THE TAMIL NADU
Dr. M.G.R. MEDICAL UNIVERSITY
CHENNAI - 600 032.

FIRST M.B.B.S. COURSE
REVISED (NON-SEMESTER) REGULATIONS

THE TAMIL NADU Dr.M.G.R. MEDICAL UNIVERSITY CHENNAI

REGULATIONS FOR THE BACHELOR OF MEDICINE AND BACHELOR OF SURGERY COURSE

In exercise of the powers conferred by Section 44 of the Tamil Nadu Dr.M.G.R. Medical University, Chennai, Act, 1987 (Tamil Nadu Act 37 of 1987), the Standing Academic Board of the Tamil Nadu Dr.M.G.R. Medical University hereby makes the following regulations:

SHORT TITLE AND COMMENCEMENT

These regulations shall be called "THE REVISED (NON-SEMESTER) REGULATIONS FOR THE M.B.B.S. COURSE OF THE TAMIL NADU Dr.M.G.R. MEDICAL UNIVERSITY, CHENNAI".

They shall come into force from 26th September 1997. These regulations are applicable to the students who are admitted to the course from the academic year 1997-98 onwards.

The regulations framed are subject to modification as made by the Standing Academic Board from time to time.

I.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 and rehabilitative aspects of medical care.

(2) With a 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 at provide an educational experience of the essentials required for health care in our country.

(3) To undertake the responsibilities of various service situations, it is essential to provide adequate placement training tailored to the needs of such services. To avail of opportunities and engage in professional activities the graduate shall endeavour to acquire 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 emphasised. This aspect of education and training of graduates should be adequately recognised in the prescribed curriculum. Adequate exposure to such experiences should be available throughout in all the three phases of graduate medical education and training. This has to be further 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 effectively 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) Enough experiences must be provided for self learning. The methods and techniques that would ensure this must become a part of the 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 master the fundamental aspects of the subjects taught and all 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 disease should receive proper emphasis throughout the course. To achieve this purpose the educational process should also

be community based rather 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 judgement, ability to collect and analyse information and to correlate the facts.

(10) The educational process should be placed in a historical 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 in 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 a means of transferring 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 first hand experience. Students shall be encouraged to learn in small groups through sheer interactions so as to gain maximal experience through contact with patients and the communities in which the patients live. While the curriculum objectives often refer to areas of knowledge or science, they are best taught in a setting of clinical relevance with hands on experience for the students to 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 teaching in out-patient and 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 improving his skill and competence in handling of patients.

(14) Proper records of the work should be maintained which will form a basis for the student's internal assessment. They 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 resolving a problem. Every attempt must be made to avoid compartmentalisation 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 member/leader when he begins his independent career. A discussion group should not have more than 20 students.

(17) Faculty members should avail of modern educational technology while teaching the students. To attain this objective Medical Education Units/Departments should 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 of students in one calendar year should not exceed one month during the 4 1/2 years Bachelor of Medicine and Bachelor of Surgery (MBBS) Course.

II. ELIGIBILITY

1) Age limit:

No candidate shall be allowed to be admitted to the Bachelor of Medicine and Bachelor of Surgery (MBBS) Course until he/she has completed the age of 17 years on or before the first day of July of the academic year in which the candidate in seeking admission.

2) Qualifying examination:

No candidate shall be allowed to be admitted to the First Bachelor of Medicine and Bachelor of Surgery (MBBS) Course until he/she has passed a qualifying examination as under:

(a) The Higher Secondary Examination or the Indian School Certificate examination which is equivalent to 10+2 Higher Secondary Examination after a period of 12 Years of study, the last two years of study comprising of Physics, Chemistry and Biology with English at a level not less than the core course for English as prescribed by the National Council for Educational Research and Training after the introduction of the 10+2+3 years educational structure as recommended by the National Committee on education;

(Note: Where the course content is not as prescribed for 10+2 education structure of the National Committee, the candidates will have to undergo a period of one year pre-professional training before admission to the Medical Colleges)

OR

(b) The Intermediate examination in science of an Indian University/Board or other recognized examining body with Physics, Chemistry and Biology which shall include a practical test in these subjects and also English as a compulsory subject.

