MGM INSTITUTE OF HEALTH SCIENCES

(Deemed University u/s 3 of UGC Act, 1956)
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Syllabus for

MBBS – (First Year)

Approved as per BOM. 04/2007, dated 14.12.2007, item 4 & amended up to BOM. 43/2015 dated ~~14.11.2015~~

Syllabus have been categorized as **'Must know'** (70%), **'Desirable to Know'** (30%) and **'Nice to Know'** (10%) topics.

Inside this booklet, **'Desirable to know'** & **'Nice to Know'** topics are stamped and remaining all unstamped topics belong to **'Must Know'** area.

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GENERAL CONSIDERATIONS AND TEACHING APPROACH

(1) Graduate medical curriculum is oriented towards training students to undertake the responsibilities of a physician of first contact who is capable of looking after the preventive, promotive, curative & rehabilitative aspect of medicine.

(2) With wide range of career opportunities available today, a graduate has a wide choice of career opportunities. The training, though broad based and flexible should aim to provide an educational experience of the essentials required for health care in our country.

"Training should be able to meet internationally acceptable standards."

(3) To undertake the responsibilities of service situations which is a changing condition and of various types, it is essential to provide adequate placement training tailored to the needs of such services as to enable the graduates to become effective instruments of implementation of those requirements. To avail of opportunities and be able to conduct professional requirements, the graduate shall endeavour to have acquired basic training in different aspects of medical care.

(4) The importance of the community aspects of health care and of rural health care services is to be recognized. This aspect of education & training of graduates should be adequately recognized in the prescribed curriculum. Its importance has been systematically upgraded over the past years and adequate exposure to such experiences should be available throughout all the three phases of education & training. This has to be further emphasized and intensified by providing exposure to field practice areas and training during the internship period. The aim of the period of rural training during internship is to enable the fresh graduates to function efficiently under such settings.

(5) The educational experience should emphasize health and community orientation instead of only disease and hospital orientation or being concentrated – on - curative - aspects. As such all the basic concepts of modern scientific medical education are to be adequately dealt with.

(6) There must be enough experiences to be provided for self learning. The methods and techniques that would ensure this must become a part of teaching - learning process.

(7) The medical graduate of modern scientific medicine shall endeavour to become capable of functioning independently in both urban and rural environment. He/she shall endeavour to give emphasis on fundamental aspects of the subjects taught and on common problems of health and disease avoiding unnecessary details of specialization.

(8) The importance of social factors in relation to the problem of health and diseases should receive proper emphasis throughout the course and to achieve this purpose, the educational process should also be community based than only hospital based. The

importance of population control and family welfare planning should be emphasized throughout the period of training with the importance of health and development duly emphasized.

(9) Adequate emphasis is to be placed on cultivating logical and scientific habits of thought, clarity of expression and independence of judgment, ability to collect and analyze information and to correlate them.

(10) The educational process should be placed in a historic background as an evolving process and not merely as an acquisition of a large number of disjointed facts without a proper perspective. The history of Medicine with reference to the evolution of medical knowledge both in this country and the rest of the world should form a part of this process.

(11) Lectures alone are generally not adequate as a method of training and are a poor means of transferring/acquiring information and even less effective at skill development and in generating the appropriate attitudes. Every effort should be made to encourage the use of active methods related to demonstration and on firsthand experience. Students will be encouraged to learn in small groups, through peer interactions so as to gain maximal experience through contacts with patients and the communities in which they live. While the curriculum objectives often refer to areas of knowledge or science, they are best taught in a setting of clinical relevance and hands on experience for students who assimilate and make this knowledge a part of their own working skills.

(12) The graduate medical education in clinical subjects should be based primarily on out-patient teaching, emergency departments and within the community including peripheral health care institutions. The out-patient departments should be suitably planned to provide training to graduates in small groups.

(13) Clinics should be organized in small groups of preferably not more than 10 students so that a teacher can give personal attention to each student with a view to improve his skill and competence in handling of the patients.

(14) Proper records of the work should be maintained which will form the basis for the students' internal assessment and should be available to the inspectors at the time of inspection of the college by the Medical Council of India.

(15) Maximal efforts have to be made to encourage integrated teaching between traditional subject areas using a problem based learning approach starting with clinical or community cases and exploring the relevance of various preclinical disciplines in both understanding and resolution of the problem. Every attempt be made to de-emphasize compartmentalization of disciplines so as to achieve both horizontal and vertical integration in different phases.

(16) Every attempt is to be made to encourage students to participate in group discussions and seminars to enable them to develop personality, character, expression and other faculties which are necessary for a medical graduate to function either in solo practice or as a team leader when he begins his independent career. A discussion group should not have more than 20 students.

(17) Faculty member should avail of modern educational technology while teaching the students and to attain this objective, Medical Education Units/ Departments be established in all medical colleges for faculty development and providing learning resource material to teachers.

(18) To derive maximum advantage out of this revised curriculum, the vacation period to students in one calendar year should not exceed one month, during the 4 ½ years Bachelor of Medicine and Bachelor of Surgery (MBBS) Course.

(19) In order to implement the revised curriculum in Toto, State Govts. and Institution Bodies must ensure that adequate financial and technical inputs are provided.

(20) HISTORY OF MEDICINE –The students will be given an outline on "History of Medicine". This will be taught in an integrated manner by subject specialists and will be coordinated by the Medical Education Unit of the College.

(21) All medical institutions should have curriculum committee which would plan curricula and instructional method which will be regularly updated.

(22) Integration of ICT in learning process will be implemented.

OBJECTIVE OF MEDICAL GRADUATE TRAINING PROGRAMME:

(1) **NATIONAL GOALS** : At the end of undergraduate program, the medical student should be able to :

(a) Recognize `health for all' as a national goal and health right of all citizens and by undergoing training for medical profession fulfill his/her social obligations towards realization of this goal.

(b) Learn every aspect of National policies on health and devote himself / herself to its practical implementation.

(c) Achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.

(d) Develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.

(e) Become exemplary citizen by observation of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

(2) **INSTITUTIONAL GOALS**: (1) In consonance with the goals each medical institution should evolve institutional goals to define the manpower (or professionals) they intend to produce. The undergraduate students coming out of a medical institute should:

(a) Be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.

(b) Be competent to practice preventive, promotive, curative and rehabilitative medicine in respect to the commonly encountered health problems.

(c) Appreciate rationale for different therapeutic modalities; be familiar with the administration of the "essential drugs" and their common side effects.

(d) Be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop humane attitude towards the patients in discharging one's professional responsibilities.

(e) Possess the attitude for continued self learning and to seek further expertise or to pursue research in any chosen area of medicine, action research and documentation skills.

(f) be familiar with the basic factors which are essential for the implementation of the National Health Programmes including practical aspects of the following:-

(i) Family Welfare and Material and Child Health(MCH)

(ii) Sanitation and water supply

(iii) Prevention and control of communicable and non-communicable diseases
(iv) Immunization
(v) Health Education
(vi) IPHS standard of health at various level of service delivery, medical waste disposal.
(vii) Organizational institutional arrangements.

(g) Acquire basic management skills in the area of human resources, materials and resource management related to health care delivery, General and hospital management, principal inventory skills and counseling

(h) Be able to identify community health problems and learn to work to resolve these by designing, instituting corrective steps and evaluating outcome of such measures.

(i) Be able to work as a leading partner in health care teams and acquire proficiency in communication skills.

(j) Be competent to work in a variety of health care settings.

(k) Have personal characteristics and attitudes required for professional life such as personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

All efforts must be made to equip the medical graduate to acquire the skills as detailed under :

A comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) Graduate:

1. **Clinical Evaluation**:

(a) To be able to take a proper and detailed history.
(b) To perform a complete and thorough physical examination and elicit clinical signs.
(c) To be able to properly use the stethoscope, Blood Pressure, Apparatus Auroscope, Thermometer, Nasal Speculum, Tongue Depressor, Weighing Scales, Vaginal Speculum etc.:
(d) To be able to perform internal examination-Per Rectum (PR), Per Vaginum (PV) etc.
(e) To arrive at a proper provisional clinical diagnosis.

II. **Bed side Diagnostic Tests**:

(a) To do and interpret Haemoglobin (HB), Total Count (TC), Erythrocytic Sedimentation Rate (ESR), Blood smear for parasites, Urine examination /albumin /sugar /ketones /microscopic:
(b) Stool exam for ova and cysts;
(c) Gram, staining and Siehl-Nielsen staining for AFB;
(d) To do skin smear for lepra bacilli
(e) To do and examine a wet film vaginal smear for Trichomonas
(f) To do a skin scraping and Potassium Hydroxide (KOH) stain for fungus infections;
(g) To perform and read Montoux Test.

III. **Ability to Carry Out Procedures**:

(a) To conduct CPR (Cardiopulmonary resuscitation) and First aid in newborns, children and adults.
(b) To give Subcutaneous (SC) /Intramuscular (IM) /Intravenous (IV) injections and start Intravenous (IV) infusions.
(c) To pass a Nasogastric tube and give gastric leavage.
(d) To administer oxygen-by masic/catheter
(e) To administer enema
(f) To pass a ruinary catheter-male and female
(g) To insert flatus tube
(h) To do pleural tap, Ascitic tap & lumbar puncture
(i) Insert intercostal tube to relieve tension pneumothorax
(j) To control external Haemorrhage.

IV Anaesthetic Procedure

(a) Administer local anaesthesia and nerve block
(b) Be able to secure airway potency, administer Oxygen by Ambu bag.

V **Surgical Procedures**

(a) To apply splints, bandages and Plaster of Paris (POP) slabs;
(b) To do incision and drainage of abscesses;
(c) To perform the management and suturing of superficial wounds;
(d) To carry on minor surgical procedures, e.g. excision of small cysts and nodules, circumcision, reduction of paraphimosis, debridement of wounds etc
(e) To perform vasectomy;
(f) To manage anal fissures and give injection for piles.

VI **Mechanical Procedures**

(a) To perform thorough antenatal examination and identify high risk pregnancies.
(b) To conduct a normal delivery;
(c) To apply low forceps and perform and suture episiotomies;
(d) To insert and remove IUD's and to perform tubectomy

VII **Paediatrics**

(a) To assess new borns and recognize abnormalities and I.U. retardation
(b) To perform Immunization;
(c) To teach infant feeding to mothers;
(d) To monitor growth by the use of 'road to health chart' and to recognize development retardation;
(e) To assess dehydration and prepare and administer Oral Rehydration Therapy (ORT)
(f) To recognize ARI clinically;

VIII **ENT Procedures**:

(a) To be able to remove foreign bodies;
(b) To perform nasal packing for epistaxis;
(c) To perform trachesotomy

IX **Ophthalmic Procedures**:

(a) To invert eye-lids;
(b) To give Subconjunctival injection;
(c) To perform appellation of eye-lashes;
(d) To measure the refractive error and advise correctional glasses;
(e) To perform nasolacrimal duct syringing for potency

X. **Dental Procedures**:

To perform dental extraction

XI **Community Healthy**:

(a) To be able to supervise and motivate, community and para-professionals for corporate efforts for the health care;
(b) To be able to carry on managerial responsibilities, e.g. Management of stores, indenting and stock keeping and accounting
(c) Planning and management of health camps;
(d) Implementation of national health programmes;
(e) To effect proper sanitation measures in the community, e.g. disposal of infected garbage, chlorination of drinking water;
(f) To identify and institute and institute control measures for epidemics including its proper data collecting and reporting.

XII **Forensic Medicine Including Toxicology**

(a) To be able to carry on proper medico legal examination and documentation of injury and age reports.
(b) To be able to conduct examination for sexual offences and intoxication;
(c) To be able to preserve relevant ancillary material for medico legal examination;
(d) To be able to identify important post-mortem findings in common un-natural deaths.

XIII **Management of Emergency**

(a) To manage acute anaphylactic shock;
(b) To manage peripheral vascular failure and shock;
(c) To manage acute pulmonary oedema and LVF;
(d) Emergency management of drowning, poisoning and seizures
(e) Emergency management of bronchial asthma and status asthmaticus;
(f) Emergency management of hyperpyrexia;
(g) Emergency management of comatose patients regarding airways, positioning prevention of aspiration and injuries
(h) Assess and administer emergency management of burns

Syllabus for

HUMAN BIOCHEMISTRY

INDEX

BROAD CURRICULUM AS PER MCI GUIDELINES (BIOCHEMISTRY)

Biochemistry including medical physics and Molecular Biology.

i) GOAL

The broad goal of the teaching of undergraduate students' biochemistry is to make them understand the scientific basis of the life processes at the molecular level and to orient them towards the application of the knowledge acquired in solving clinical problems.

ii) OBJECTIVES

a) KNOWLEDGE

At the end of the course, the student should be able to:

(1) Describe the molecular and functional organization of a cell and list its sub cellular components;

(2) Delineate structure, function and inter-relationships biomolecules and consequences of deviation from normal;

(3) Summarize the fundamental aspects of enzymology and clinical application wherein regulation of enzymatic activity is altered;

(4) Describe digestion and assimilation of nutrients and consequences of malnutrition;

(5) Integrate the various aspects of metabolism and their regulatory pathways;

(6) Explain the biochemical basis of inherited disorders with their associated sequelae;

(7) Describe mechanisms involved in maintenance of body fluid and pH homeostasis;

(8) Outline the molecular mechanisms of gene expression and regulation, the principles of genetic engineering and their application in medicine;

(9) Summarize the molecular concepts of body defence and their application in medicine;

(10) Outline the biochemical basis of environmental health hazards, biochemical basis of cancer and carcinogenesis;

(11) Familiarize with the principles of various conventional and specialized laboratory investigations and instrumentation analysis and interpretation of a given data;

(12) The ability to suggest experiments to support theoretical concepts and clinical diagnosis.

b) SKILLS:

At the end of the course, the student should be able to:

(1) Make use of conventional techniques/instruments to perform biochemical analysis relevant to clinical screening and diagnosis;

(2) Analyze and interpret investigative data;

(3) Demonstrate the skills of solving scientific and clinical problems and decision making;

iii) INTEGRATION

The knowledge acquired in biochemistry should help the students to integrate molecular events with structure and function of the human body in health and disease.

DETAILS OF SYLLABUS FOR HUMAN BIOCHEMISTRY.

Structural formulae are not obligatory.

Must know:

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

2. **Chemistry of Lipids:** classification and biological importance of triacylglycerol, phospholipids, glycolipids, fatty acids (PUFA), prostaglandin, steroids and lipoproteins.

3. **Chemistry of proteins:** general nature of amino acids, various ways of Classification of amino acids, biologically important peptides, classification, properties and biological importance of proteins. Structural organization of proteins, Plasma proteins-functions, clinical significance of various fractions, methods of separation (only principle).

4. **Enzymes :** General nature, classification of enzymes, specificity and mode of action of enzymes, factors affecting enzyme activity. Enzyme inhibitions (Kinetic not required).Clinical importance (Diagnostic, therapeutic and as a Laboratory reagent) of enzymes and isoenzymes.
5. **Biological oxidation:** General concept of oxidation and reduction. Role of enzymes and co-enzymes. Electron transport chain. Substrate level and Oxidative phosphorylation, Role of uncouplers and inhibitors.

6. **Haemoglobin:** Chemistry and functions of haemoglobin . Types of normal and abnormal hemoglobins.(HbS, M,Thalassemia). Haemoglobin derivatives.

7. **Vitamins:** General nature, classification, sources,active forms and metabolic role, deficiency manifestations, daily requirement and hypervitaminosis.

8. **Nutrition:** Balance diet for normal adult, Quality of dietary protein, SDA, protein energy malnutrition (Kwashiorkor and Marasmus).

9. **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,Uric acid pathway

(significance only). Metabolism of Galactose and Galactosemia. Blood sugar level and its regulation, oral GTT and glycosuria, Biochemistry of diabetes mellitus.

10. **Protein Metabolism:** Biochemical aspects of digestion and absorption of proteins. Fate of amino acid in the body (Deamination, Transmination, Transdeamination,Decarboxylation), Fates of ammonia (Urea cycle, glutamine formation), Metabolism of aromatic and sulphur containing amino acids and their inborn errors. Metabolism of Glycine.

11. **Lipid Metabolism:** Biochemical aspects of digestion and absorption of Lipids. Beta oxidation, biosynthesis of saturated fatty acids only, cholesterol biosynthesis, transport (role of HDL & LDL) Excretion, Ketogenesis, Ketolysis and Ketosis. Adipose tissue metabolism, Lipolysis and re-esterification, fatty liver and atherosclerosis.

12. **Chemistry and Metabolism of purines:**, nucleosides, nucleotides. Biologically important free nucleotides, Biosynthesis of purines(sources of ring & regulatory steps only, conversion of IMP to GMP & AMP) and salvage pathway, Biosynthesis of pyrimidines, Breakdown of purines and pyrimidines, Gout, Lesch- Nyhan Syndrome

13. Metabolic interrelationship of carbohydrates, lipids and proteins metabolism.

14. **Hormones :** General characteristics and Mechanism of hormone action. cAMP the second messenger, phosphotidyl inositol /calcium system as second messenger.

15. **Chemistry of nucleic acids:** structure and function of DNA and RNA, Genetic code, DNA Replication, Transcription, Translation, chain initiation, chain elongation , chain termination, Inhibitors of protein biosynthesis.

16. Molecular Mechanism of gene expression and regulation 1) Lacoperon model, Mutations.

17. **Mineral Metabolism :** Study of (i) Calcium and phosphorous (ii) sodium, potassium & chloride; (iii) magnesium, copper & iodine; (iv) Iron, (v) manganese, selenium, zinc & fluoride. Their importance in body in brief.

18. Water and electrolyte balance and imbalance.

19. Acid base balance and imbalance.

20. **Haemoglobin Metabolism :** Synthesis and break down of haemoglobin, porphyria (in brief), Fate of bilirubin, different types of Jaundice.

21. **Function tests:** (i) Liver function tests, (ii) Kidney function tests & (iii) Thyroid function tests.

22. **Detoxication mechanisms:** (Bio- transformation) oxidation, reduction, conjugation, hydrolysis.

Desirable to know:

1. Introduction of Biochemistry as a basic science for the study of medicine, It's importance in clinical practice.
2. Molecular and functional organization of a cell and its sub cellular components.
3. **Genetic engineering :** Recombinant DNA , Restriction endonuclease, Chimeric molecule, and Gene library. Applications of recombinant DNA technology in relation to medicine.

4. **Molecular concept of body defence and their applications:** i) Immunoglobulins- structure & functions, ii) Free radicals, enzymatic and non-enzymatic antioxidants.

5. **Radioisotopes :** Uses of radioisotopes (therapeutic, diagnostic) and hazards.

6. Metabolic changes during starvation.

Nice to know:

1. **Environmental Biochemistry:** Definition, chemical stress, air & water pollution.
2. **Biochemistry of cancer** : carcinogens, and outline mechanism of carcinogenesis.

TOPICS OF THE LECTURES AND APPROXIMATE NUMBER OF LECTURES, HUMAN BIOCHEMISTRY - FIRST PHASE- M.B.B.S.

Lectures.

1. Introduction to Biochemistry, Cell structure and function. 1
2. Chemistry of Carbohydrates. 4
3. Chemistry of Proteins. 4
4. Chemistry of Lipids. 4
5. Chemistry of Nucleo proteins. 2
6. Enzymes. 6

7. Biological oxidation. 2
8. Chemistry and functions of Haemoglobin; abnormal haemoglobin. 2
9. Carbohydrate Metabolism. 6
10. Protein Metabolism. 6
11. Lipid Metabolism. 6
12. Integration of metabolism and metabolic changes during starvation. 2
13. Mechanism of hormones action. 1
14. Vitamins (Fat & Water soluble) 6
15. Nutrition. 2
16. Purines and Pyrimidine metabolism. 2
17. Chemistry and functions of Nucleic acids.; Protein biosynthesis, Gene expression,mutations. 5
18. Genetic engineering and it applications. 2
19. Biochemistry of cancer. 1
20. Radioisotopes. 1
21. Haemoglobin metabolism, liver function tests,Detoxification mechanisms. 3
22. Kidney function tests,Thyroid function tests 2
23. Mineral Metabolism. 4
24. Water and Electrolyte Balance. 2
25. Acid base balance, 2
26. Environmental Biochemistry. 1
27. Molecular concept of body defence. 2

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.

