous formative and internal assessment is required to ensure competencies and thereby a competent medical graduate. If required, we can have two internal assessments and the third internal assessment can be calculated from various unitary and continuous tests taken throughout the year.

10: **Supplementary examinations:** Supplementary exam be conducted between 4 to 6 weeks from the date of declaration of results of regular university examinations. The result of Supplementary examinations be declared within 10 days from the date of completion of examinations.

11. There shall be no supplementary/ repeater batch. For students who fail in their university examination:

- Students who pass in 1st MBBS supplementary examination shall be offered special classes and ward postings to cover up the syllabus, so that he/she copes up with subjects. Subsequently (after passing in supplementary examination) the student shall continue with his/her regular batch. Attendance of special classes/ postings for such students shall be counted. Students who fail to pass in supplementary examination, shall be joining the subsequent junior batch.

- Students who pass in 2nd MBBS supplementary examination shall be offered special classes and ward postings to cover up the syllabus, so that he/she copes up with subjects. The student shall not join classes of the Final MBBS till he/she is given a chance of passing in first supplementary examination. He/she shall continue with his regular batch after passing in supplementary examination of 2nd MBBS.

Attendance of special classes/ postings be counted. Students who fail to pass in supplementary examination of 2nd MBBS may be allowed to continue with his/her regular batch. However the student shall have to pass 2nd MBBS before taking up Final MBBS examination, as per the existing guidelines.

12. Details and guidelines on NEXT examination shall be notified by NMC.



MGM INSTITUTE OF HEALTH SCIENCES

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Grade 'A' Accredited by NAAC

Sector-01, Kamothe, Navi Mumbai - 410209

Tel 022-27432471, 022-27432994, Fax 022-27431094

E-mail- registrar@mgmuhs.com Website : www.mgmuhs.com