OR

(c) The pre-professional/pre-medical examination with Physics, Chemistry and Biology, after passing either the higher secondary school examination or the pre-University or an equivalent examination. The pre-professional/pre-medical examination shall include a practical test in Physics, Chemistry & Biology and also English as a compulsory subject;

OR

(d) The first year of the three years degree course of a recognized University, with Physics, Chemistry and Biology including a practical test in these subjects provided the examination is a University Examination and candidate has passed 10 + 2 with English at a level not less than a core course.

OR

(e) B.Sc. examination of an Indian University, provided that he/she has passed the B.Sc. examination with not less than two of the following subjects-Physics, chemistry, Biology (Botany, Zoology) and further that he/she has passed the earlier qualifying examination with the following subjects-Physics, Chemistry, Biology and English.

OR

(f) Any other examination which in scope and standard is found to be equivalent to the intermediate science examination of an Indian University/Board, taking Physics, Chemistry and Biology including a practical test in each of these subjects and English.

Note:

(i) The pre-medical course may be conducted either in a Medical College or a Science College.

(ii) The marks obtained in Mathematics are not to be considered for admission to MBBS Course.

3.Selection of Students: The Selection of students to medical colleges shall be based solely on the merit of the candidates and for determination of merit the following criteria be adopted:

(i) In a state having more than one Board/examining body conducting the qualifying examination or where there is more than one medical college under the administrative control of one authority a competitive entrance examination should be held.

(ii) To be eligible for competitive entrance examination, the candidate must have passed any of the qualifying examinations as enumerated above at II(2).

(iii) A candidate for admission to medical course must have obtained not less than 50% marks in English and 50% marks in Physics, Chemistry and Biology taken together, both at qualifying and competitive examinations;

Provided further that in respect of candidates belonging to Scheduled Castes/Scheduled Tribes and Other Backward Classes(OBC) the marks obtained be read as 40% instead of 50%.

4) Eligibility Certificate:

Candidates who have passed any qualifying examination other than the Higher Secondary course examination conducted by the Government of Tamil Nadu shall obtain an eligibility certificate from the University by remitting the prescribed fee along with the application form before seeking admission to any one of the affiliated Medical Institutions.

III.REGISTRATION

A candidate admitted to the course in any of the affiliated colleges shall apply for registration with this University within three months from the date of joining in the College. The application for registration

in the prescribed form along with the fee prescribed should be submitted to this University through the Head of the College.

IV. COURSE OF STUDY

(1). Every student shall undergo a period of certified study extending over 4 1/2 academic years followed by one year of compulsory rotating internship. The first MBBS course shall commence on the 1st July of an academic year.

(2). The period of 4 1/2 years is divided into three phases as follows:

(a) Phase-I (I MBBS) (one year) consisting of Pre-clinical subjects (Human Anatomy, Physiology including Bio-Physics,Bio-Chemistry and introduction to Community Medicine including Humanities). Besides 60 hours for introduction to Community Medicine including Humanities, rest of the time shall be somewhat equally divided between Anatomy and Physiology plus Bio-chemistry combined (Physiology 2/3 and Bio-Chemistry 1/3).

(b) Phase-II(II MBBS) (1 1/2 years) consisting of para clinical/clinical subjects.

During this phase teaching of para-clinical and clinical subjects shall be done concurrently.

The para-clinical subjects shall consist of Pathology, Pharmacology, Microbiology, Forensic Medicine including Toxicology and part of Community Medicine.

The clinical subjects shall consist of all those detailed below in Phase III.

Out of the time for Para-clinical teaching approximately equal time shall be allotted to Pathology, Pharmacology, Microbiology and Forensic Medicine and Community Medicine combined (1/3 Forensic Medicine and 2/3 Community Medicine).