LIST OF BIOCHEMISTRY BOOKS FOR IST MBBS (UNDERGRADUATE COURSES)

A.TEXT BOOKS

Sr.No.	Name of the Book	Name of the Author
1	Medical Biochemistry	U.Satanarayan
2	Biochemistry for Medical students	D.M.Vasudevan & Shree Kumari
3	Medical Biochemistry	Pankaja Naik
4	Medical Biochemistry	R.C.Gupta
5	Medical Biochemistry	Harbn's Lal
6	Medical Biochemistry	M.N.Chatterjea & Rana Shinde
7	Medical Biochemistry	Debajyoti Das
8	Biochemistry	A.C.Deb

B. REFERENCE BOOKS

Sr.No.	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

RULES & REGULATIONS OF EXAMINATION FOR THE SUBJECTS OF FIRST MBBS COURSE AT CONSTITUENT COLLEGES OF MGM UNIVERSITY OF HEALTH SCIENCES, NAVI MUMBAI
(Approved vide BOM – 04/2007 Resolution No. 4 and amended vide BOM-07/2008 Resolution No. 3.2)

1. THEORY EXAMINATION IN ANATOMY

1.1. There shall be two papers in preliminary/university examination in the Anatomy The course content shall be distributed as per given below:

1.2. **ANATOMY PAPER-I**- shall includes gross anatomy, systemic histology and systemic embryology of the region Superior extremity, head face, neck and neuro Anatomy.

1.3. **ANATOMY PAPER –II:** shall includes the gross anatomy, systemic histology and systemic '1 embryology of the region Thorax, Abdomen, Pelvix, interior extremity , General histology, General embryology, general anatomy & genetics.

2. PRACTICAL EXAM. PATTERN:

2.1. Total Marks for Orals (Viva)	20 marks
2.1.1. i) Axial Skeleton	10 marks
2.1.2. ii) Appendicular skeleton	5 marks
2.1.3. iii)Embryology models	5 marks

3. DISTRIBUTION OF PRACTICAL MARKS

3.1. Soft parts dissected body, organs, viscera, brain Histology	20 marks
3.2. spotting	6 marks
3.3.one slide for discussion	4 marks
3.4.Radiology	5 marks
3.5.Surface anatomy	5 marks

4. THEORY EXAMINATION IN PHYSIOLOGY

4.1. There shall be two papers in preliminary/university examination in the physiology The course content shall be distributed as per given below:

4.2. **Physiology Paper I**: Cell membrane and transport systems across the cell membrane, Homeostasis, Cardiovascular, Blood, Respiratory, Endocrines, Reproduction, Acclimatization to hypoxia, , Exercise physiology

4.3. **Physiology Paper II :** Nerve and Muscle Physiology, Gastrointestinal, Excretory and Temperature regulation, C.N.S. and special senses.

5. PATTERN OF VIVA VOCE AND PRACTICAL EXAMINATION :-

There shall be separate batches of students for viva and Practicals.

5.1. Viva examination(orals) Total marks 20

5.2. Practical examination Total marks 40 3 Exercises :

5.3. Clinical examination Total 20 marks

Four sub questions each of 5 marks,

5.3.1. C.V.S. 5
5.3.2. R.S. 5
5.3.3. C.N.S. 5
5.3.4. Abdomen & Special senses 5
5.4. Haematology 10
5.5. Short exercise 10
Sub questions having 2 marks each
5.5.1. Calculations,
5.5.2. Interpretation of graphs,
5.5.3. Charts,
5.5.4. Data analysis and interpretation
5.5.5. Photographs on-endocrine disorders,
5.5.6. Neurological disorder,

6. Topics to be asked as applied questions in theory.
6.1. Erythroblastosis foetalis
6.2. Haemophilia, purpura
6.3. Myasthenia gravis
6.4. Peptic ulcer
6.5. Oedema
6.6. Jaundice and anaemia – due to mismatched transfusion
6.7. Myxoedema
6.8. Cretinism
6.9. Hyperthyroidism
6.10. Tetany
6.11. Acromegaly, Gigantism
6.12. Respiratory distress syndrome
6.13. Parkinsonism
6.14. Asthma

7. **THEORY EXAMINATION IN BIOCHEMISTRY**
7.1. There will be TWO papers, each of two and half hours duration. Each paper will be of 50 marks with one compulsory question on applied biochemistry.

7.2. **BIOCHEMISTRY PAPER –I**
7.2.1. Molecular and functional organization of a cell and its sub-cellular components.
7.2.2. Chemistry of enzymes and their clinical applications.
7.2.3. Chemistry and metabolism of proteins and related disorders.
7.2.4. Chemistry and metabolism of purines and pyrimidines and related disorders.
7.2.5. Chemistry and functions of DNA and RNA , Genetic code ; Protein biosynthesis &.regulation (Lac-operon)
7.2.6. The principles of genetic engineering and their applications in medicine.
7.2.7. Chemistry and Metabolism of haemoglobin.
7.2.8. Biological oxidation.

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7.2.9. Molecular concept of body defence and their applications in medicine.
7.2.10. Vitamins and Nutrition.

7.3. BIOCHEMISTYR PAPER - II.

7.3.1. Chemistry and metabolism of carbohydrates and related disorders.
7.3.2. Chemistry and metabolism of lipids and related disorders.
7.3.3. Mineral metabolism: Water and electrolyte balance & imbalance.
7.3.4. Acid base balance and imbalance.
7.3.5. Integration of various aspects of metabolism and their regulatory pathways. Starvation metabolism.
7.3.6. Mechanism of hormone action.
7.3.7. Environmental biochemistry.
7.3.8. Liver function tests, Kidney function tests, Thyroid function tests.
7.3.9. Detoxification mechanisms.
7.3.10. Biochemical basis of cancer and carcinogenesis.
7.3.11. Radioisotopes.
7.3.12. Investigation techniques: (LCD-Topics) Colorimeter, Electrophoresis, Chromatography & Flame photometer.

8. PRACTICAL :

Practical examination in Biochemistry will be of TWO hours duration Exercise

8.1.1. Group A
Q.1.: One quantitative experiment 20 marks
(15 marks for expt. & 5 marks for table viva)

8.1.2. Group B
Q.2.: One qualitative/ quantitative experiment 15 marks
(10 marks for expt. & 5 marks for table viva)

8.1.3. Group C
Q.3. Spot identification 5 marks.

Group A :
Blood sugar, Blood urea; Serum total protein, Albumin and A/G ratio, Alanine amino transaminase(SGPT), Aspartate amino transaminase(SGOT) , Alkaline phosphatase, Serum amylase, Serum total bilirubin, Serum uric acid, Serum calcium,

Group B :
Creatinine in urine, Serum cholesterol, Serum phosphorus, CSF protein & sugar , Tests for monosaccharides (Ben edict, Barfoed,Selivanoff, Nylander, rapid furfural) , Tests for disaccharides, Colour reactions of proteins, Precipitation reactions of proteins, Normal Organic constituents of urine, Abnormal constituents of urine.

Group C :
Identification of slide under microscope,

Use of reagent.
Significance of test.
Use of Instrument /Appliances.
Identification of Hb - derivative.
Identification of GTT , Electrophoretogram and chromatogram.

Candidate will be allowed to use flow chart for quantitative exercise.

9. INTERNAL ASSESSMENT:

9.1. Internal assessment shall be based on the overall performance of the students during examinations during the course of the study in First MBBS.

9.2. Weightage for the internal assessment shall be 20% of the total marks in each subject.

9.3. The Students must secure a minimum of 35% of the total marks assigned for internal assessment in the subject in order to be eligible to appear in final university examination in that subject.

9.4. There shall be one terminal examination on conclusion of 1st semester and one preliminary examination, 6 weeks prior to commencement of university examination.

9.5. The First terminal examination will include one theory paper of 60 marks & practical of 40 marks and viva 20 marks. Preliminary examination shall have Theory 100 marks (2 papers of 50 marks each), Viva 20 marks & Practicals of 40 marks.

9.6. **Computation of Internal Assessment**- Internal assessment shall be computed out of 40 marks (20 marks in theory and 20 marks in practical) on overall performance in class test / internal examination conducted by the department, seminars, presentation, project work, field work, laboratory journal and attendance etc.

9.7. **Distribution of 20 marks in theory shall be as follows :-**

9.7.1 5 marks for attendance as per the following guidelines :-
Below 75% - 0
Upto 75% - 2.5
Above 75% - Proportionately higher marks at pro-rate basis.

9.7.2 & 5 marks for seminars, presentations, participation in academic activity assignments other than routine lectures etc.

9.7.3 10 marks for academic performance in theory in 1st term or prelim exam – average of both to be listed.

9.7.4 Marks in decimal computed in 9.7.1, 9.7.2 and 9.7.3 should be converted into whole number at the end.

9.8. **Distribution of 20 marks in praetical shall be as follows :-**

9.8.1 5 marks for attendance as per the following guidelines :-
Below 75% - 0
Upto 75% - 2.5
Above 75% - Proportionately higher marks at pro-rate basis.

9.8.2 5 marks for laboratory journal & assignments.

9.8.3 10 marks for academic performance in practical in 1st term & prelim exam – average of both.

9.8.4 Marks in decimal computed in 9.8.1, 9.8.2 and 9.8.3 should be converted into whole number at the end.

9.9. The Internal Assessment mark in practical shall be equal 20% of the total marks secured by in practical examination, project and laboratory journals.

9.10. Internal assessment shall be submitted by the Head of the department through Dean of the Constituents Colleges one week before commencement of University theory examination.

10. UNIVERSITY EXAMINATION:

10.1. There shall be one main university examination in a year at the end of second semester in the subjects of Anatomy, Physiology and Biochemistry.

11. CRITERIA FOR PASSING:

11.1. Students shall be declared pass in first professional of MBBS only if he/she obtain 50% aggregate in theory together with orals, 35% aggregate internal assessment and 50% in practicals separately in each subject for all the subjects of preclinical, provided he/she gets 50% of total marks in theory and practical and internal assessment.

11.2. However he/she will be exempted to appear again in the subject if he/she obtain 50% aggregate in theory together with orals and 50% in practicals and 50% in theory and practical and internal assessment taken together in each

12. Supplementary Examination:

12.1. Supplementary examination shall be conducted within six weeks from the date of declaration of results of first professional examination so as to allow the students who pass in supplementary examination may join the same batch in MBBS Course of phase-II. Unsuccessful students in the supplementary examination shall have to appear again in subsequent year.

13. DURATION OF EACH PAPER : 2 Hours & 30 minutes

13.1. Section A – M.C.Q. : 30 Minutes

13.2. Section B and Section C : 2 Hours

14. PATTERN OF QUESTION PAPER: There will be three sections in

14.1. Terminal Examination:

14.1.1. **Section A** – Comprising of MCQ

Q. No. 1: Multiple Choice Questions 10 Marks

(20 Question of 0.5 marks each to be solved in 30 minutes)

14.1.2. **Section B** – Comprising of short question

Q. No. 2: Write in Brief 30 Marks

(Any six out of seven of 5 marks each)

Q. No. 3 : Write shorts notes 20 Marks

(Any two out of three of 5 marks each)

14.1.3. **Section C** – Comprising of short and long question
Q.No.4 writes long answer
(Any two out of three of 10 marks each) 20 Marks

14.2. UNIVERSITY EXAMINATION / PRELIMINARY EXAMINATION:

There shall be two papers in each subjects

14.2.1. **Section A** – Comprising of MCQ
Q. No. 1: Multiple Choice Questions 10 Marks
(20 Question of 0.5 marks each to be solved in 30 minutes)

14.2.2. **Section B** – Comprising of short question
Q. No. 2: Write in Brief 20 Marks
(Any four out of five of 5 marks each)

14.2.3. **Section C** – Comprising of short and long question
Q. No. 3 : Write Answers in Details 20 Marks
(Any two out of three of 10 marks each)

15. DISTRIBUTION OF MARKS FOR SUBJECTS OF PRECLINICAL PHASE:

SN	Subject	Theory /Oral / Practical/ Internal Assessment	Maximum marks in each part of the subject	Minimum marks required to pass in each head of the subject
1	**ANATOMY**	Theory-I	50	60
		Theory-II	50	
		Oral	20	
		Internal Assessment	20	-
		Practical	40	20
		Internal	20	-
		Grand Total	**200**	**100**
1	**PHYSIOLOGY**	Theory-I	50	60
		Theory-II	50	
		Oral	20	
		Internal Assessment	20	-
		Practical	40	20
		Internal	20	-
		Grand Total	**200**	**100**
3	**BIOCHEMISTRY**	Theory-I	50	60
		Theory-II	50	
		Oral	20	
		Internal Assessment	20	-

		Practical	40	20
		Internal	20	-
		Grand Total	**200**	**100**

16. RE-VALUATION:

16.1. There shall be no provision of re-valuation of answer sheets, candidates shall be permitted to apply for recounting of theory papers within 7 days from the date of declaration of results.

Place: CBD Belapur
Date: 29.09.2008.

MGM UNIVERSITY OF HEALTH SCIENCES NAVI MUMBAI

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BOM-23/2012, dated 30.03.12, Resolution No 4

Annexure - III

Mahatma Gandhi Mission's Institute of Health Sciences ,
Sector – 18 Kamothe, Navi Mumbai - 410 209

TOPICS FOR HORIZONTAL INTEGRATION IN I-MBBS

(Anatomy , Physiology , Biochemistry)

Sr. no	Month	Name of the Topic	Anatomy	Physiology	Biochemistry
1	1st &2nd week of August	Cell	Cell membrane organelles (1)	Function of cell membrane , cell organelles & transport across cell membrane (3)	Biochemical function carried out by organelles, fluid mosaic model ,transport (2)across cell membrane
2	3rd week of August	Nerve Muscle	Structure of muscle & Structure of Nerve(1)	Types of Muscles ,Molecular Structure of muscle,Classification of Nerve fibres (3)	–
3	3rd week of August	Blood	Overview of circulatory system (1) structure of bone(1)	Blood – composition & functions (1), Hemopoiesis(1)	structure of Hb Physiological functions of Hb Hb derivatives abnormal Hb(3) Plasma proteins(2) Immunochemistry (1)
4	Sept	Respiratory System	Organization of RS. Thoracic cage lungs, Pleura Tracheobronchial tree(2)	Respiratory System Organisation(1) Mech. Respiration(1) Muscle movements (1)	Phospholipids (1)
5	Sept	Cardio vascular system	Mediastinum, pericardium , Heart, Great vessels (2)	Cardio vascular system Organisation(1) Structure & function of Heart & blood vessels (1)	Lipoproteins (1)
6	Nov & Dec	Digestive system	Gross anatomy of GIT with microscopic structure & development -Liver & hepatobiliary apparatus Pancreas(5)	Digestive system(10) Liver& gallbladder bile entrahepatic circulation (2)	General idea of digestion & absorption of carbohydrates , proteins , lipids (1) LFT (1) Hb metabolism (2) Iron Metabolism(1)

7	Jan	Excretory system	Gross anatomy& development, Microanatomy of kidney, ureter bladder, ,urethra(4)	Excretory system(10)	RFT(1) Protein metabolism(7) water & electrolytes(1) Na+, K+ (1)
8	3rd week of Jan	Endocrine system	Demonstration of pituitary gland , thyroid , Pancreas& suprarenal (3)	Endocrine system(8)	Mechanism of Hormone action (1) TFT (1),Ca-P metabolism, (1) trace elements (1)
9	Feb	Reproductive system	Mammary gland Reproductive system- male & female with development, structure(9)	Reproductive system(7)	----
10	Feb – March	Special senses	Eye, Ear, Tongue, vestibular apparatus Nose Olfactory system (4)	Special senses(12)	--
11	March-April	Nervous system	Overview –spinal cord, Brain meninges, Autonomic nervous system(10)	Central Nervous system(20)	---

Prof & HOD
Anatomy

Prof & HOD
Physiology

22/3/12
Prof & HOD
Biochemistry

Approved in BOM ~~2005~~ 26/2012, Dated 27/09/2012

~~Item~~ Item No.-5

5. Resolved to include Lecture-cum-demonstration topic "Immunoassay Techniques" in the 1st MBBS, Biochemistry Journal.

Approved in BOM - 28/2013, Dated 25/03/2013

Resolved to include 'Lipoprotein metabolism' in place of 'Transport (role of HDL & LDL) in First MBBS – Biochemistry Theory Syllabus.

Approved in BOM - 38/2014, Dated 28/11/2014

Resolution No. 3.1(c): Resolved to include Lipid Profile as LCD topic in the Biochemistry curriculum of I[st] year MBBS course with effective from Academic Year 2015-16.

Approved in BOM - 40/2015, Dated 13/05/2015

Resolution No. - 3.1 (b)

Resolution No. 3.1(b): Resolved to incorporate LCD on immunoassay technique in UG practical syllabus of Biochemistry.

BOM-38/2014

A-3(B)

MGM/MC/Biochem/2014/581

Date-10/01/2014

To

The Registrar,
MGMIHS, Kamothe,
Navi Mumbai

MGM University of Health Sciences
INWARD NO. 928
DATE: 10-1-14
REF: DIPN

Reference: Acad. 15/2014 dated 01.01.2014 received on 09.01.2014

Subject: Topics for Horizontal and Vertical Integration for 1st MBBS

Dear Sir,

It was decided in the BOS that as of now Vertical Integration is not feasible at the 1st MBBS level, but it can be done at higher level (II & III MBBS) as per current MCI Curriculum. Therefore I am not submitting the topics of Vertical Integrated Teaching.

Following are the topics for Horizontal Integrated Teaching -

Sr. No.	Topics	Anatomy	Physiology	Biochemistry
1.	Diabetes Mellitus	Endocrine part of pancreas	Control of Insulin Secretion & Functions	Lab Diagnosis & GTT
2.	Endemic Goiter	Thyroid Gland	Formation & Regulation of T_3, T_4 & TSH	Iodine Metabolism & Function Tests
3.	Myocardial Infraction	Coronary Arteries	ECG	Cardiac Markers
4.	Fatty Liver	Liver Histology	Functions of liver – Transport of Fat from the liver	Lipotropic Factors
5.	Obstructive Jaundice	Hepato-Biliary Tree	Bile Juice, Entro-hepatic recirculation	Diagnostic Biochemical Markers
6.	Glomerular Filtration	Nephron	Physiology of Glomerular Filtration	Inulin & creatinine clearance test

Dr. A. D. Deepak
Chairperson BOS- Preclinical,
Dept of Biochemistry,
MGM Medical College,
Kamothe, NM

10/1/14

(Approved in BOM 38/2014, dated 28/11/2014, Resolution No. - 3.1)

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY INTRODUCTION TO ANATOMY	PHYSIOLOGY EXTERNAL ENVIRONMENT LIFE PROCESS	BIOCHEMISTRY BIOCHEMICAL COMPOSITION OF CELL	PHYSIOLOGY HOMEOSTASIS	BIOCHEMISTRY CARBOHYDRATES	ANATOMY CONNECTIVE TISSUE (TISSUES OF BODY)
10 TO 11 A.M.	BIOCHEMISTRY INRODUCTION TO BIOCHEMISTRY	ANATOMY CELL	PHYSIOLOGY INTERNAL ENVIROMNMENT (BODY FLUIDS)	ANATOMY TERMINOLOGY	PHYSIOLOGY CONTROL SYSTEM BIOFEEDBACK	PHYSIOLOGY TRANSPORT ACROSS CELL MEMBRANE I
11 TO 01P.M.	PHYSIOLOGY INTRODUCTION BIOCHEMISTRY INTRODUCTION	PHYSIOLOGY PHYSICAL EXAM. BIOCHEMISTRY INTRODUCTION TO LAB	PHYSIOLOGY PHYSICAL EXAM. BIOCHEMISTRY PRACTICAL LAB	PHYSIOLOGY MICROSCOPE COLLECTION OF BLOOD BIOCHEMISTRY BIODATA WRITING	PHYSIOLOGY MICROSCOPE COLLECTION OF BLOOD BIOCHEMISTRY BIODATA WRITING	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD INTRODUCTION TO SUP. EXT. AND PECTORAL REGION DISSECTION GENERAL INRODUCTION	LECT MAMMARY GLAND DISSECTION GENERAL INRODUCTION	LCD CLAVICLE DISSECTION PECTORAL REGION I	LCD AXILLA DISSECTION PECTORAL REGION II	LECT AXILLARY ARTERY AND AXILLARY NERVE DISSECTION PECTORAL REGION III	LCD SCAPULA DISSECTION AXILLA I

ANNEXURE – 28

Received from Dean, MGM MC, Aurangabad on 15/4/2015 (AC meeting)

BOM-40/2015

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY BONES AND CARTILAGE	PHYSIOLOGY COMPOSITION AND FUNCTIONS OF BLOOD	BIOCHEMISTRY PROTEIN I	PHYSIOLOGY PLASMA PROTEINS	*HOLIDAY*	ANATOMY HISTOLOGY INTRODUCTION
10 TO 11 A.M.	BIOCHEMISTRY CHEMISTRY OF CARBOHYDRATES II	ANATOMY MUSCLE	PHYSIOLOGY TRANSPORT ACROSS CELL MEMBRANE II	ANATOMY GENERAL CNS	*HOLIDAY*	PHYSIOLOGY ERYTHROCYTES FUNCTIONS
11 TO 01P.M.	PHYSIOLOGY MICROSCOPE COLLECTION OF BLOOD BIOCHEMISTRY TASTE ON MONOSACCHARIDE I	PHYSIOLOGY MICROSCOPE COLLECTION OF BLOOD. BIOCHEMISTRY TASTE ON MONOSACCHARIDE I	PHYSIOLOGY TUTORIAL (GEN. PHSIOLOGY) BIOCHEMISTRY	PHYSIOLOGY STUDY OF NEUBAUER'S CHAMBER AND PCV BIOCHEMISTRY TASTE ON MONOSACCHARIDE I	*HOLIDAY*	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD BACK DISSECTION AXILLA II	LECT BRACHIAL PLEXUS DISSECTION BRACHIAL PLEXUS	LCD SCAPULAR REGION DISSECTION BACK AND SUBSCAPULAR REGION I	LCD HUMERUS DISSECTION BACK AND SUBSCAPULAR REGION II	*HOLIDAY*	LCD FRONT AND BACK OF ARM DISSECTION BACK AND SUBSCAPULAR REGION III

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY OF MUSCLE	PHYSIOLOGY MEMBRANE POTENTIAL RMP	BIOCHEMISTRY CHEMISTRY OF HAEMOGLOBIN I	PHYSIOLOGY ACTION POTENTIAL	BIOCHEMISTRY CHEMISTRY OF HAEMOGLOBIN II	ANATOMY HISTOLOGY OF NERVOUS TISSUE
10 TO 11 A.M.	BIOCHEMISTRY PROTEIN II	ANATOMY JOINT I	PHYSIOLOGY ERYTHROPOIESIS . FACTORS EFFECTING	ANATOMY JOINT II	PHYSIOLOGY HB FUNCTIONS ANAEMIA	PHYSIOLOGY NEURON AND CLASSIFICATION OF NERVES
11 TO 01P.M.	PHYSIOLOGY STUDY OF NEUBAUER'S CHAMBER AND PCV BIOCHEMISTRY TASTE ON MONOSACCHARIDE II	PHYSIOLOGY STUDY OF NEUBAUER'S CHAMBER AND PCV BIOCHEMISTRY TASTE ON TRISACCHARIDE I	PHYSIOLOGY TUTORIAL (GEN. PHYSIOLOGY) BIOCHEMISTRY	PHYSIOLOGY STUDY OF NEUBAUER'S CHAMBER AND PCV BIOCHEMISTRY TASTE ON TRISACCHARIDE I	PHYSIOLOGY R.B.C. COUNT AND ESR BIOCHEMISTRY TASTE ON TRISACCHARIDE II	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD RADIUS DISSECTION HISTO FRONT OF ARM I	LECT DERMATOMES AND VENOUS DRAINAGE DISSECTION HISTO FRONT OF ARM II	LCD FRONT OF FORE ARM (SUPERFICIAL) DISSECTION HISTO BACK OF ARM I	LCD ULNA DISSECTION BACK OF ARM II	LECT CUBITAL FOSSA AND ELBOW JOINT DISSECTION SHOULDER JOINT I	LCD WRIST AND PALM I DISSECTION SHOULDER JOINT II

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HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY GEN. CARDIOVASCULAR SYSTEM	PHYSIOLOGY LEUCOCYTES LEUCOPOIESIS	BIOCHEMISTRY CARBOHYDRATE IV	PHYSIOLOGY FUNCTIONS OF WBC AND MONOCYTE MACROPHAGE	BIOCHEMISTRY PROTEIN III	ANATOMY HISTOLOGY EPITHELIUM
10 TO 11 A.M.	BIOCHEMISTRY CARBOHYDRATE III	ANATOMY GEN. LYMPHATIC SYSTEM	PHYSIOLOGY PROPERTIES OF NERVE	ANATOMY INTEGUMENTARY SYSTEM	PHYSIOLOGY PROPERTIES OF NERVE II	PHYSIOLOGY IMMUNITY
11 TO 01P.M.	PHYSIOLOGY R.B.C. COUNT AND ESR BIOCHEMISTRY TASTE ON TRISACCHARIDE II	PHYSIOLOGY R.B.C. COUNT AND ESR BIOCHEMISTRY TEST ON POLYSACCHRIDE I	PHYSIOLOGY TUTORIAL/ LCD BLOOD AND RBC	PHYSIOLOGY R.B.C. COUNT AND ESR BIOCHEMISTRY TEST ON POLYSACCHRIDE I	PHYSIOLOGY RBC AND HB BIOCHEMISTRY TEST ON POLYSACCHRIDE II	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD WRIST AND PALM II DISSECTION HISTO CUBITAL FOSSA	LECT SHOULDER JOINT DISSECTION HISTO FRONT OF FOREARM I	LCD BONES OF HAND DISSECTION HISTO FRONT OF FOREARM II	LCD BACK OF FOREARM AND HAND DISSECTION PALM I	LECT RADIOULNAR JT. DISSECTION PALM II	LCD ELBOW AND WRIST JT DISSECTION BACK OF FOREARM I

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY GLANDULAR EPITHELIUM	PHYSIOLOGY NUROMUSCULAR JUNCTION	HOLIDAY	PHYSIOLOGY BLOOD GROUPS	BIOCHEMISTRY PROTEIN V	ANATOMY HISTOLOGY OF BONE AND CARTILAGE
10 TO 11 A.M.	BIOCHEMISTRY PROTEIN IV	ANATOMY GENERAL EMBRYOLOGY I	HOLIDAY	ANATOMY GENERAL EMBRYOLOGY II	PHYSIOLOGY MUSCLE CLASS. AND STRUCTURE	PHYSIOLOGY RH INCOMPATIBILITY BOOD TRANSFUSION
11 TO 01P.M.	PHYSIOLOGY RBS AND HB BIOCHEMISTRY TEST ON POLYSAECHRIDE II	PHYSIOLOGY RBS AND HB BIOCHEMISTRY TUTORIAL ON CARBOHYDRATE	HOLIDAY	PHYSIOLOGY RBS AND HB BIOCHEMISTRY TUTORIAL ON CARBOHYDRATE	PHYSIOLOGY TLC AND BLOOD GR. BIOCHEMISTRY COLOUR REACTION OF PROTEIN I	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD RADIAL NERVE DISSECTION HISTO BACK OF FOREARM II	LECT MEDIAN AND ULNAR NERVE DISSECTION HISTO DISSECTION OF JTS	HOLIDAY	LCD X-RAYS AND LIVING ANAT.	LECT PALMER SPACES AND 1ST METACARPAL JT. DISSECTION HISTO SEMINAR	LCD INTRODUCTION OF THORAX DISSECTION INT. TO THORAX

MGM MEDICAL COLLEGE ,AURANGABAD
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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY OF CONNECTIVE TISSUE	PHYSIOLOGY SARCOTUBULAR SYSTEM & EXCITATION	BIOCHEMISTRY LIPID II	PHYSIOLOGY MOLECULAR BASIS OF MUSCLE CONTRACTION	BIOCHEMISTRY LIPID III	ANATOMY HISTOLOGY OF BONE II
10 TO 11 A.M.	BIOCHEMISTRY LIPID I	ANATOMY GENRAL EMBRYOLOGY III	PHYSIOLOGY COAGULATION OF BLOOD	ANATOMY GENERAL EMBRYOLOGY IV	PHYSIOLOGY ANTICOGULATION INTRAVASCULAR CLOT FORMATION	PHYSIOLOGY PROPERTIES OF SKELETAL MUSCLE
11 TO 01P.M.	PHYSIOLOGY TLC AND BLOOD GR. BIOCHEMISTRY COLOUR REACTION OF PROTEIN I	PHYSIOLOGY TLC AND BLOOD GR. BIOCHEMISTRY COLOUR REACTION OF PROTEIN II	PHYSIOLOGY TUTORIAL	PHYSIOLOGY TLC AND BLOOD GR. BIOCHEMISTRY COLOUR REACTION OF PROTEIN II	PHYSIOLOGY DLC & BLOOD INDICES BIOCHEMISTRY PRECIPITATION REACTION OF PROTEIN I	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD INTERCOSTAL SPACE DISSECTION HISTO INTERCOSTAL SPACE I	LECT INTERCOSTAL SPACE DISSECTION HISTO INTERCOSTAL SPACE II	LCD THORACIC VERTEBRAE AND STERNUM DISSECTION HISTO INTERCOSTAL SPACE III	LCD PLEURA DISSECTION PLEURA I	LECT MEDIASTIMUM DISSECTION PLURA II	LCD LUNGS DISSECTION LUNGS I

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY VASCULAR SYSTEM	PHYSIOLOGY PROPERTIES OF SKELETAL MUSCLE	BIOCHEMISTRY ENZYME I	PHYSIOLOGY INTRODUCTION TO CVS	BIOCHEMISTRY ENZYME II	ANATOMY HISTOLOGY OF RESPIRATORY SYSTEM
10 TO 11 A.M.	BIOCHEMISTRY LIPID IV	ANATOMY GENERAL EMBRYOLOGY V	PHYSIOLOGY SMOOTH MUSCLE	ANATOMY GENERAL EMBRYOLOGY VI	PHYSIOLOGY INTRODUCTION OF RESPIRATORY SYSTEM	PHYSIOLOGY PROPERTIES OF CARDIAC MUSCLE I
11 TO 01P.M.	PHYSIOLOGY DLC & BLOOD INDICES BIOCHEMISTRY PRECIPITATION REACTION OF PROTEIN I	PHYSIOLOGY DLC & BLOOD INDICES BIOCHEMISTRY COLOUR REACTION OF PROTEIN II	PHYSIOLOGY TUTORIAL	PHYSIOLOGY DLC & BLOOD INDICES BIOCHEMISTRY COLOUR REACTION OF PROTEIN II	PHYSIOLOGY DLC AND BTCT BIOCHEMISTRY LCD PH METER	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD PERICARDIUM & EXT. FEATURE OF HEART DISSECTION HISTO ANT. MEDIASTINUM I	LECT MECH. OF RESPIRATOTION AND JT. OF THORAX DISSECTION HISTO ANT. MEDIASTINUM II	LCD RIGHT ATRIUM & RIGHT VENTRICLE, PULMONARY TRUCK DISSECTION HISTO MIDDLE MEDIA. I	LCD LF. ATRIUM & VENTRICAL ASC. AORTA DISSECTION MIDDLE MEDIA. II	LECT BRONCHO PULMONARY SEG. DISSECTION HEART I	LCD SUPERIOR VENA CAVA, TRACHEA VAGI DISSECTION HEART II

MGM MEDICAL COLLEGE ,AURANGABAD
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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY LYMPHOID I	PHYSIOLOGY MECHANICS OF RESPIRATION	BIOCHEMISTRY ENZYME IV	PHYSIOLOGY ATMOSPHERIC AIR & DEAD SPACE AIR.	BIOCHEMISTRY VITAMINS I	ANATOMY HISTOLOGY LYMPHOID II
10 TO 11 A.M.	BIOCHEMISTRY ENZYME III	ANATOMY GENERAL EMBRYOLOGY VII	PHYSIOLOGY PROPERTIES OF CARDIAC MUSCLE	ANATOMY GENERAL EMBRYOLOGY VIII	PHYSIOLOGY JUNCTIONAL TISSUES OF HEART	PHYSIOLOGY LUNG VOLUMES AND CAPACITIES
11 TO 01P.M.	PHYSIOLOGY DLC AND BTCT BIOCHEMISTRY LCD PH METER	PHYSIOLOGY DLC AND BTCT BIOCHEMISTRY TUTORIAL ON HAEMATOLOGY	PHYSIOLOGY TUTORIAL	PHYSIOLOGY DLC AND BTCT BIOCHEMISTRY TUTORIAL ON HAEMATOLOGY	PHYSIOLOGY INTRODUCTION TO EXPT. PHYSIOLOGY BIOCHEMISTRY TEST ON BILESALT AND PIGMENT	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD ESOPHAGUS/ DES AORTA/ THORACIC DUCT DISSECTION HISTO HEART III	LECT RIGHT ATRIUM DISSECTION HISTO SUPERIOR MEDIA.	LCD AZYGOS SYSTEM DISSECTION HISTO POST. MEDIA.	LCD X-RAYS AND LIVING	LECT. BLOOD SUPPLY OF HEART. DISSECTION/ SEMINAR	LCD INTRODUCTION AND ANTERIOR COMP. OF THIGH DISSECTION INTRODUCTION

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY GIT I	PHYSIOLOGY ORIGIN AND SPREAD OF CARDIAC IMPULSE	BIOCHEMISTRY VITAMIN III	HOLIDAY	BIOCHEMISTRY VITAMIN IV	ANATOMY HISTOLOGY GIT II
10 TO 11 A.M.	BIOCHEMISTRY VITAMIN II	ANATOMY GENERAL EMBRYOLOGY IX	PHYSIOLOGY ALVEOLAR VENTILATION	HOLIDAY	PHYSIOLOGY E.C.G.	PHYSIOLOGY TRANSPORT OF OXYGEN
11 TO 01P.M.	PHYSIOLOGY INT. TO EXP. PHYSIOLOGY BIOCHEMISTRY TEST ON BILE SALT AND PIG.	PHYSIOLOGY EFFECT OF GRADED STIMULUS AND SMC & NORMAL ECG BIOCHEMISTRY TEST ON BILE	PHYSIOLOGY TUTORIAL	HOLIDAY	PHYSIOLOGY EFFECT OF GRADED STIMULUS AND SMC & NORMAL ECG BIOCHEMISTRY TEST ON BILE	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD HIP BONE DISSECTION HISTO FRONT OF THIGH	LECT FEMORAL TRINGLE DISSECTION HISTO FEMORAL TRINGLE	LCD ADD. COMPARTMENT OF THIGH DISSECTION HISTO FEMORAL	HOLIDAY	LECT ADDUCTOR CANAL DISSECTION MEDIAL SIDE OF THIGH I	LCD FEMUR AND PATELLA DISSECTION MEDIAL SIDE OF THIGH I

MGM MEDICAL COLLEGE ,AURANGABAD
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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY GIT III	PHYSIOLOGY NERVE SUPPLY OF HEART AND HEART RATE	BIOCHEMISTRY VITAMIN VI	HOLIDAY	BIOCHEMISTRY VITAMIN VII	ANATOMY HISTOLOGY GIT IV
10 TO 11 A.M.	BIOCHEMISTRY VITAMIN V	ANATOMY GENERAL EMBRYOLOGY X	PHYSIOLOGY TRANSPORT OF CARBOHYDRATES	HOLIDAY	PHYSIOLOGY CARDIAC CYCLE I	PHYSIOLOGY CARDIAC CYCLE II
11 TO 01P.M.	PHYSIOLOGY EFFECT OF GRADED STIMULUS AND SMC & NORMAL ECG BIOCHEMISTRY TUTORIAL ON PROTEIN	PHYSIOLOGY EFFECT OF GRADED STIMULUS AND SMC & NORMAL ECG BIOCHEMISTRY TUTORIAL ON PROTEIN	PHYSIOLOGY TUTORIAL	HOLIDAY	PHYSIOLOGY EFFECT OF LOAD ON SKELETAL MUSCLE & PROPTERTIES ON CARDIAC MUSCLE BIOCHEMISTRY LCD CALORIMETRY	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD GLUTEAL REGION I DISSECTION HISTO GLUTEAL REGION I	LECT GLUTEAL REGION DISSECTION HISTO GLUTEAL REGION II	LCD GLUTEAL REGION II DISSECTION HISTO GLUTEAL REGION III	HOLIDAY	LCD TIBIA DISSECTION POPLITEAL FOSSA I	LCD POPLITEAL REGION DISSECTION POPLITEAL FOSSA II

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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY GIT V	PHYSIOLOGY NERVOUS REGULATION OF RESPIRATION	BIOCHEMISTRY BIOLOGICAL OXIDATION I	PHYSIOLOGY CARDIAC OUTPUT II	BIOCHEMISTRY BIOLOGICAL OXIDATION II	ANATOMY HISTOLOGY RESPIRATORY SYSTEM
10 TO 11 A.M.	BIOCHEMISTRY VITAMIN VIII	ANATOMY GENERAL EMBRYOLOGY XI	PHYSIOLOGY CARDIAC OUTPUT I	ANATOMY EMBRYOLOGY PHARYNGEAL POUCHES & ARCHES	PHYSIOLOGY CHEMICAL REGULATION OF RESPIRATION	PHYSIOLOGY HAEMADYNAMIC OF CIRCULATION
11 TO 01P.M.	PHYSIOLOGY EFFECT OF LOAD ON SKELETAL MUSCLE & PROPTERTIES ON CARDIAC MUSCLE BIOCHEMISTRY LCD COLORIMETER	PHYSIOLOGY EFFECT OF LOAD ON SKELETAL MUSCLE & PROPTERTIES ON CARDIAC MUSCLE BIOCHEMISTRY ESTIMATION OF BLOOD SUGAR	PHYSIOLOGY TUTORIAL	PHYSIOLOGY EFFECT OF LOAD ON SKELETAL MUSCLE & PROPTERTIES ON CARDIAC MUSCLE BIOCHEMISTRY ESTIMATION OF BLOOD SUGAR	PHYSIOLOGY GENESIS OF TETANUS AND PROPERTIES OF CARDIAC MUSCLE BIOCHEMISTRY ESTIMATION OF BLOOD SUGAR	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD BACK OF THIGH DISSECTION HISTO BACK OF THIGH I	LECT POPLITAL FOSSA DISSECTION HISTO BACK OF THIGH II	LCD HIP JOINT DISSECTION HISTO HIP JOINT I	LCD TARSALS & METATARSALS DISSECTION HIP JOINT II	LECT HIP JOINT DISSECTION FRONT OF LEG & DORSUM OF FOOT I	LCD FRONT OF LEG & DORSUM OF FOOT DISSECTION FRONT OF LEG & DORSUM OF FOOT II

MGM MEDICAL COLLEGE ,AURANGABAD

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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY OF URINARY SYSTEM	PHYSIOLOGY HYPOXIA ACCLIMATIZATION AT HIGH ALTTITUDE	BIOCHEMISTRY CARBOHYDRATE METABOLISM I	PHYSIOLOGY ARTERIAL BLOOD PRESSURE	BIOCHEMISTRY CARBOHYDRATE METABOLISM II	ANATOMY SOLE OF FOOT
10 TO 11 A.M.	BIOCHEMISTRY BIOLOGICAL OXIDATION III	ANATOMY EMBRYOLOGY RESPIRATORY SYSTEM	PHYSIOLOGY VENOUS CIRCULATION	ANATOMY EMBRYOLOGY GIT I	PHYSIOLOGY ABNORMALITY OF RESPIRATION	PHYSIOLOGY REGULATION OF BLOOD PRESSURE I
11 TO 01P.M.	PHYSIOLOGY GENESIS OF TETANUS AND PROPERTIES OF CARDIAC MUSCLE II BIOCHEMISTRY ESTIMATION OF BLOOD SUGAR	PHYSIOLOGY GENESIS OF TETANUS AND PROPERTIES OF CARDIAC MUSCLE II BIOCHEMISTRY TUTORIAL ON LIPID CHEMISTRY	PHYSIOLOGY TUTORIAL	PHYSIOLOGY GENESIS OF TETANUS AND PROPERTIES OF CARDIAC MUSCLE II BIOCHEMISTRY TUTORIAL ON LIPID CHEMISTRY	PHYSIOLOGY BIOCHEMISTRY REVISION PRACTICLE	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD FIBULA AND LAT. COMP. OF LEG DISSECTION HISTO LAT. SIDE OF LEG I	LECT CUTANEOUS NERVES & VENOUS DRAINAGE & LYMPH DISSECTION HISTO LAT. SIDE OF LEG II	LCD BACK OF LEG DISSECTION HISTO MEDIAL SIDE OF LEG	LCD SOLE I DISSECTION BACK OF LEG I	LECT KNEE JOINT DISSECTION BACK OF LEG II	LCD SOLE II AND JT. OF FOOT DISSECTION SOLE I

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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY SKIN, SCALP & NAIL	PHYSIOLOGY PULMONARY FUNCTION TEST	BIOCHEMISTRY CARBOHYDRATE METABOLISM IV	PHYSIOLOGY CAPILLARY CIRCULATION	BIOCHEMISTRY CARBOHYDRATE METABOLISM V	ANATOMY INGUANAL CANAL
10 TO 11 A.M.	BIOCHEMISTRY CARBOHYDRATE METABOLISM III	ANATOMY EMBRYOLOGY GIT II	PHYSIOLOGY REGULATION OF BLOOD PRESSURE II	ANATOMY EMBRYOLOGY GIT III	PHYSIOLOGY LYMPH	PHYSIOLOGY EDEMA FORMATION
11 TO 01P.M.	PHYSIOLOGY REVISION BIOCHEMISTRY REVISION	PHYSIOLOGY FATIGUE, VAGAL ESCAPE BIOCHEMISTRY ESTIMATION OF TOTAL PROTEIN	PHYSIOLOGY TUTORIAL	PHYSIOLOGY FATIGUE, VAGAL ESCAPE BIOCHEMISTRY ESTIMATION OF TOTAL PROTEIN	PHYSIOLOGY FATIGUE, VAGAL ESCAPE BIOCHEMISTRY ESTIMATION OF TOTAL PROTEIN	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD TIBIOFEBULAR & ANKLE JT DISSECTION HISTO SOLE II	LECT ARCHES OF FOOT, MECH OF WALKING DISSECTION HISTO SOLE III	LCD X-RAYS AND LIVING OF INF. EXT.	LCD INTRODUCTION TO ABDOMEN DISSECTION HISTO INTRODUCTION	LCD ANTERIOR ABD. I DISSECTION ANTERIOR ABD. I	LCD ANTERIOR ABD II DISSECTION ANTERIOR ABD. II

MGM MEDICAL COLLEGE ,AURANGABAD

HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY MALE GENITAL SYS. I	PHYSIOLOGY INTRODUCTION TO EXCRETORY SYSTEM	BIOCHEMISTRY CARBOHYDRATE METABOLISM VII	PHYSIOLOGY RENAL CIRCULATION & AUTOREGULATION OF RENAL BLOOD FLOW	BIOCHEMISTRY CARBOHYDRATE METABOLISM VIII	ANATOMY LECT STOMACH
10 TO 11 A.M.	BIOCHEMISTRY CARBOHYDRATE METABOLISM VI	ANATOMY EMBRYOLOGY GIT IV	PHYSIOLOGY PULMONARY CIRCULATION	ANATOMY EMBRYOLOGY GIT V	PHYSIOLOGY CORONARY CIRCULATION	PHYSIOLOGY GFR
11 TO 01P.M.	PHYSIOLOGY FATIGUE, VAGAL ESCAPE BIOCHEMISTRY ESTIMATION OF TOTAL PROTEIN	PHYSIOLOGY INTRODUCTION TO CLINICAL EXAM. EFFECTS OF DRUGS ON HEART BIOCHEMISTRY SEMINAR ON VITAMIN	PHYSIOLOGY TUTORIAL	PHYSIOLOGY INTRODUCTION TO CLINICAL EXAM. EFFECTS OF DRUGS ON HEART BIOCHEMISTRY SEMINAR ON VITAMIN	PHYSIOLOGY INTRODUCTION TO CLINICAL EXAM. EFFECTS OF DRUGS ON HEART BIOCHEMISTRY SEMINAR ON VITAMIN	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD MALE EXT. GENITAL ORGAN DISSECTION HISTO MALE GENITAL ORGAN	LECT TESTIES DISSECTION HISTO TESTIES	LCD PERITONEUM I DISSECTION HISTO PERITONEAL CAVITY I	LCD PERITONEUM II DISSECTION PERITONEAL CAVITY I	LECT PERITONEUM DISSECTION GRATER AND LESSER OMENTUM	LCD STOMACH & COELIAC TRUNK DISSECTION STOMACH & COELIAC TRUNK

MGM MEDICAL COLLEGE ,AURANGABAD
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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY MALE GENITAL ORGAN II	PHYSIOLOGY CEREBRAL AND HEPATIC CIRCULATION	BIOCHEMISTRY PROTEIN METABOLISM II	PHYSIOLOGY CARDIO RESPIRATORY CHANGES DURING EXCERCISE	BIOCHEMISTRY PROTIEN META. III	ANATOMY LECT PANCREAS
10 TO 11 A.M.	BIOCHEMISTRY PROTEIN META. I	ANATOMY EMBRYOLOGY GIT VI	PHYSIOLOGY TUBULAR FUNCTION	ANATOMY EMBRYOLOGY GIT VII	PHYSIOLOGY MECHANISM OF CONCENTRATION OF URINE	PHYSIOLOGY CIRCULATORY SHOCK I
11 TO 01P.M.	PHYSIOLOGY INTRODUCTION TO CLINICAL EXAM. EFFECTS OF DRUGS ON HEART BIOCHEMISTRY SEMINAR ON VITAMIN	PHYSIOLOGY ARTERIAL PULSE AND EFFECT OF IONS ON HEART BIOCHEMISTRY ESTIMATION OF BLOOD UREA	PHYSIOLOGY TUTORIAL	PHYSIOLOGY ARTERIAL PULSE AND EFFECT OF IONS ON HEART BIOCHEMISTRY ESTIMATION OF BLOOD UREA	PHYSIOLOGY ARTERIAL PULSE AND EFFECT OF IONS ON HEART BIOCHEMISTRY ESTIMATION OF BLOOD UREA	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD DUODENUM DISSECTION HISTO DUODENUM	LECT DUODENUM DISSECTION HISTO MESENTRY	LCD SMALL INTESTINE & SUP. MESENTRIC ARTERY DISSECTION HISTO SMALL INTESTINE	LCD LARGE INTESTINE AND INF. MESENTRIC ARTERY DISSECTION COECUM & APPENDIX	LECT COECUM & APPENDIX DISSECTION LARGE INTESTINE	LCD PANCREASE DISSECTION PANCREASE

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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY FEMALE GENTIAL TRACT I	PHYSIOLOGY RENAL HANDLING OF WATER & ELECTROLYTES	BIOCHEMISTRY PROTEIN META. V	PHYSIOLOGY ACIDIFICATION OF URINE	BIOCHEMISTRY PROTEIN META. VI	ANATOMY LECT. KIDNEY
10 TO 11 A.M.	BIOCHEMISTRY PROTEIN META. IV	ANATOMY EMBRYOLOGY URINARY SYST. I	PHYSIOLOGY CIRCUALTORY SHOCK II	ANATOMY EMBRYOLOGY URINARY SYST. II	PHYSIOLOGY MITURATION Mituration	PHYSIOLOGY RENAL FUNCTION TESTS.
11 TO 01P.M.	PHYSIOLOGY ARTERIAL PULSE AND EFFECT OF IONS ON HEART BIOCHEMISTRY ESTIMATION OF BLOOD UREA	PHYSIOLOGY RECORDING OF BLOOD PRESSURE & STETHOGRAPHY BIOCHEMISTRY LCD ON CHROMATOGRAPHY	PHYSIOLOGY TUTORIAL	PHYSIOLOGY RECORDING OF BLOOD PRESSURE & STETHOGRAPHY BIOCHEMISTRY LCD ON CHROMATOGRAPHY	PHYSIOLOGY RECORDING OF BLOOD PRESSURE & STETHOGRAPHY BIOCHEMISTRY ESTIMATION OF SERUM BILIRUBIN	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD LIVER DISSECTION HISTO LIVER	LECT EXTRA HEPATIC BILLIARY APP. DISSECTION HISTO GALL BLADDER	LCD SPLEEN DISSECTION HISTO SPLEEN	LCD KIDNEY DISSECTION KIDNEY, URETER, SUPRARENAL	LECT AUTONOMIC NERVOUS SYSTEM DISSECTION KIDNEY, URETER, SUPRARENAL	LCD SUPRARENAL AND URETERS DISSECTION POST. WALL

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY FEMALE REPRODUCTIVE SYSTEM II	PHYSIOLOGY BODY TEMP. REGULATION I	BIOCHEMISTRY PROTEIN META VIII	PHYSIOLOGY BODY TEMP. REGULATION III	BIOCHEMISTRY ACID BASE BALANCE I	ANATOMY LECT URINARY BLADDER
10 TO 11 A.M.	BIOCHEMISTRY PROTEIN META VII	ANATOMY EMBRYOLOGY URINARY SYSTEM III	PHYSIOLOGY BODY TEMP. REGULATION II	ANATOMY EMBRYOLOGY URINARY SYSTEM IV	PHYSIOLOGY INTRODUCTION TO ENDOCRINOLOGY	PHYSIOLOGY INTRODUCTION TO GIT
11 TO 01P.M.	PHYSIOLOGY RECORDING OF BLOOD PRESSURE & STETHOGRAPHY BIOCHEMISTRY ESTIMATION OF SERUM BILIRUBIN	PHYSIOLOGY BLOOD PRESSURE II & CLINICAL EXAMINATION OF CVS BIOCHEMISTRY ESTIMATION OF SERUM BILIRUBIN	PHYSIOLOGY TUTORIAL	PHYSIOLOGY BLOOD PRESSURE II & CLINICAL EXAMINATION OF CVS BIOCHEMISTRY ESTIMATION OF SERUM BILIRUBIN	PHYSIOLOGY BLOOD PRESSURE II & CLINICAL EXAMINATION OF CVS BIOCHEMISTRY TUTORIAL ON ENZYMES	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD PERINEUM & ANAL TRINGLE DISSECTION HISTO PERINEUM & ANAL TRINGLE	LECT ISCHIORECTAL FOSSA DISSECTION HISTO ISCHIORECTAL FOSSA I	LCD BONY PELVIS DISSECTION HISTO ISCHIORECTAL FOSSA II	LCD UROGENITAL TRINGLE DISSECTION UROGENITAL TRINGLE I	LECT PERINEAL POUCHES DISSECTION UROGENITAL TRINGLE II	LCD URINARY BLADDER DISSECTION URINARY BLADDER

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TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY OF ENDOCRINES I	PHYSIOLOGY ANTERIOR PITUTARY	BIOCHEMISTRY LIPID META I	PHYSIOLOGY PITUTARY II	BIOCHEMISTRY LIPID META II	ANATOMY LECT PROSTATE & PELVIC DIA.
10 TO 11 A.M.	BIOCHEMISTRY ACID BASE BALANCE II	ANATOMY EMBRYOLOGY MALE GENITAL I	PHYSIOLOGY SALIVARY SECRETION	ANATOMY EMBRYOLOGY MALE GENITAL II	PHYSIOLOGY DEGLUTATION	PHYSIOLOGY THYROID I
11 TO 01P.M.	PHYSIOLOGY BLOOD PRESSURE II & CLINICAL EXAMINATION OF CVS BIOCHEMISTRY TUTORIAL ON ENZYMES	PHYSIOLOGY ECG & CLINICAL EXAMINATION OF RS BIOCHEMISTRY ESTIMATION OF ALK. PHOSPHATASE	PHYSIOLOGY TUTORIAL	PHYSIOLOGY ECG & CLINICAL EXAMINATION OF RS BIOCHEMISTRY ESTIMATION OF ALK. PHOSPHATASE	PHYSIOLOGY ECG & CLINICAL EXAMINATION OF RS BIOCHEMISTRY ESTIMATION OF ALK. PHOSPHATASE	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD UTERUS DISSECTION HISTO UTERUS	LECT UTERUS DISSECTION HISTO OVARY AND F. TUBE	LCD OVARY AND F. TUBE DISSECTION HISTO OVARY AND F. TUBE	LCD RECTUM & ANAL CANAL DISSECTION RECTUM & ANAL CANAL I	LECT RECTUM & ANAL CANAL DISSECTION RECTUM & ANAL CANAL II	LCD PROSTATE DISSECTION PROSTATE

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY HISTOLOGY OF ENDOCRINES II	PHYSIOLOGY GASTRIC SECRETIONS I	BIOCHEMISTRY LIPID META IV	HOLIDAY	BIOCHEMISTRY LIPID META V	ANATOMY LECT (INTEGRATED) CORSS SECTIONAL ANAT.
10 TO 11 A.M.	BIOCHEMISTRY LIPID MRTA III	ANATOMY EMBRYOLOGY FEMALE REPRODUCTIVE I	PHYSIOLOGY THYROID II	HOLIDAY	PHYSIOLOGY GASTRIC SECRETIONS II	PHYSIOLOGY PANCREATIC SECRETION
11 TO 01P.M.	PHYSIOLOGY ECG & CLINICAL EXAMINATION OF RS BIOCHEMISTRY ESTIMATION OF ALK. PHOSPHATASE	PHYSIOLOGY ARTIFICIAL RESPIRATION & SPIROMETRY BIOCHEMISTRY TEST ON CARBOHYDRATE METABOLITES	PHYSIOLOGY TUTORIAL	HOLIDAY	PHYSIOLOGY ARTIFICIAL RESPIRATION & SPIROMETRY BIOCHEMISTRY TEST ON CARBOHYDRATE METABOLITES	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD DIA. AND MUSCLES OF POST. ABD. WALL DISSECTION HISTO DIAPHRAGM	LECT NERVES, VESSLES & LYMPH OF POST ABD. WALL DISSECTION HISTO POST. ABD WALL & PELVIS	LCD X-RAYS & LIVING HISTOLOGY PRACT.	HOLIDAY	REVISION	REVISION

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY SEMINAR	PHYSIOLOGY GASTRIC MOTILITY	BIOCHEMISTRY LIPID META VII	PHYSIOLOGY ADERNAL GLAND I	BIOCHEMISTRY MECHANISM OF HORMONE ACTION	ANATOMY EMBRYOLOGY HEART II
10 TO 11 A.M.	BIOCHEMISTRY	ANATOMY EMBRYOLOGY FEMALE REPRODUCTIVE II	PHYSIOLOGY PARATHYROID	ANATOMY EMBRYOLOGY HEART I	PHYSIOLOGY ADERNAL GLAND II	PHYSIOLOGY
11 TO 01P.M.	PHYSIOLOGY ARTIFICIAL RESPIRATION & SPIROMETRY BIOCHEMISTRY ESTIMATION OF SGOT & SGPT	PHYSIOLOGY ARTIFICIAL RESPIRATION & SPIROMETRY BIOCHEMISTRY ESTIMATION OF SGOT & SGPT	PHYSIOLOGY TUTORIAL	PHYSIOLOGY CARDIAC EFFIENCY BIOCHEMISTRY ESTIMATION OF SGOT & SGPT	PHYSIOLOGY CARDIAC EFFIENCY BIOCHEMISTRY ESTIMATION OF SGOT & SGPT	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	REVISION	REVISION	REVISION	REVISION	REVISION	REVISION

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING
FIRST TERM EXAMINATION

TIME	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	THEORY ANATOMY	THEORY PHYSIOLOGY	THEORY BIOCHEMISTRY	TERMINAL PRACTICLE	TERMINAL PRACTICLE	TERMINAL PRACTICLE
10 TO 11 A.M.						
11 TO 01P.M.						
01 TO 02 P.M.						
02 TO 05 P.M.						

MGM MEDICAL COLLEGE ,AURANGABAD
HORIZONTAL INTEGRATION 1ST M.B.B.S. TEACHING

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9 TO 10 A.M.	ANATOMY INTRODUCTION TO ANATOMY	PHYSIOLOGY	BIOCHEMISTRY	PHYSIOLOGY	BIOCHEMISTRY	ANATOMY
10 TO 11 A.M.	BIOCHEMISTRY	ANATOMY	PHYSIOLOGY	ANATOMY	PHYSIOLOGY	PHYSIOLOGY
11 TO 01P.M.	PHYSIOLOGY BIOCHEMISTRY	PHYSIOLOGY BIOCHEMISTRY	PHYSIOLOGY BIOCHEMISTRY	PHYSIOLOGY BIOCHEMISTRY	PHYSIOLOGY BIOCHEMISTRY	P.S.M.
01 TO 02 P.M.	LUNCH					
02 TO 05 P.M.	LCD DISSECTION	LCD DISSECTION	LCD DISSECTION	LCD DISSECTION	LCD DISSECTION	LCD DISSECTION

Approved in BOM-43/2015, dated 06/11/2015
Resolution No.-3.1(b)

Resolution No. 3.1(b): Resolved to include Early Clinical Exposure in the curriculum of First MBBS by way of video clipping, animations, visit to Wards wherever necessary **(Annexure-II)**) for the batch of Students to be admitted in 1st MBBS from the academic year 2016-17 onwards.

1. Introduction of early clinical exposure
   - For example –
     - Introduction to imaging techniques and correlation with anatomical structure in normal person.
     - Upper limb – Erb'spalsy,Klumke's paralysis,claw hand, wrist drop,
     - Lower limb – varicose veins, Trendelenburg's test for gluteus medius, Knee arthroscopy and replacement, foot drop
     - Thorax – pleural effusion, procedure of pleural or pericardial tap, diaphragmatic hernia, X-ray chest with introduction of terms such as CT scan, HRCT, Bronchoscopy. Introduction of echocardiography and valvular movements; Angiography.
     - Abdomen – renal calculi, Meckel's diverticulum, cholecystitis, Introduction to endoscopy of stomach and large intestine and duodenum, Peancreatic and gallstone removal with endoscopy.
     - Pelvis – interior of bladder by cystoscopy, ectopic pregnancy, haemorrhoids, Introduction of pelvic laprosopy.
     - Head, face, neck – facial palsy, parotitis, black eye in scalp injury
     - Neuro-anatomy – Huntington's chorea, hydrocephaly, procedure of lumbar puncture, Introduction of MRI and MRI angiography and tensor imaging.

O/C

MGM INSTITUTE OF HEALTH SCIENCES

(Deemed University u/s 3 of UGC Act, 1956)
Grade 'A' Accredited by NAAC
Sector -1, Kamothe, Navi Mumbai – 410 209.
Tel: 022-27432471 / 27432994, Fax: 022-27431092
Email: registrar@mgmuhs.com | Website: www.mgmuhs.com

MGM/01 -AC-19/2014/264

Dated: 04/11/2014

To

Dr. A.D. Deepak,
Prof. & Head, Dept. of Biochemistry,
Chairperson – BOS (Pre Clinical)
MGM Medical College, Navi Mumbai

Sub.: Model Question Paper- Reg.

Dear Sir,

As per the discussions in Academic Council Meeting (AC-19 / 2014) dated 31st October, 2014, you are hereby requested to prepare the Model Question Papers for Pre Clinical subjects, as per the MGMIHS and MCI norms, and submit the same to the Examination Section before 15th November, 2014, with intimation to the undersigned.

Thanking you,

Registrar

Registrar
MGM INSTITUTE OF HEALTH SCIENCES
(DEEMED UNIVERSITY u/s 3 of UGC Act, 1956)
KAMOTHE, NAVI MUMBAI

Mahatma Gandhi Mission

MEDICAL COLLEGE

DEPARTMENT OF BIOCHEMISTRY

PH No:- 022-27437809

Ref:- MGM/MED-C/BIOCHEM/690 Date:- 26-11-2014

To,
The Registrar,
MGM Institute of Health Sciences,
Kamothe, Navi Mumbai.

Reference:- Circular No. MGM/01-AC-19/2014/264 dated- 4-11-14

Sub:- Preparation Of Model Question Papers for Pre Clinical Subjects & Log Book.

Sir,

With reference to the above , I am sending the Model Question Paper for Biochemistry Department & log Book.

Thanking you,

Prof & Head
Dept. of Biochemistry

AR (Examin)

MGM Medical College, Navi Mumbai
Department of Biochemistry
University Examination
I-MBBS

Total Marks-50

Paper-I

Date: 30-05-2013

Time: 10.00 a.m. to 12.30 p.m.

SECTION – B

Q.2. Write in brief (Any Four out of Five) **(4 X 5 = 20)**

1. Schematic representation of Krebs- Henseleit cycle and mention its disorders
2. Molecular basis of Sickle cell anemia & give its clinical manifestations.
3. Define isoenzymes and give diagnostic use of any two Isoenzymes.
4. write a note on Lac-Operon model of gene expression.
5. A full term infant was observed to have a lack of pigmentation , blue eyes, white hair & confirmed as a case of albinism.
   a) Name the deficient pigment. (1 Mark)
   b) Name the enzyme responsible for the defect. (1 Mark)
   c) Write biochemical reaction catalysed by the enzyme. (1 Mark)
   d) Name the amino acid, from which the pigment is synthesized. (1 Mark)
   e) Management of the disease. (1 Mark)

SECTION – C

Q.3 Write in detail. (Any Two out of Three) **(2 X 10 = 20)**

1. Catabolism of Purine with related disorders.
2. Give an account of ETC (with diagramme) with sites of ATP formation, inhibitors. Add a note on uncouplers.
3. Write sources, RDA, biochemical functions and deficiency manifestations of vitamin A.

****

MGM Medical College, Navi Mumbai
Department Of Biochemistry
University Examination
I-MBBS

Total Marks-50

Paper-II

Date: 31-05-2013 Time: 10.00 a.m. to 12.30 p.m.

Section – B

Q. 2. Short answer questions (Any Four) **(4 x 5=20)**

1. Hormonal regulation of blood calcium level.
2. Detoxification by conjugation
3. Biochemical changes in starvation.
4. Diagnostic applications of radioisotopes.
5. A 65 year old male presented with acute chest pain, sweating & discomfort in Casualty . After the admission his blood was sent to Laboratory for investigations & findings are

Investigation	Patient	Normal
a) Serum cholesterol	350 mg/dl	150-220 mg/dl
b) S.G.O.T	55 IU / L	5-35 IU/ L
c) LDH	220 U / L	50-110 U/ L

a) What is most probable diagnosis. (1 Mark)
b) Which isoenzyme of LDH will you estimate to confirm above diagnosis. (1 Mark)
c) Name additional tests to be done to confirm your diagnosis. (1 Mark)
d) What is biochemical mechanism for the symptoms. (2 Marks)

Section – C

Q. 3. Write in detail (Any Two) **(2 x10=20)**

1. Describe formation and breakdown of ketone bodies. Add a note on ketosis.
2. Describe Krebs cycle, its regulation and energetics
3. Describe liver function tests .

****

Approved in BOM 43/2015, Dated 05/11/2015
Resolution No. 3.1 (d)

Resolution No. 3.1(d): Resolved to accept the proposed pattern of redistribution of the marks in First MBBS – University Biochemistry Practical Examination **(Annexure-III)** for the batch of Students to be admitted in 1st MBBS from the academic year 2016-17 onwards.

Redistribution of the marks in First MBBS – University Biochemistry practical Examination as below :

1. Current Pattern of Biochemistry Practical Examination

Total Marks =40

Q.1 Long quantitative/ qualitative experiment 20 marks
Q.2 Short quantitative/ qualitative experiment 15 marks
Q.3 Spotting 5marks

2. Proposed Pattern of Biochemistry Practical Examination

Total Marks =40

Q.1 Long quantitative/ qualitative experiment 20 marks
Q.2 Short quantitative/ qualitative experiment 10 marks
Q.3 Spot- Clinical interpretation of the datas & applied Biochemistry (10 Marks)

For e.g.: 5 Spots of 2 marks each (10 Marks) or 2 case study questions of five marks each (10 Marks)

Case study: Which will be given based on various investigations taught in practical syllabus for example: Diabetic ketoacidosis, jaundice, Kidney diseases, and AMI, etc.

Following subquestions one mark each could be asked like

1. Which Tests can be done.
2. What is principle of test/ instrument.
3. Give names of reagents used in the test./ use of reagent.
4. What is normal range.
5. What is clinic biochemical correlation.

1st year - MBBS

Resolution No. 1.3.7.1 of BOM-51/2017: Resolved to continue the current Internal Assessment pattern for MBBS (i.e. 5 marks for Day-to-day assessment) for Pre and Para Clinical subjects (Anatomy, Physiology, Biochemistry, Microbiology, Pharmacology, Pathology and FMT).
For rest of the subjects, Internal Assessment is to be calculated from terminal/Post end exam marks and Prelims examination, with immediate effect.

1st MBBS
Biochemistry

Resolution No. 1.3.7.3 of BOM-51/2017: Approved to include Bioethics in First MBBS curriculum with three Lectures (1 hr each) per subject of Anatomy, Physiology and Biochemistry with topics: (with effective from Academic year 2017-18)

3) Biochemistry –

1) Prudency of investigations, Confidentiality of tests & results
2) Disposal of investigation material & integrity
3) Informed consent

MBBS, Biochemistry

Resolution No. 1.3.7.4 of BOM-51/2017: Approved to include "Lecture cum Demonstration" on Glucose Tolerance Test in the UG (MBBS) Syllabus of Biochemistry with effective from Academic year 2017-18.

1st MBBS - Biochemistry

Resolution No. 3.5.2 of BOM-52/2018: It was resolved to conduct Bioethics as lecture schedule in MBBS in Anatomy, Physiology, Biochemistry with topics & time table as mentioned below, with effect from batch admitted in 2017-18 onwards–

3) Biochemistry –

1) Prudency of investigations, Confidentiality of tests & results– (January)
2) Disposal of investigation material & integrity – (February)
3) Informed consent – (April)

I MBBS

Resolution No. 3.5.9 of BOM-52/2018:

a) BOM reiterated the earlier BOM resolution as mentioned below:

Resolution No. 1.3.7.5 of BOM-51/2017: It was resolved that

i) In all the subjects of all courses, MCQ weightage (Section A) shall be a maximum of 20% of the total marks in each paper.

ii) BOS will have to accordingly workout the changes in Section B & C weightage and put up in forthcoming BOS meeting.

iii) Further University Examination section must validate the MCQ Question Bank by Faculties before giving it to question paper-setter.

b) To be effective from:

(i) Ist MBBS - Batch appearing in University August/September 2018 examination onwards.

(ii) IInd MBBS - Batch appearing in University January 2019 examination onwards.

(iii) IIIrd MBBS (Part I) and IIIrd MBBS (Part II) - Batch appearing in University January 2019 examination onwards.

Resolution No. 3.5.11 of BOM-52/2018: Resolved to have Exam Schedule of Ist MBBS which is as follows :

1. Terminals 1st week of February 2018
2. Prelims – 1st week of July 2018
3. University Exam
   a) Theory – August 1st week 2018
   b) Practical – 3rd week of August 2018

1ST MBBS

Resolution No. 3.5.1 of BOM-52/2018: Resolved to have Internal Assessment for each subject in 1st (MBBS) as mentioned below, with effect from batch admitted in 2017-18 onwards:

Theory – 20 marks

1. 15 marks (Terminal & Prelim exam theory marks)
2. 5 marks (Departmental assessment)
    a. 3 marks (4 Periodical Theory tests)
    b. 2 marks (Seminars)

Practical – 20 marks

1. 15 marks (Terminal + Prelim Practical marks)
2. 5 marks (continuous departmental assessment)
    a. 3 marks (4 Periodical practical tests)
    b. 2 marks Journals

Note –There will be 4 periodical tests in each subject (Two per term) in theory & practicals of 30 marks each.

Resolution No. 3.5.8 of BOM-52/2018: It was resolved that 2 horizontal & 1 Vertical integration will be taken per term in 1st MBBS, with effect from batch admitted in 2017-18 onwards. **[Annexure-II A, II B, II C & II D]**

Annexure - II

Annexure - II

~~Annexure VII A~~

I MBBS -Horizontal Integration Topics of Anatomy ,Physiology and Biochemistry.

Sr. No.	Topics	Anatomy	Physiology	Biochemistry
1.	Diabetes Mellitus	Endocrine Part Of Pancreas	Control of Insulin Secretion & Functions	lab Diagnosis & GIT
2.	Endemic Goiter	Thyroid Gland	Formation & Regulation of T_3, T_4 & TSH	Iodine Metabolism & Function Tests
3.	Myocardial Infarction	Coronary Arteries	ECG	Cardiac Markers
4.	Jaundice	Hepato Biliary Tree	Fate of Haemoglobin Bile Enterohepatic circulation	Diagnostic tests for Jaundice.
5.	Glomerular Filtration	Nephron	Physiology of Glomerular Filtration	Inulin & Creatinine Clearance Test

*Note :

1. Two sessions of Horizontal integration will be conducted per term for 1st MBBS students.
2. This can be subject to change as per requirement and rotation in subsequent years.

Annexure VII B

Vertical Integration Topics of Anatomy

1. **Breast cancer**
   - Anatomy – Mammary Gland
   - Radiology – Mammography
   - Surgery – Diagnosis and treatment in reference to Anatomy

2. **Thyroid – Goitre**
   - Anatomy – Thyroid Gland
   - Medicine – Diagnosis with reference to Anatomy and Physiology
   - Surgery – Diagnosis and treatment in reference to Anatomy
   - Community Medicine – Epidemiology

3. **Tonsillitis**
   - Anatomy – Palatine Tonsil
   - ENT – Diagnosis and treatment in reference to Anatomy

4. **Fallopian tube – Ectopic Pregnancy**
   - Anatomy – Fallopian tube
   - OBGY – Diagnosis and treatment in reference to Anatomy
   - Community Medicine – Tubal ligation as method of contraception

5. **Tuberculosis**
   - Anatomy – Lungs
   - Pathology – Changes in lungs with reference to normal histology
   - Radiology – Findings in chest radiographs
   - Respiratory Medicine – Diagnosis and treatment in reference to Anatomy
   - Community Medicine – Epidemiology

*Note : As per the discussion in the meeting BOS Preclinical – 27/11/2017, we are submitting sample topics for vertical integration. This can be subject to change as per requirement and rotation in subsequent years

One session of vertical integration will be conducted per term for 1st MBBS students

Annexure for item no 8 in BOS Preclinical – 27/11/2017

PG Allied Posting

As per the discussion in the meeting BOS Preclinical – 27/11/2017, we are submitting final schedule of allied posting in MD Anatomy.

a. Pathology – 2 weeks
b. FMT – 2 weeks
c. Radiology – 4 weeks
d. Genetics – 2 weeks

NOTE : MD Student from Aurangabad campus can be deputed for genetics posting in Navi Mumbai campus.

Annexure VII C

Vertical Integration Topics of Physiology

1. Anaemia

- Physiology – Erythroposis & Regulation
- Pathology – Etiology, Classification
- Medicine – Treatment
- PSM - Epidemiology & Prevention

2. Diabetes Mellitus

- Physiology – Action of Insulin
- Medicine – Signs & Symptoms
- Pharmacology – Pharmacological & non pharmacological management

3. Errors of Refraction

- Physiology – Optics of eye
- Ophthalmology – errors of refraction and their correction

4. Pulmonary Function test

- Physiology – Pulmonary Functions
- Chest & TB – PFT & Interpretation

5. Gastric secretion

- Physiology – Physiology of Gastric Secretion
- Pathology – Pathophysiology of Peptic ulcer
- Surgery – Diagnosis, Complication & Treatment

Note : As per the discussion in the meeting BOS Preclinical – 27/11/2017, we are submitting sample topics for vertical integration. This can be subject to change as per requirement and rotation in subsequent years

One session of vertical integration will be conducted per term for 1st MBBS students

Annexure VII D

Topics for Vertical Integration of Biochemistry for I[st] Year MBBS.

1. **Thyroid**
   - Biochemistry- synthesis, regulation and mechanism of action of Thyroid hormones, Thyroid Function Tests
   - Pathology- etiology, pathophysiology, classification of Goitre
   - Medicine- signs & symptoms of hyperthyroidism and hypothyroidism, treatment
   - ENT- Surgical treatment

2. **Kidney**
   - Biochemistry- Renal Function Tests, Acid Base balance, Urine Analysis
   - Pathology- pathophysiology of Renal disorders
   - Medicine & Peadiatrics - Interpretation and differential diagnosis of Renal Function Tests, Arterial Blood Gas Analysis & Urine Analysis. Clinical Features of related disorders.

3. **Liver**
   - Biochemistry- Role in Metabolism & Detoxification , Liver Function Tests
   - Pathology- Pathophysiology of Jaundice liver cirrhosis, Alcoholic liver disease
   - Medicine- Interpretation and differential diagnosis of Liver Function Tests. Clinical Features of related disorders.

Prof. & Head

Department Of Biochemistry

Professor & Head,
Dept. of Biochemistry
M.G.M. Medical College,
Kamothe, Navi Mumbai-410209

Resolution No. 4.3.5 of BOM-53/2018: Resolved to add reference book entitled "ESSENTIAL IN RESPIRATORY MEDICINE" by Dr. S.H. Talib in the UG/PG curriculum in medicine and allied subjects

Resolution No. 4.5.1.1 of BOM-55/2018: Resolved that from 2018-2019 batch onwards**:**

(i) Following should be deleted from the Ist MBBS Biochemistry practical syllabus:

- Tests for bile
- Tests for polysaccharides

(ii) Following topics needs to be grouped (Experiment no. -27, 28 & 29) as "Lipid profile" (lecture cum demonstration) in Biochemistry Journal

Existing Experiments	Proposed
27. Triglycerides Des Dynamic Extended stability with lipid clearing agent GPO - Trinder method, End point 28. HDL - Cholesterol Phosphotungstic Acid Method, End Point 29. Cholesterol Des Dynamic extended stability 89 Chod-Pap method, End point with lipid clearing agent	Lipid Profile

(iii) "Write up" of the following Lecture cum demonstration topics are approved which needs to be added in practical journal: [**Annexure-28-A,B,C,D]**

a) Enzyme immunoassay
b) Lipid profile
c) First Aid in Biochemistry laboratory & Laboratory Hazards
d) Blood collection and anticoagulants

(iv) Inclusion of the Case studies in Biochemistry Journal- A separate heading (D- Case Studies) should to be added in biochemistry Journal

(v) Therefore a new index of 1st MBBS Biochemistry journal is prepared & enclosed alongwith **[Annexure-29]**

Annexure – 1 – A

IMMUNOASSAY TECHNIQUE

Introduction:

Immunochemical techniques are usually employed to detect or quantitate the antigen or antibody. RIA and ELISA are to important immunoassay techniques used to measure hormones , drugs , tumour markers and antigens which occur in microquantities in biological sample.

Enzyme linked immunosorbent Assay

Introduction:

ELISA is based on the immunochemical principles of the antigen antibody reaction. The technique is commonly used to detect very small quantities of antigens or antibodies in biological sample. It is also employed for hormone estimations and to detect tumour markers and growth factors.

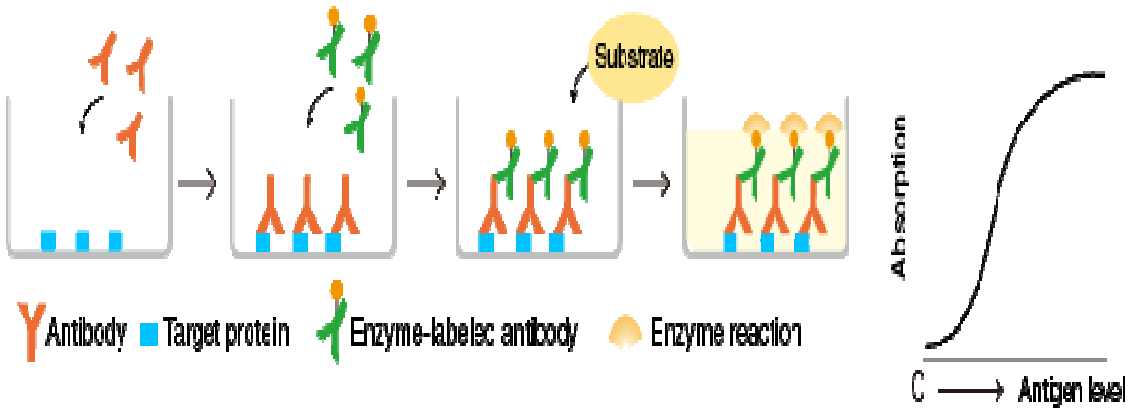
Types of ELISA :

1. Single antibody method (Competitive method)
2. Double Antibody Method (Sandwich Method)

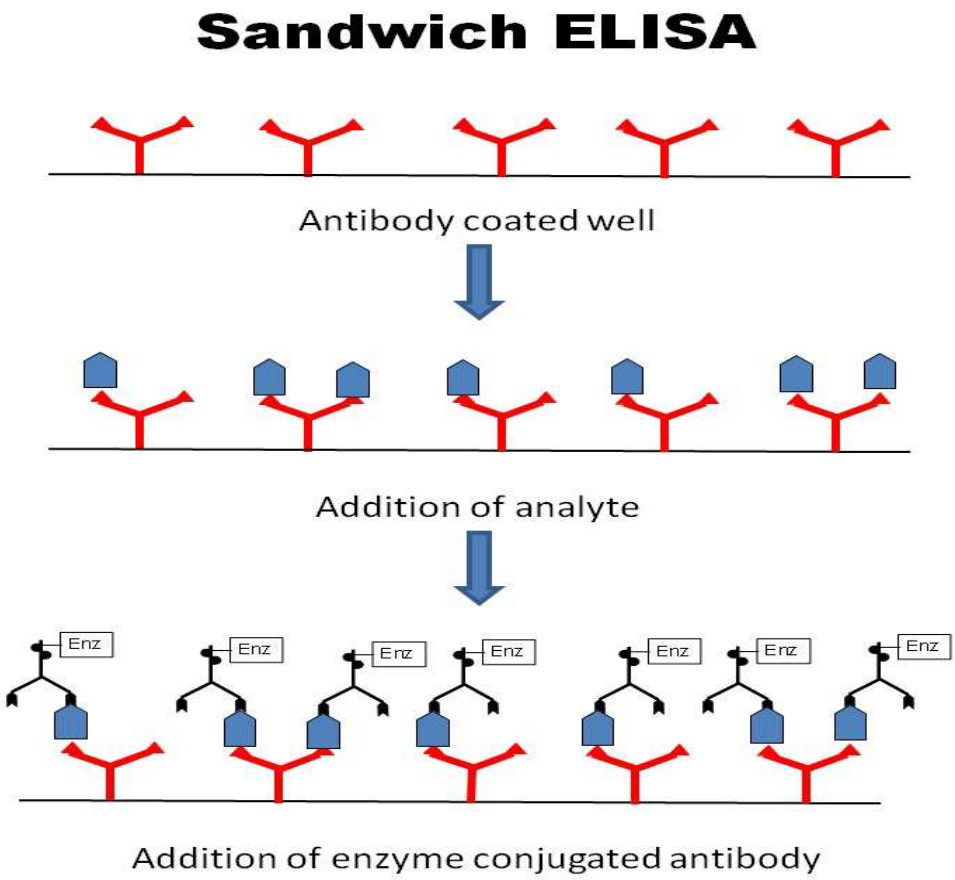
Single antibody method (Competitive method): In this technique, a known amount of enzyme labelled antigen and unknown amount of unlabelled antigen (in patient sample) mixture are allowed to react with specific antibody fixed on an inert solid.

There is competation between labeled antigen and unlabelled antigen for binding with limited number of antibodies available. Wells are washed after the incubation period. During washing the unbound antigen are washed off with buffer. After washing the unbound antibody- enzyme conjugate with buffer , the enzyme substrate is added and enzyme activity is measured.

The enzyme activity measured is directly proportional to amount of labelled antigen and inversely proportional to amount of the unlabelled antigen in test sample.



Double Antibody Method (Sandwich Method):): In this technique, the unknown antigen in the test sample is allowed to bind with specific antibody attached covalently to a solid support like a thin sheet polyvinyl chloride. Now a second antibody labeled with the enzyme is added. This antibody binds with the already bound antigen, forming an Antibody- antigen – antibody complex. The antigen is now in a state of being ‘ sandwiched’ between two antibodies. After washing off excess antibodies, the enzyme substrate is added. Enzyme activity is measured by measuring the product formed colorimetrically. The enzyme activity is directly proportional to amount of antigen present in the test sample. For each molecule of antigen that binds in the final complex , there will be thousands of product molecules produced which cause amplification. This amplification effect makes ELISA a highly sensitive immunoassay.



Materials used in ELISA

1. Solid phase: plastic tubes or micro titre plates
2. Enzymes
   - Horse radish peroxidase for which substrate is hydrogen peroxide
   - Alkaline phosphatase for which substrate is p nitrophenyl phosphate

Applications-

1. ELISA is used in clinical biochemistry laboratory to measurew hormones in the serum like thyroid hormone, insulin, reproductive hormone, pituitary hormones like FSH, LH, TSH
2. Used to measure tumor markers in serum like AFP, PSA, HCG, CEA, CA 125, etc
3. To study infectious diseases like detection opf bacterial toxins, viruses, hepatitis B surface antigens.
4. For the assay of antibodies in serum in infectious diseases including antiviral antibodies e. g. Epstein Barr virus, Rubella Virus
5. For the assay of auto antibodies e.g. anti DNA , ANA, antithyroglobulin.

RADIOIMMUNO ASSAY:

The estimation of compound occurring in biological fluids in extremely low concentrations can be done by this technique.

Principle: Radioimmuno assay is a combination of the principles of radioactivity of isotopes and immunological reactions of antigens and antibody. RIA method is based on the competition between unlabelled antigen in the sample / standard and radio labeled analyte/ antigen for the limited number of binding sites of the specific antibody. At the end of the incubation , the bound antibody and the free analyte/ antigen are separated . The concentration of analyte in sample is estimated by measuring the radioactivity of the bound fraction of samples and standards in the radioactive counters. As the concentration of unlabelled antigen increases , the levels of labeled antigen – antibody decreases.

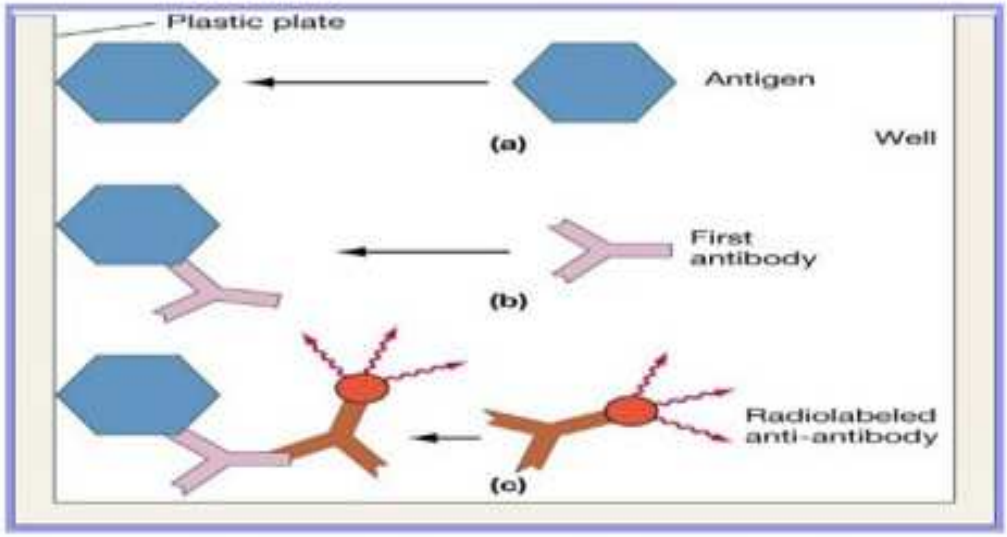
Applications: A large number of compounds which occur in minute concentration in biological fluid can be accurately quantitated.

1. Hormones such as thyroid profile (T3 T4 TSH), growth hormne , insulin, estradiol, FSH, LH , Prolactin etc can be accurately measured.
2. Tumor markers such as PSA, AFP, etc can be detected.
3. All vitamin levels can be measured.
4. Therapeautic monitoring of drugs can be done.

Limitations:

1. The reagents and equipments are expensive.
2. The shelf life of reagent is short hence can not be stored for long
3. The assay is of long duration.
4. Proper safty measurses must be taken while handling and disposing radio active materials to avoid radiological hazards

Radioimmunoassay (RIA)



Annexure – 1 – B

LIPID PROFILE

Lipid profile refers to a group of biochemical test done for estimating major plasma lipids to evaluate the risk of atherosclerosis. Hyperlipidemia, particularly hypercholesterolemia, is well known to cause atherosclerosis which may result in serious clinical disorders like myocardial infarction and cerebral strokes.

Cholesterol is transported in the blood by lipoproteins mainly HDL and LDL. Further, HDL plays an important role in the removal of cholesterol from tissues and LDL in its deposition into the tissues. Hence their cholesterol content is particularly helpful in predicting the risk of atherosclerosis.

BLOOD LIPID PROFILE

It includes estimation of the following

1. Total Cholesterol
2. HDL- Cholesterol (HDL-C)
3. LDL- Cholesterol (HDL-C)
4. Triglycerides
5. HDL/LDL Ratio

Cholesterol estimation has already been discussed. Here is a brief account of HDL-C and LDL-C in the overall context of lipid profile and its clinical importance.

TOTAL SERUM CHOLESTEROL

Enzymatic Method for Estimation of Cholesterol

Commercially available cholesterol reagents commonly combine all enzymes and other required components into a single reagent. The reagent usually is mixed with 3 µL to 10 µL aliquot of serum or plasma, incubated under controlled conditions for color development and absorbance is measured at about 500 nm. The reagents typically use a **bacterial cholesterol ester hydrolase** to hydrolyze cholesterol esters to cholesterol and fatty acids **(Figure 26.5**). The 3-OH group of cholesterol is then oxidized to a ketone derivative and H2O2 by cholesterol oxidase. H_2O_2 is then measured in a peroxidase catalyzed reaction that forms dye.

$$\text{Cholesterol ester} + H_2O \xrightarrow[\text{hydrolase}]{\text{Cholesterol ester}} \text{Cholesterol} + \text{Fatty acid}$$

$$\text{Cholesterol} + O_2 \xrightarrow[\text{hydrolase}]{\text{Cholesterol}} \text{Ketone derivative of cholesterol} + H_2O_2$$

$$\xrightarrow{\text{Peroxidase}}$$

H_2O_2+ Phenol + 4 –aminoantipyrine ⟶ Quinoneimine dye + 2 H_2O

NORMAL VALUES AND INTERPRETATION

Cholesterol Normal Value
< 200mg/dl- Desirable
200-239 mg/dl – Borderline
240 mg /dl- High risk

- The normal range for healthy young adults is less than 200 mg / dL.
- It may be lower in children
- The concentration increases with age.
- The concentration in the women is generally somewhat lower than in men up to the time of menopause but then increase and may exceed that in men of the same age.

INCREASED CONCENTRATION

- The total concentration is increased in
  - Hypothyroidism
  - Uncontrolled diabetes mellitus
  - Nephrotic syndrome
  - Extrahepatic obstruction of the bile ducts
  - Various hyperlipidemias

- Long time elevated cholesterol concentration (more than 240 mg /dL) is a high –risk factor for the development of coronary artery disease.
- Lowering of plasma cholesterol concentration reduces the incidence of coronary heart diseases.
- National Cholesterol Education Program (NCEP) defined the levels of serum cholesterol believed to be desirable, tolerable or a high-risk factor for development of coronary artery disease. The report classifies total cholesterol concentration (Table 26.2) which is applicable to all individuals over 20 years of age and sex.

DECREASED CONCENTRATION: Hypocholesterolemia is usually present in :

- Hyperthyroidism
- Hepatocellular disease
- Certain genetic defects, e.g. abetalipoproteinemia

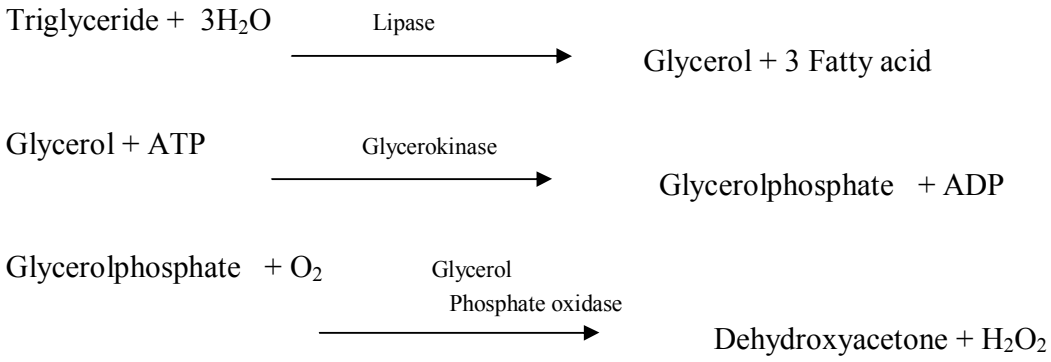
TRIGLYCERIDES (TGS)

TGs are major lipids as well as storage form of lipid in adipose tissue. Their primary function is to provide energy. The normal serum TG levels are from 50-160mg%, the mean being 120mg%. Higher TGs levels are seen in conditions like diabetes mellitus, nephritic syndrome, hypothyroidism, obesity etc. High TG levels alone without any other lipid abnormality are usually not associated with increased risk of atherosclerosis.

Enzymatic method for estimation of triglycerides(TG):

Single reagents that consist of all the required enzymes, cofactors and buffers generally are used.

The first step is the hydrolysis of triglycerides to glycerol and fatty acid by lipase. Glycerol is then oxidized to dihydroxyacetone and H2O2 by glycerophosphate oxidase enzyme. The H2O2 formed in the reaction subsequently is measured as described in enzymatic method for total serum cholesterol



NORMAL VALUES AND CLINICAL INTERPRETATION

Triglyceride Normal Value

< 150 mg /dl- Desirable

150-199 mg/dl- Borderline

200-499 mg/dl- High risk

The normal range of serum triglycerides is 40 to 145 mg / dL. Mean values rise slowly with age after three decade.

Values below the normal range are of little clinical significance.

Elevated concentration is often found in disturbance of lipid metabolism and in atherosclerosis and coronary artery disease. The serum triglyceride concentration is greatly elevated in hyperlipoproteinemia type I and V and moderately increased in type II b and III.

The cause of hyperlipoproteinemia is a genetic origin but hypertriglyceridemia occur commonly secondary to the following pathologic conditions:

- Hypothyroidism
- Nephrotic syndrome
- Alcoholism
- Obstructive liver diseases
- Acute pancreatitis
- Uncontrolled diabetes mellitus
- Glycogen storage disease (type I)

DECREASED CONCENTRATION:

The plasma triglyceride concentration is low in the rare disease, abetalipoproteinemia (absence of low density lipoproteins)

HDL CHOLESTEROL (HDL-C)

HDL or high density lipoprotein, also known as α-lipoprotein, is good for body. Its cholesterol content, contrary to the bad image of cholesterol is called good cholesterol. This is because HDL- removes cholesterol from peripheral tissues, esterifies it with the help of LCAT enzyme and Apo-A-I (coenzyme) and then transfers it ultimately to the liver through VLDL, LDL etc.

This helps in prevention of development of atherosclerosis.

Principle: LDL, VLDL and chylomicrons are prepecipitaed by polyanions in the presence of magnesium ions to leave HDL in solution. The supernatant containing HDL is used for cholesterol estimation by the same method as for total cholesterol.

NORMAL VALUES AND CLINICAL SIGNIFICANCE OF HDL CHOLESTEROL:

HDL Cholesterol Normal Value

60 mg /dl- Desirable

35- 45 mg/dl- Borderline

< 35 mg/dl- High risk

Serum level of HDL cholesterol for:

- Men is 30 to 60 mg / dL.
- For women 40 to 80 mg/dL which is 20 to 30% higher than men

Studies have indicated that when the HDL cholesterol value is lower than 55 mg/dL in men and lower than 55 mg / dL in women there is an increased risk for heart disease and the relative risk increases with lower HDL cholesterol concentrations.

Higher HDL cholesterol concentrations may be associated with decreased risk of coronary disease. Thus, HDL cholesterol levels are inversely related to the risk of cardiovascular disease. HDL cholesterol level above 60 mg/dL indicates very low risk for coronary artery disease (CAD). HDL below 35 mg/dL cholesterol increases the risk of CAD.

The ratio of total cholesterol to HDL cholesterol gives a more accurate and definite assessment of heart disease risk (Table 26.3)

Decreased levels are associated with stress, obesity, androgens, cigrarette smoking and diseases like diabetesmellitus, augments the risk of coronary artery disease . HDL cholesterol is very low in genetic disorder, **Tangier disease**

VLDL- CHOLESTEROL (VLDL-C)

Serum TGs level is also used to calculate VLDL- cholesterol indirectly. Direct separation of VLDL from serum is a very lengthy and difficult procedure requiring 18 hours of ultra centrifugation.

VLDL-C is approximately equal to $1/5^{th}$ of the serum TG level and is based on the normal TG and cholesterol ratio in VLDL. However, this should not be used if serum TG is more than 400mg% or if the patient has type III hyperlipoproteinemia, because in these conditions the VLDL composition changes.

LDL- CHOLESTEROL (LDL-C)

LDL is richest in cholesterol among all the lipoproteins. About 30% of the total LDL is taken up by peripheral tissues where it delivers its cholesterol. Hence in case of high LDL-C, there is an increased deposition of cholesterol in the tissues. This enhances the risk of atherosclerosis including coronary artery disease (CAD). LDL- cholesterol is thus very helpful in evaluating the risk of CAD.

The value of LDL cholesterol may be calculated, if the concentrations of total and HDL cholesterol and triglycerides are measured. In practice, LDL can be measured indirectly by use of Friedwald equation assuming that total cholesterol is composed primarily.
Total cholesterol = cholesterol in (VLDL+ LDL+HDL).
LDL cholesterol = Total cholesterol – (HDL cholesterol + 1/5 x Triglyceride (Tg))

The concentrations of all constituents should be expressed in the same units mg/dL or mg/L. 1/ 2022 x TG is used when LDL cholesterol is expressed in mmol/L. The factor 1 / 5 x TG is an estimate of the VLDL cholesterol concentration.

NORMAL VALUES AND CLINICAL INTERPRETATION

LDL Cholesterol Normal Value

60 - 130 mg /dl- Desirable

130-159 mg/dl- Borderline

160-189 mg/dl- High risk

The LDL cholesterol in women is somewhat lower than in men but increase after menopause

Low levels of LDL cholesterol lower the risk.

Values above 160 mg/dL indicate high risk.

Values between 130 and 160 mg/dL are in border line risk

Values below 130 mg/dL are safer side. (Table 26.2)

Thus , the risk of cardiovascular disease is correlated directly with a high concentration of LDL cholesterol. The highest correlations have been obtained as a risk factor by the ratio of LDL cholesterol to HDL cholesterol (Table 26.3)

FRIEDWALD EQUATION

According to this equation total serum cholesterol (TC) is equal to the sum of cholesterol contents of high, low and very low density lipoproteins.

TC= HDL- C + LDL-C + VLDLC
LDL- C= TC – (HDL-C + VLDL-C)
= TC –(HDL – C + TG/5)
(Since VLDL – C = 1/5 th TG)

HDL- AND LDL-C RATIO:

HDL-C: LDL-C Ratio is a good measure of the risk of atherosclerosis than either the LDL-C or HDL-C alone. Normal HDL-C: LDL-C Ratio is 2-2.5.
Once HDL-C and LDL-C are known the ratio of the HDL-C and LDL-C can be easily calculated. It is good predictor of atherosclerosis.
High ratio due to increase LDL-C or decrease HDL-C is considered a positive predictor of risk of atherosclerosis than the LDL-C or HDL-C alone

Cholesterol / HDL ratio Normal Value

4.0- Desirable

5.0- Borderline

6.0- High risk

Annexure – 1 – C

FIRST AID IN BIOCHEMISTRY LABORATORY & LABORATORY HAZARDS

A. CONTACT WITH CORROSIVE CHEMICALS AND REAGENTS

1. Wash the affected area with plenty of water
2. Seek medical help immediately
3. Acid splashes on skin- Bath the area with 5% sodium carbonate.
4. Alkali splashes on skin- Bath the area with 5% Acetic Acid.
5. Contact with phenol- Irrigate with polyethylene glycol mixed with water.

B. EYE ACCIDENTS

1.Most urgent ocular emergency
2. An alkali burns are more disasterous than acid burns
3.Wash eye with plenty of water
4.Seek medical help immediately
5.Rinse eyes in sterile saline

C. ACCIDENTAL SWALLOWING OF POISONOUS REAGENT

1. Spit it out immediately
2. Rinse mouth promptly with water
3. Induce vomiting by warm salt water

D. ACCIDENTAL SWALLOWING OF INFECTIOUS SPECIMEN

1. Spit it out immediately
2. Rinse mouth promptly with water
3. Wash mouth with dilute antiseptic lotion

E. CONTACT OF LIP AND TONGUE WITH CORROSIVE REAGENTS

1. Wash with plenty of water
2. Acids- wash with 2% sodium carbonate.
3. Alkali- wash with 5% acetic acid

F. INJURIES CAUSED BY BROKEN GLASS

1. Wash with disinfectant
2. Cover with gauze and adhesive tape

G. BLEEDING

1. Make the patient lie down
2. Stop bleeding by applying pressure
3. Clean area with antiseptic
4. Apply sterile gauze and bandages

H. ACCIDENTAL SWALLOWING OF CORROSIVE REAGENTS

1. Rinse with water
2. Take medical help
3. Acids- antidote is 5% soap solution,8% magnesium hydroxide
4. Alkalis- antidote is lemon juice /5% acetic acids

I. BURNS

1. Wash the affected area with plenty of water
2. Cover burnt area with sterile dressing
3. Seek medical help immediately

General Instructions to Students

DO'S

- ✓ Be Punctual
- ✓ Maintain silence
- ✓ Wear white apron
- ✓ Use teats for pipetting
- ✓ Avoid pipetting corrosive by mouth
- ✓ Handle biological fluids with great care to avoid infection
- ✓ Ensure safety while boiling fluids
- ✓ Turn off burners after use
- ✓ Waste to be thrown in dustbin
- ✓ Girls should tuck their hairs with pins
- ✓ Report any accident to the staff immediatey
- ✓ Report glassware breakage immediately

DONT'S

- Do not talk while pipetting
- Do not use paper to light burner
- Do not handle broken glass with bare hand
- Do not waste any reagent unnecessarily
- Do not throw filter paper or broken glassware into the wash basin
- Do not eat and drink in laboratory
- Do not keep cloth or books near burner

SAFTY SIGNS

CORROSIVE:-
DESTROYS LIVING TISSUES.
e. g.- Concentrated acids,
alkalies,
phenols.

TOXIC:-
CAN BE DANGEROUS
IF SWALLOWED ,
ABSORBED THROUGH SKIN,
INHALATION
e.g.-potassium cyanide,
ninhydrin

FLAMMABLE HAZARDS -
THEY SHOULD BE KEPT
AWAY FROM THE
AREA WHERE HEATING
PROCEDURES ARE CARRIED
OUT.
e.g.- carbon tetrachloride,
ether, chloroform,

OXIDISING
SUBSTANCES:-
MAY NOT BE FLAMMABLE
BUT MAY CAUSE A
FIRE WHEN BROUGHT
INTO CONTACT WITH
COMBUSTIBLE MATERIAL

EXPLOSIVES :-
MUST BE HANDLED WITH
EXTRTEME CARE
e.g. – dry picric acid

NOTE:- EXPLOSIONS CAN ALSO OCCUR FROM THE MIXTURE OF TWO COMPOUNDS WHICH IN THEMSELVES ARE HARMLESS. AN AWARENESS OF THIS IS NECESSORY TO AVOID A LABORATORY HAZARD.

Annexure – 1 – D

Blood Collection & anticoagulants

Blood Collection:

The procedure in which an operator bleeds a specific amount of blood of subject for a particular investigation can be termed as collection of blood.

Preparation of specimen collection material

Following material should be readily available in the specimen collection section-

- Disposable syringes and needles (of bore size 19, 20 and 21) or vacutainer systems.
- Disposable lancets.
- Gauze pads or adsorbent cotton
- Tourniquet
- 70% (V/V) ethanol (or isopropanol)
- Clean and dry wide mouth bottles (50 ml and 100 ml)
- Sterile wide mouth bottles(100 ml)
- Needle disposal system
- First Aid box

Table 1: Anticoagulated bulbs or tubes for blood collection

Color	Anticoagulant	USE
Red	-	For Serum
Lavender	EDTA (Na_2 or K_2)	Whole blood for CBC
Blue	Sodium citrate (liquid)	Whole blood for ESR And coagulation test
Green	Heparin	Plasma or Whole blood
Gray	Sodium fluoride	Plasma for blood glucose

Patient preparation

Following instructions are given to the patient:

1. The patient should be on balanced diet at least for 2 to 3 days prior to the test.
2. The day before sample collection, the patient should not drink intoxicating substance, esp. alcoholic drinks and eat tobacco.
3. It is necessary to find out if the patient is under any specific medication.
4. The patient should not undergo vigorous exercise prior to the test.
5. Patient should report to the laboratory after fasting for 12-16 hrs. Patient should not drink tea, coffee or any other drinks except one glassful of water.
6. Patient should basic information about venipuncture. (since patients cooperation is needed during blood collection)
7. For post –prandial blood collection, it is necessary for the patient to report to the laboratory, 15 mins before the scheduled blood collection time.
8. The patient must rest for at least 15 minutes before the blood collection.

Responsibilities of a phlebotomist

The Phlebotomist (the technician who collects blood) should be trained to-

- Approach the patient pleasantly and confidently.
- Obtain blood samples properly, quickly and without undue discomfort to the patient
- Details of drugs or local medicines taken by the patient before blood collection.
- Relevant clinical information regarding patient's conditions.

Laboratory request form

1. The laboratory request form should be dated and include a number to identify all paperwork and specimen associated with each patient.
2. The laboratory request form should provide the following information.

- Patient full name, sex and weight (if necessary)
- Identifications number
- List of required specific tests
- Urgent tests: Only those tests that are required for the immediate care
- Name of the physician ordering the test

Basic steps for drawing a blood specimen

- Ascertaining whether the patient has fasted. Some tests require the patient to fast. Such care is needed to ensure accurate results.
- Reassuring the patient.

The technician must gain patient's confidence and assure him, that, although the venipuncture will be slightly painful, it will be of short duration.

- Positioning the patient

a) The patient should be made to sit comfortably in a chair and should position his arm on a slanting armrest, extending the arm straight from the shoulder and it should not bend at the elbow.
b) If the patient wants to lie down , let the patient lie comfortably on the back. The patient should extend the arm straight from the shoulder. For support, a pillow may be placed under the arm.

Blood collection procedure

- Checking the paper works and tubes

  The tubes and bulbs should be checked for appropriate kinds and for paper labeling.

- Selecting vein site

  For most venipuncture procedures on adults, veins located in the arm are used. The median cubital vein is the one used for the patient. If the venipuncture of this vein is unsuccessful, one of the cephalic or basillic veins may be used. The blood, however, usually flows more slowly from these veins.

- Factors in site selection

1. Healed burn areas should be avoided.
2. Hematoma: specimens collected from a hema-toma area may cause erroneous test results.

- Following techniques are useful when encountering a patient with difficult veins:

1. Look for a blood drawing site.

2. Feel for a vein using the tip of the finger. Think of four things when feeling for a vein, bounce, direction of vein, size of needle, and depth.
3. Choose the vein that feels the fullest.
4. Try the other arm unless otherwise instructed.
5. Ask the patient to make a fist.
6. Apply a tourniquet briefly.
7. Massage the arm form wrist to elbow.

- Applying tourniquet

A tourniquet will increase venous filling, which makes the veins more prominent and easier to enter. For valid test results, the tourniquet should never be left on the arm for more than two minutes because a tourniquet prevents the blood from flowing freely and the balance of fluids and blood elements may get disrupted.

- Cleansing the area

Once the vein to be used has been located, the technician must cleanse the area thoroughly to prevent any contamination . Spirit or 70% ethanol is used for cleansing and the area is allowed to dry to prevent possible hemolysis of the blood specimen. If the skin is touched after it has been cleansed, the procedure must be repeated.

- Inspecting needles and syringes

The appropriate needle is attached to the syringe. The cover of the needle must not be removed until the technician is ready to draw blood. When ready for use, examine the needle especially the tip and check for any blockage by pressing the piston(The piston will not move freely, if needle is blocked).

- **Performing the venipuncture**

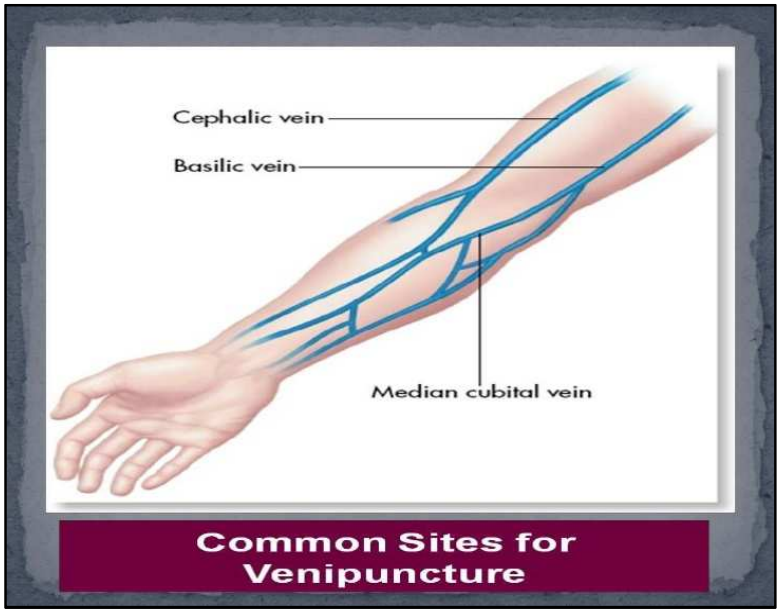
1. The patients arm is gripped tightly and thumb of another hand is used to draw skin taut.
2. The vein is penetrated (by positioning th needle at a 30^{o} to 40^{o} angle). Initially some resistance is encountered but once the point of the needle passes through the vein wall of resistance is felt.
3. After blood has been drawn, the patient would release the fist and the tourniquet is also released.

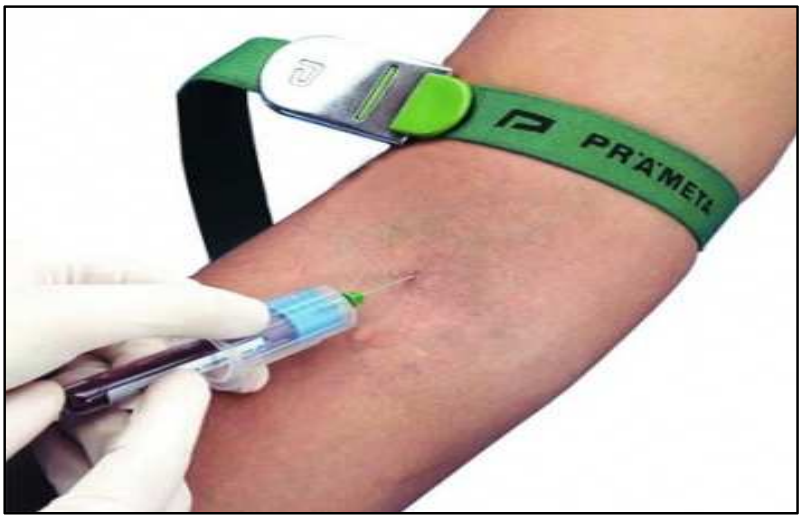
4. A cotton ball is held firmly over the venipuncture site as soon as the needle is removed. The patient may remove the cotton ball after 10-15 minutes, (if the patient continues to bleed, pressure is applied to the site with a gauze pad or cotton ball until the bleeding stops).
5. After removing the needle the collected blood is dispensed in the appropriate tubes or bulbs.
6. The blood in the anticoagulated bulbs is mixed carefully and blood collected in the tubes (or bulbs without anticoagulants) is kept at a room temperature (25^{o}c + - 5^{0}C) for the separation of serum for 30-45 minutes.
7. The tubes and bulbs should be covered with appropriate stoppers.
8. After venipuncture the needle should be removed from the syringe and disposed by using needle destroyer.
9. Dispose used cotton ball, gauze pads and distracted needle residue into a non-penetrable container (A specific waste disposal container).

- **Patient after care**

1. If bleeding from the puncture site continues for an unusually long time, elevate the area and apply a pressure dressing. Observe the patient closely. Check for anticoagulant and ASA (acetylsalicylic acid) type injection.
2. If the patient feels dizzy or faints, put the head down between the knees or have patient lie flat and breathe deeply. A cool towel may be applied to head or back of neck. If the patient remains unconscious, notify the physician immediately.
3. Hematomas can be prevented by-

- Use of proper technique
- Release of tourniquet before the needle is withdrawn
- Application of sufficient pressure over the puncture sites.
- Maintenance of extended extremity until the bleeding stops.


Cephalic vein
Basilic vein
Median cubital vein
Common Sites for Venipuncture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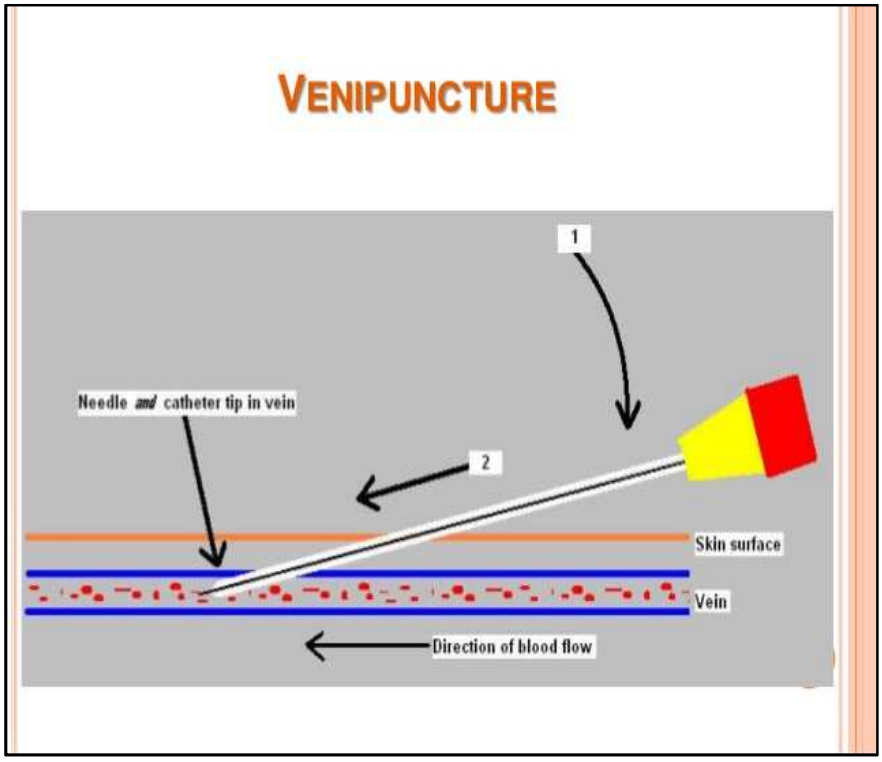


Specimen rejection criteria

1. Specimen improperly labeled.
2. Specimen improperly collected or preserved.
3. Specimen submitted without properly completed request form.
4. Specimen sample volume not sufficient for requirement of test protocol.
5. Patients not prepared properly for test requirements.
6. If separated serum or plasma is grossly hemolyzed.

Hemolysis of blood

Hemolysis means, the liberation of hemoglobin after red blood cells have ruptured. Due to hemolysis the serum or plasma assumes pink to red color. It is important to avoid hemolysis at every step during blood sampling, transportation and storage, because hemolysis causes specific or non specific change in measurements of a number of analyses . In venipuncture, hemolysis may occur by-

1. Using too small a needle
2. Forcing the blood through needle

3. Shaking the tube or bulb too vigorously after blood collection
4. Presence of excess of anticoagulant in the container (tube or bulb)
5. Centrifuging blood samples at high speed before completion of clotting
6. Freezing or thawing of blood
7. Using unclean tubes with residual detergent
8. Presence of water in the container(tube or bulb)

Chemical tests affected by hemolysis

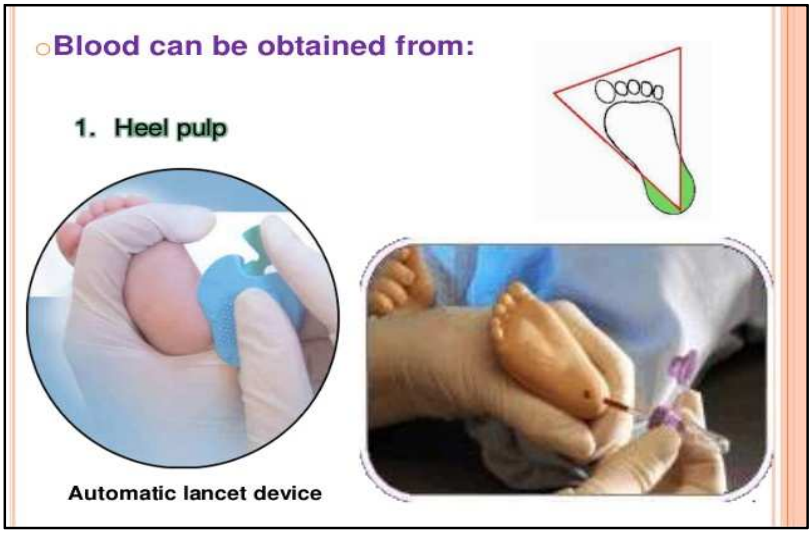
Following tests are specifically affected due to hemolysis of serum:

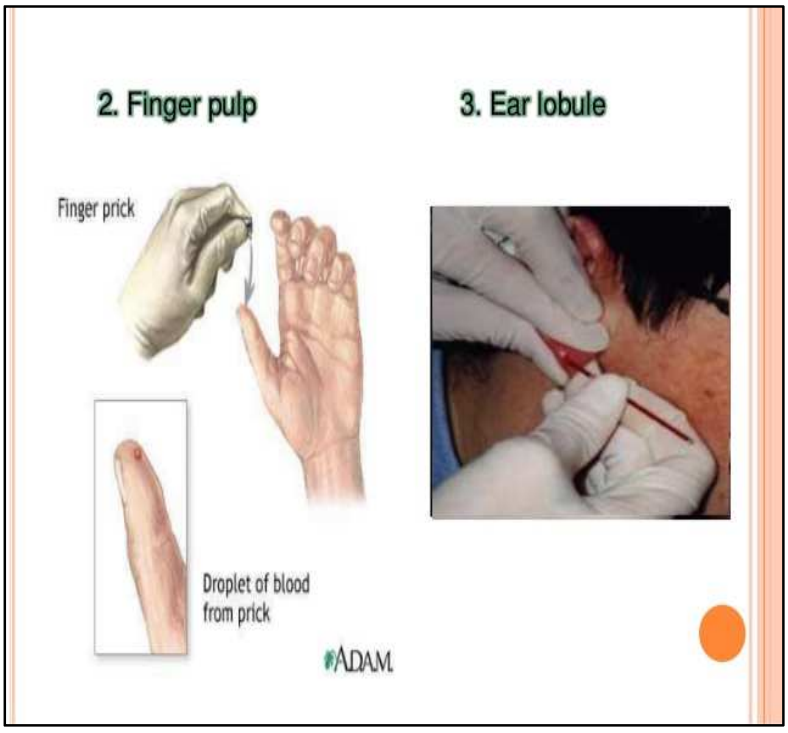
- Serum potassium
- Serum inorganic phosphorus
- Serum Glutamate Oxaloacetate Transaminase (SGOT)
- Serum Lactate Dehydrogenase (LDH)
- Serum acid Phosphatase

Skin puncture blood collection

If only a small volume of blood is required for a blood test, then it can be collected by skin puncture.

In an adult or grown child, blood may be obtained by puncturing the tip of finger or by piercing an earlobe. The skin of the palmar side of tip of the third or fourth finger of the non-writing hand should be first cleaned by using cotton or gauze pat saturated in 70 ethanol (or isopropanol). After evaporation of alcohol, when the skin is dry, a sharp stab is applied with a lancet. The depth of incision should be less than 2.5 mm to avoid contact with bone. The finger should be held in such a way that gravity assists the collection of blood on the fingertip.





Arterial puncture

For the determination of blood pH, PCO_2, PO_2 and bicarbonate, arterial blood is used. An arterial puncture requires considerable skill and is usually performed only by physicians or by specially trained nurses or technicians. The sites preferred for arterial puncture are the radial artery at the wrist, the bacterial artery in the elbow, and the femoral artery in the groin.

Tourniquet is not required for arterial puncture. Heparinized glass syringes are used (since plastic may be permeable to gases) with 18 or 20 gauge needles. Once an arterial puncture has been performed , firm pressure should be applied over the puncture site for at least 5 minutes to minimize bleeding. After collecting the blood for blood gas analysis, the nozzle of the syringe containing the blood should be sealed and the syringe is placed in ice for immediate transport to the clinical laboratory.

Deciding specimen types and anticoagulants

Serum is used for most of the clinical chemistry tests, since most the anticoagulants may interfere in the test. However, for the determination of blood gases, lactate and ammonia whole blood is used. For the determination of blood glucose, blood should be collected in tubes (or bulbs) containing fluoride anticoagulant. Plasma separated from this whole blood is then used for blood glucose determination. Fluoride prevents glycolysis of glucose.

Sodium fluroide

Sodium fluoride is an anticoagulants and prevents glycolysis by inhibiting the enzyme systems involved in glycolysis. It is used in combination of potassium oxalate. Usually one part of sodium fluoride and three parts of potassium oxalate are mixed to prepare anticoagulated powder and 8 mg of this powder is used to collect 2-3 ml of blood.

Heparin

It is available as sodium, potassium, lithium and ammonium salts. It causes interference with tests. It prevents coagulation of blood by acting as an antithrombin to prevent the transformation of prothrombin into thrombin and thus the formation of fibrin from fibrinogen. Most blood tubes are prepared with powdered 0.2 mg heparin for each ml of blood to be collected.

Ethylenediamine tetra-acetic acid (EDTA)

Since this anticoagulant preserves the cellular components well, it is used for hematological examinations. It is used as disodium or dipotassium salt. The dipotassium salt is preferred because it is more soluble compared to disodium salt.

EDTA prevents coagulation by binding calcium, which is essential for the clotting mechanism. It is effective at a final concentration of 1 to 2 mg/ml of blood.

Citrate

Sodium citrate solution, at a concentration o 3.4 or 3.8 g/dl in a ratio of 1 parts to 9 parts of blood is widely used for coagulation studies, since the effect is easily reversible by addition of CA (II) . It preserves labile procoagulants . Citrate prevents blood coagulation by chelating with calcium.

Oxalates

Sodium, potassium, ammonium and lithium oxalates inhibit blood coagulation by forming insoluble complexes with calcium ions. As mentioned earlier, potassium oxalate is used in combination with sodium fluoride for blood used for glucose determination.

Separation of serum

1. Collects 5 to 7 ml of blood in a tube, (which do not contain any anticoagulant).
2. Keep the tube in slanting position and allow the blood to clot at room temperature (25^{o}c + - 5^{0}C) . However, if blood is collected in a vacutainer tube(Which contains clot activating material), it should be kept in a vertical position at a room temperature (25^{o}c + - 5^{0}C) for 15-30 minutes.
3. After 15-30 minutes , loosen the clot slowly and by using a Pasteur pipette, transfer the separated serum into a centrifuge and centrifuge it at 1,500 RPM for 10 minutes.
4. Pale yellow colored serum is obtained above the packed red blood cells in the centrifuge tube.
5. Transfer it to a clean and dry test tube, by using a Pasteur pipette, label it and stopper appropriately and immediately store at 2-8^{O} C, till it used to perform a test.

Separation of plasma

1. Collect about 5 ml of blood in a specific anticoagulant containing tube or bulb.
2. Shake the tube (or bulb) gently to mix the anticoagulant with blood.
3. Centrifuge at 1,500 RPM for about 10 minutes. Pale yellow colored plasma will separate above the sedimented red blood cell pack.
4. Transfer the plasma to a clean and dry test tube, label appropriately and store at 2-8^{o} C till a test is performed on this specimen.

Difference in composition of plasma and serum (only components with significant differences are considered).

Quantity of blood collection

It depends on the number of tests to be performed on one patient. In each anticoagulant containing bulb , 2-3 ml blood is sufficient. Approximately 0.5 ml of plasma can be obtained from 2-3ml anticoagulated blood, by centrifugation. For about 1 ml of serum , 5-7 ml of blood should be collected in a tube, without anticoagulant.

Vacutainers

Vacutainers are used to collect blood by venipuncture. Or by finger prick method, instead of conventional syringes and needles.

Blood collection by using vacutainer

During the blood collection process, the rear cannula pushes through the rubber sleeve and punctures the rubber topper, allowing the vacuum in the tube to draw blood from the vein.

When one tube is withdrawn form the back of the needle, to collect blood in another container, the sleeves slide back into position and keep the blood from flowing out through the rear end of the cannula. When the last tube has been filled, the entire assembly is removed form the patients arm and the needle is disposed off using needle disposal system

Resolution No. 4.5.1.2 of BOM-55/2018: Resolved that the internal assessment for 1st M.B.B.S. will be calculated as per the table below from 2018-19 onwards. Further Departments should maintain record of Internal Assessment:

Theory: (20 Marks)

	I Terminal & Prelim	4 Periodicals	PBL	Seminar
Existing	15	3		2
Revised	10	5	5 PBL/Seminar/case studies/any other as per dept.	

Practical: 20 marks

	I Terminal & Prelim	4 Periodicals	OSPE	Journal
Existing	15	3		2
Revised	10	5	5 Journal/OSPE/any other method as per dept.	

Resolution No. 4.5.1.3 of BOM-55/2018: Resolved to accept specific mark distribution in MCQ (Section A) in 1st MBBS – Anatomy, Physiology & Biochemistry. To be implemented from 2018-19 onwards. **[Annexure-30-A,B,C]**

Item No. - 7

DEPARTMENT OF BIOCHEMISTRY

Annexure C-3

Distribution of MCQ's

Paper-I

Annexure - 30 (C)

Sr. No.	Topic	MCQs (20)	Marks (10)
1	Molecular and functional organization of a cell and its sub-cellular components	01	0.5
2	Chemistry of enzymes and their clinical applications.	03	1.5
3	Chemistry and metabolism of proteins and related disorders.	02	01
4	Chemistry and metabolism of purines and pyrimidines and related disorders.	02	01
5	Chemistry and functions of DNA and RNA , Genetic code ; Protein biosynthesis &.regulation (Lac-operon)	03	1.5
6	The principles of genetic engineering and their applications in medicine.	02	01
7	Chemistry and Metabolism of hemoglobin.	02	01
8	Biological oxidation.	01	0.5
9	Molecular concept of body defense and their applications in medicine.	01	0.5
10	Vitamins	02	01
11	Nutrition	01	0.5

Paper-II

Sr. No.	Topic	MCQs	Marks
1	Chemistry and metabolism of carbohydrates and related disorders.	02	01
2	Chemistry and metabolism of lipids and related disorders.	02	01
3	Mineral metabolism	02	01
4	Water and electrolyte balance & imbalance.	01	0.5
5	Acid base balance and imbalance.	01	0.5
6	Integration of various aspects of metabolism and their regulatory pathways.	01	0.5
7	Starvation metabolism	01	0.5
8	Mechanism of hormone action.	01	0.5
9	Environmental biochemistry.	01	0.5
10	Liver function tests, Kidney function tests, Thyroid function tests.	03	1.5
11	Detoxification mechanisms.	01	0.5
12	Biochemical basis of cancer and carcinogenesis.	01	0.5
13	Radioisotopes.	01	0.5
14	Investigation techniques : (LCD-Topics) First Aid in Biochemistry laboratory, Colorimeter, Electrophoresis, pH meter, Chromatography, Flame photometer, Lipid profile, Immunoassay techniques	02	01

Received 19/11/18

I/C Head
Dept. of Biochemistry

Professor & Head
Department of Biochemistry,
MGM Medical College,
Kamothe, Navi Mumbai

BOS Member

Resolution No. 4.5.1.4 of BOM-55/2018: Resolved to include a lecture on 'Quality control' in Ist MBBS Biochemistry theory syllabus from 2018-2019 batch (under nice to know category) **[Annexure-31].** For inclusion of this topic in practical syllabus the item is referred back to BOS for lack of relevant write-up.

Annexure -31

I MBBS Biochemistry

DEPARTMENT OF BIOCHEMISTRY

As per BOS suggestion we are submitting herewith definitions which will be covered under covered under demonstration of Quality control methods in Clinical Biochemistry Laboratory.

Item No.10:- Demonstration of Quality control methods in Clinical Biochemistry Laboratory

1) Definition of Quality Control
2) Need of Quality Control
3) Quality Control Procedure
4) Quality Control material
5) Calibration
6) Calibration material
7) Precision
8) Accuracy
9) Pre analytical errors
10) Post analytical errors
11) External Quality Control

13/10/18

I/C Head
Dept. of Biochemistry

Professor & Head
Department of Biochemistry
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Kamothe, Navi Mumbai

Member BOS

Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-

(i) Slow learners must be re-designated as potential learners.

(ii) Students scoring less than 35% marks in a particular subjects/course in the 1st formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.

(iii) Students scoring more than 75% marks in a particular subjects/course in the 1st formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

Resolution No. 3.1.1.8 of BOM-57/2019: Resolved to incorporate "Quality Control" lecture cum demonstration topic write-up at "Serial No.11 under Section C" in biochemistry journal of 1st MBBS students from batch admitted in 2019-20 onwards. **[Annexure-5]**

Annexure - 5

QUALITY CONTROL (QC)

Quality Control (QC) in the clinical laboratory is a system designed to increase the probability that each result reported by the laboratory is valid and can be used with confidence by the provider to make a diagnostic or therapeutic decision. QC procedures detect analytical errors and, when used and monitored properly, alert analysts to problems that might limit the usefulness of the test. In practice, most QC procedures operate by submitting controls (sample materials well characterized by previous testing) to the laboratory testing process, and comparing the results of current testing to an expected range of values derived from previous testing.

Accuracy

It is the closeness of a result to the true value. For example, if one technician performs a test on a serum which is known to contain 100 mg/dl glucose and obtain a result of 99 mg/dl. A second technician does the same test on the same sample, and gets the result of 95 mg/dL. Then the value of the first technician is considered as accurate. Values farther away from the true values are less accurate than those closer.

Precision

This refers to the reproducibility of the result. If one technician performs glucose analysis on the same sample on three different occasions and obtains 101 mg/dL respectively, then the results have been reproduced very well, and the precision is very good. Precision depends on the technique, the reagents, as well as on the technical ability of the technician.

Precision is how close repeated measures of the same sample lie; accuracy is how close the value reported is to the true value and bias describes variables which may affect precision and accuracy and lead to over or under reporting.

Specificity

Specificity of a reaction denotes that only one substance will answer that particular test. For example, in the case of glucose oxidase method, only glucose molecules are assayed. So it is a very specific method, but if the reducing property of the glucose is utilized for the assay purpose

(e.g., Nelson Somogyi method), then other reducing agents in the blood will interfere in the reaction, and hence specificity is lowered. Specificity is determined by the method of the analysis.

Sensitivity

It indicates whether the method could be utilized to test a very dilute solution. For example, biuret method is used for solutions having a few gram of protein/dL. Spectrophotometric method is useful to detect a few milligram of protein/dL, while ELISA method is employed if the solution has only microgram of protein/dL. Thus ELISA method is more sensitive.

The sensitivity of an assay is the fraction of those with a disease that the assay correctly predicts. A test should be both sensitive and specific. Generally speaking, as the sensitivity is increased, sensitivity is decreased.

Quality Control Charts

These are used to compare the observed control values with the control limits and provide a visual display which can be quickly reviewed. A daily QC chart should be available in the laboratory. The control chart helps to detect accuracy problems (shift in mean) and precision problem (shift in SD). The values will indicate if the analytical run is in control (acceptable) or out of control (unacceptable). If any of these changes are noticed, prompt action is warranted. Commonly employed charts in the laboratory practice are Levey-Jennings chart, Westgard multirole chart and Cumulative sum chart.

Internal Quality Control

Through internal quality control, the laboratory can ensure that the results being issued by laboratory are reliable. Internal quality control is the study of errors and introduction of procedures to recognize and minimize them. The errors include all those arise within the laboratory between the receipt of the specimen and dispatch of the report. A laboratory that meets quality requirements has fewer reruns and complaints, and this saves money. Meeting quality requirements satisfies clinicians (users of the laboratory) , giving the laboratory a greater competitive edge and providing job security for the senior staff. It also leads to better and more efficient patient care.

For internal quality control, it is necessary to understand the following requirements of clinicians:

- An adequate test menu to meet clinical decision making needs.
- Information and education about the tests that is appropriate for a particular clinical problem.
- Instructions on preparing the patient prior to specimen collection and on the appropriate specimen for an assay.
- Phlebotomy performed safely and efficiently without discomfort to the patient.
- Analytical procedures performed without error and with "appropriate" analytical performance- including precision, accuracy, sensitivity, specificity, and freedom from interferences.
- Clear presentation of results and reports, without ambiguity with reference values, therapeutic intervals and / or decision levels available as needed.
- Turnaround time, from submission of the test request to delivery of the report, within clinically acceptable limits.
- Readily available laboratory consultation when needed; i.e. appropriate interpretation of laboratory results presented in a timely manner.

External Quality Assurances (EQAs)

Typically, a national organization will send the same sample to different laboratories; the laboratories will send the results to the organization, which will measure how similar the results are. Internal QC maintains the accuracy and precision of the analytical method, whereas EQAs is necessary for maintaining long-term accuracy of analytical methods.

Resolution No. 3.1.1.9 of BOM-57/2019: Resolved to incorporate 32 thematic case studies under "Section D" in Ist MBBS Journal – Biochemistry from batch admitted in 2019-20 onwards. **[Annexure-6]**

Annexure - 6

Carbohydrate Metabolism

Case Study 1

A 50 year old man was admitted to the hospital in a confused & semiconscious state. Several days before admission, he was complaining of undue thirst & also started to get up several times during the night to urinate. His breath had fruity odour. Following is the data of his lab investigations

BSL (random)	-	480 mg%
Rothera's test on urine	-	Purple ring
Urine sugar	-	Present (++++)

1. What is the probable diagnosis?
2. Describe the biochemical basis giving rise to the following conditions
   -Increased thirst & frequency of urination
   -Fruity odour to the breath

Case Study 2:-

A one year old child reported with diarrhea, vomiting, jaundice, lethargy. Examination revealed hepatosplenomegaly & Cataract. His blood galactose level was raised.

1. What is the probable diagnosis?
2. Which enzyme is deficient?
3. Name abnormal metabolites excreted in the urine?
4. What is the cause of cataract?

Case Study 3

A 12 year child complained of abdominal discomfort, a feeling of being bloated & diarrhea after taking milk.

1. Name the probable disorder.
2. Cause of the disorder.
3. What will you suggest the patient to relieve the symptoms.

Case Study 4

A 38 year old person suffering from fever & chills was diagnosed as malaria patient. He was given antimalarial drug primaquine. After two days, he complained of passing red coloured urine & weakness. Laboratory data shows Hb level 7.5gm%, unconjugated bilirubin 7.8mg%.

1. What is probable diagnosis?
2. What defect is responsible?
3. Why rise in unconjugated bilirubin?
4. Expalin mechanism of anaemia.

Case Study 5

A 3 year old boy with mental retardation was found to have cataract. Biochemical investigations show high blood concentration of galactose.

1. Name the probable disease & name the enzyme most likely to be detective.
2. Give the reaction catalysed by defective enzyme.
3. What is the cause of development of cataract?
4. What is the treatment for this disease?

HB Metabolism:

Case Study 1

A 20 year old man came to the hospital with complaints of anorexia, nausea, headache weakness, pain in abdomen, clay coloured stools but dark urine. Laboratory data is

Total bilirubin	-	10mg%
Conjugated bilirubin	-	6mg%
UnConjugated bilirubin	-	4mg%
SGPT	-	120IU/L
SGOT	-	70IU/L
ALP	-	6 KA

1. Name the condition giving treasons
2. What are the causes of this condition?
3. Give the cause of clay stools & dark Urine
4. Why SGPT is increased?

Case Study 2

A new born baby develops yellow skin & conjunctiva on third day of birth. The condition improved on giving phototherapy

1. What is the probable diagnosis?
2. What is the cause of this condition?
3. What can be the complications of this condition? Give treatment.

Protein Metabolism

Case study 1

A one year old child with delayed milestones was brought to hospital. His mother gave history of mousy odour from diapers.

1. What is the probable diagnosis?
2. What is the biochemical basis of diaper odour?
3. What should be the management of this patient?
4. Draw the reaction catalysed by deficient enzyme.

Case Study 2

A baby born to healthy normal parents was found to have lack of pigmentation. The baby had white skin, hair & blue eyes. Parents & grandparents had similar problem.

1. Name the disease & metabolite involved.
2. Mention the enzyme defect.
3. Name other disorders associated with the metabolite.

Case Study 3

A patient was diagnosed as having alkaptonuria.

1. Outline the biochemical pathway & point out metabolic defect which leads to this condition.
2. State the changes in urine on standing in such patients & why?
3. What is onchronosis?
4. What treatment should be given?

Case study 4

A child was admitted with complaints of acidosis, lethargy, convulsions mental retardation & urine smell like burnt sugar

1. What is probable diagnosis?
2. Name the defective enzyme. Give the cause of this disease.
3. Write urinary findings & diagnosis.
4. What treatment will you suggest?

Case Study 5

A 30 year old man was admitted in hospital with pain in right flank & back. He was diagnosed to have a kidney stone. There was increased excretion of cystine, ornithine, arginine & lysine in urine. The final diagnosis was Cystinuria.

1. What is the cause of Cystinuria?
2. What is the major complication of Cystinuri?
3. How the condition can be treated?
4. Name the biosynthetic precursor of Cysteine

Vitamins

Case Study 1

A 3 year old boy was admitted with symptoms of pellagra, mental retardation & excessive urinary excretion of tryptophan

1. What is probable diagnosis?
2. Why there is mental retardation & pellagra like symptoms?
3. Write the treatment for this condition.

Case Study 2

A 10 year old boy from rural area was brought to the OPD for the complaints of diminished vision in dimlight. His cornea was ulcerated & there were white triangular patches over conjunctiva.

1. Name the vitamin involved.
2. Explain the biochemical role of the vitamin in vision.
3. Give the recommended dietary allowance.

Case Study 3

A 6 year old baby had bony deformities. He had history of delayed eruption of teeth. Biochemical investigations show low calcium, low phosphate, low calcitriol & high ALP.

1. What is the probable diagnosis?
2. Which vitamin deficiency causes this disease?
3. Give manifestations of this disease.
4. Why ALP is high

Case Study 4

A middle aged woman reported with history of pain in the back & limbs. She also gave history of pathological fracture. Her bone scan revealed low bone density.

1. What is the diagnosis & probable cause?
2. Which serum enzyme level will be affected?
3. Suggest the treatment preventive measures

4. Give methods for measurement of bone density.

Case Study 5

After minor inquiries sustained during fall from cycle the patient was bleeding profusely.

1. Which vitamin deficiency can cause this condition?
2. What is the cause of profuse bleeding?
3. What is the RDA of this vitamin?
4. Give types of this vitamin

Case Study 6

Patient complains of anorexia, peripheral neuropathy, muscular weakness, pain & numbness of legs. He states that polished rice is his staple diet.

1. Name the disorder & give its cause.
2. Give active form & two reactions catalysed by the deficient molecule.
3. Give sources & RDA of deficient molecule

Case Study 7

A patient of tuberculosis was given the drugs isoniazid (Isonicotin acid hydrazine, INH). She developed neurological manifestations & her urine contained Xanthenuric acid.

1. Name the disorder.
2. Why deficiency of this vitamin occurs in treatment with INH?
3. Why neurological disorders occur?
4. Why xanthenuric acid is present in urine

Case Study 8

A 23 old woman had complaints of weakness & lethargy. Her haemoglobin level was 7 gm %.Her blood was found to contain large abnormal immature erythrocytes. This woman had a highly elevated excretion of FIGLU, a metabolite of histidine in Urine.

1. What is the probable cause of anaemia?
2. Which type of anaemia does the patient suffer from? What is its biochemical basis?
3. Why FIGLU is excreted in this case?

Mineral Metabolism

Case Study 1

A patient in the hospital had seizures & usually appeared weak & tired. Physical findings were deposition of copper in eyes as green ring around the cornea & hepatomegaly.

1. What is the probable disease?
2. What is the biochemical problem in this disease?
3. What is the treatment for this disease
4. Name any four copper containing enzymes

Case Study 2

An adolescent individual came to OPD with complaints of growth failure, sexual immaturity, loss of taste Acuity & delayed wound healing.

1. Identify deficient mineral?
2. What is its RDA?

3. Mention its food sources.
4. Name the enzyme associated with this mineral

Case Study 3

A patient was admitted to the hospital with the history of irritability, spasm of muscles & convulsions. Serum calcium level was 6 mg%

1. What is the probable diagnosis?
2. Name hormones that regulate serum calcium
3. Give function of calcium.
4. Give sources & RDA of calcium

Nucleic acid Metabolism

Case Study 1

A 4 year old boy complains of joint pain, aggressive behavior, learning disability & urge to bite his own fingers & lips. His serum uric acid is above normal

1. Name the disorder & enzyme defect?
2. Draw the reaction catalyzed
3. What is the normal serum uric acid level & explain the cause of hyperurecemia observed above.

Case Study 2

An elderly man had severe pain in the joints. His laboratory findings are
Serum uric acid – 12mg%
Urinary uric acid- 2.5 gm / day

1. Name the disease& the enzyme defect?
2. Give clinical features
3. Why alcohol should be avoided in this condition.
4. Give treatment. Name any two drugs used in the treatment of above disease.

HB Chemistry

One year severely anemic child was diagnosed as a case of thalassemia. He was given frequent blood transfusions. He died at the age of 17 years

1. What is thalassemia & give its types
2. Give manifestations of major thalassemia
3. Give treatment of this condition

Acid Base Disorders

Case Study 1

Blood examination in a patient who presented with persistent vomiting, muscular cramps & shallow respiration reveals-
pH= 7.6 (normal is 7.4)
HCO3= 40 mmol/L (normal is 24-30 mmol/L)
PCO2= 50 mmHG (normal is 40 mmHg)

1. Name the acid base disorder
2. Give the cause of this disorder
3. Why respiration is shallow?
4. Why muscular cramps develop?

Case Study 2

A patient after head injury presented with hyperventilation. The findings were H_2CO_3 ↓ & pH ↑

1. Name the condition & explain it
2. Give the mechanism of compensation & explain it
3. Why pH is increased?

TFT

Case Study 1

A 26 yr old man walked into the OPD with heavy sweating, loss of weight & palpitation. His thyroid gland was enlarged & he was diagnosed as hyperthyroidism.

1. What was the thyroid function tests carried out to reach this conclusion?
2. What are the reasons for the enlarged thyroid gland & loss of weight?
3. Why does the patient constantly of feeling hot.

Lipid Metabolism

Case Study 1

A 45 year old obese man complained of gastric pain & was admitted in hospital due to heavy alcohol ingestion. Blood was taken for organ function tests. Serum looked opalescent & was analysed for lipids. Serum cholesterol was 310 mg & serum T.G. was 690mg%

1. What is the probable diagnosis
2. Which additional tests you will confirm

Case Study 2

A 56 year old male, who presented with anorexia & enlarged liver was diagnosed as fatty liver.

1. Enumerate causes leading too this condition
2. Why alcoholics are prone to develop this condition
3. Name the factors that prevent fatty liver stating their role

Case Study 3

Laboratory investigations in 60 year old woman with hypertension revealed plasma cholesterol level- 390mg% & the increased concentration of LDL

1. What is your propabable diagnosis?
2. What is the normal plasma cholesterol level?
3. How cholesterol biosynthesis is regulated?
4. Which lipoprotein has protective effect against the disorder?.

Resolution No. 3.1.4.2 of BOM-57/2019:

i. Resolved to include "Gender Sensitization" into UG (from new batch 2019-2020) and PG (from existing batches) curricula. **[Annexure-21]**

ii. Resolved to align the module of "Gender Sensitization" with MCI CBME pattern for MBBS students.

iii. Resolved that Dr. Swati Shiradkar, Prof., Dept. of OBGY., MGM Medical College, Aurangabad will coordinate this activity at both campuses.

Annexure - 21

Gender sensitization for UG (2nd , 3rd , 8th semesters) and PG (3 hours)

INCLUSION OF " GENDER SENSATIZATION" IN CURRICULUM

Introduction :

The health care provider should have a healthy gender attitude, so that discrimination, stigmatization, bias while providing health care will be avoided. The health care provider should also be aware of certain medico legal issues related with sex & gender.

Society particularly youth & adolescents need medically accurate, culturally & agewise appropriate knowledge about sex, gender & sexuality. So we can train the trainers for the same. It is need of the hour to prevent sexual harassment & abuse .

To fulfill these objectives, some suggestions are there for approval of BOS.

Outline

1)For undergraduates :- Three sessions of two hours each, one in 2nd term, one in 3rd term & one in 8th term.

2)For Faculties and postgraduates :- One session of two hrs .

3)For those want to be trainers or interested for their ownself, value added course, which is optional about sex, gender, sexuality & related issues.

Responsibility

ICC of MGM, MCHA , with necessary support from IQAC & respective departments.

Details of undergraduate sessions

1)First session in 2nd term

Aim – To make Students aware about the concept of sexuality & gender**.**

To check accuracy of knowledge they have,

To make them comfortable with their own gender identify & related issues.

To make them aware about ICC & it is functioning.

Mode – Brain storming , Interactive power point presentation experience sharing.

Duration – Around two hours

Evaluation – Feedback from participants.

2)Second session in 3rd / 4th term

Aim – To ensure healthy gender attitude in these students as now they start interacting with patients.

To ensure that the maintain dignity privacy while interacting with patients and relatives, particularly gender related.

To make them aware about importance of confidentiality related with gender issues.

To encourage them to note gender related issues affecting health care & seek solutions.

Mode – focused group discussions on case studies, Role plays & discussion.

Duration – Around two hours.

Evaluation – Feedback from participants.

Third session in 8th term.

Aim – To understand effect of gender attitudes on health care in various subjects.

To develop healthy gender attitude while dealing with these issues.

Mode – Suggested PBL by departments individually. (In collaboration with ICC till faculty sensitization is complete)

Evaluation – Feedback

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FOR POSTGRADUATES

Session of 2-3 hrs preferably in induction program.

Aim – To introduce medically accurate concept of gender, sex, gender role & sex role.

To ensure healthy gender attitude at workplace.

To understand gender associated concepts on health related issues & avoid such bias wile providing health care.

To make them aware about ICC & it's functioning.

Mode – Interactive PPT

Role plays & discussion

Duration – 2 to 3 hrs

Evaluation – Feedback.

FOR FACULTIES

Session of 2 hours may be during combined activities.

Aim – To ensure clarity of concept abut gender & sex.

To discuss effect of these concept on health related issues.

To identify such gender & sex related issues in indivual subject specialties.

To discuss methodology like PBL for under graduate students when whey are in 7^{th}-8^{th} semester.

Mode – Role play

Focused group discussion

Case studies

Evaluation – Feed back.

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Sdp-Pimple/joshi-obgy