(c) Phase-III(III MBBS) (Two years) - Continuation of study of clinical subjects from phase II.

The clinical subjects to be taught during Phase II and III are Medicine and its allied specialities, Surgery and its allied specialities, Obstetrics and Gynaecology and Community Medicine.

Besides clinical posting the rest of the teaching hours should be divided between didactic lectures, demonstrations, seminars, group discussions etc. in various subjects.

The training in Medicine and its allied specialities will include General Medicine, Paediatrics, Tuberculosis and Chest, Skin and Sexually Transmitted Diseases, Psychiatry, Radio-diagnosis, Infectious diseases etc. The training in Surgery and its allied specialities will include General Surgery, Orthopaedic Surgery including Physiotherapy and Rehabilitation, Ophthalmology, Oto-Rhino-Laryngology, Anaesthesia, Dentistry, Radio-therapy etc. The Obstetrics & Gynaecology training will include family medicine, family welfare planning etc.

(3) The first year (approximately 240 teaching days) shall be occupied in the Phase I (Pre-clinical) subjects.

No student shall be permitted to join the Phase II (Para-clinical/clinical) group of subjects until he has passed in all the Phase I (Pre-clinical) subjects for which he will be permitted not more than four chances (actual examination), provided the four chances are completed within three years from the date of enrolment.

After passing pre-clinical subjects, 1-1/2 years shall be devoted to para-clinical subjects. Phase II will be devoted to Para-clinical and clinical subjects, along with clinical postings. During clinical phase (Phase III) pre-clinical and para-clinical teaching shall be integrated into the teaching of clinical subjects wherever relevant.

(4) **WORKING DAYS IN AN ACADEMIC YEAR:**

Each academic year shall consists of not less than 240 working days.

(5) **CURRICULUM:**

The curriculum and the syllabi for the course shall be as specified in the Annexure.

V. SUBMISSION OF LABORATORY RECORD NOTE BOOKS

At the time of practical/clinical examination each candidate shall submit to the Examiners his/her laboratory note books duly certified by the Head of the Department as a bonafide record of the work done by the candidate.

The practical record shall be evaluated by the concerned Head of the Department (Internal Evaluation) and the practical record marks shall be submitted to the University 15 days prior to the commencement of the theory examinations.

The candidate may be permitted by the examiners to refer to the practical record book during the practical examination in the subject of Biochemistry only. No other materials, handwritten, cyclostyled or printed guides are allowed for reference during the practical examinations.

In respect of failed candidates the marks awarded for records at previous examinations will be carried over to the next examinations. If a candidate desires he/she may be permitted to improve his/her performance by submission of fresh records.

VI. INTERNAL ASSESSMENT

a) A minimum of Four written examinations shall be conducted in each subject during an academic year and the average marks of three best performances shall be taken into consideration for the award

of internal assessment marks. Assignments completed by candidates may also be considered.

b) A minimum of three practical examinations shall be conducted in each subject during an academic year and an average of two best performances shall be taken into consideration for award of internal assessment marks.

c) A failed candidate in any subject should be provided an opportunity to improve his/her internal assessment marks by conducting a minimum of two examinations in theory and practical separately and average be considered for improvement.

d) The internal assessment marks (both in written and practical taken together) should be submitted to the University endorsed by the Head of the institutions fifteen days prior to the commencements of the theory examinations.

e) A candidate should obtain a minimum of 50% of marks in internal assessment in a subject to be permitted to appear for the University examination in that subject.

VII. UNIVERSITY EXAMINATIONS

1. Timing of Examinations:

I professional examination: at the end of one academic year

II professional examination: at the end of 1 1/2 years from the commencement of Phase II.

III professional Part I examination: at the end of one year of Phase III.

III professional Part II (Final Professional) examination: at the end of 2 year of Phase III.

2. Exemption in passed subjects:

Candidates who fail in an examination but obtain pass mark in any subject shall be exempted from re-examination in that subject.

3. Carry over of failed subjects:

(a) Passing in First MBBS Professional examination is compulsory before proceeding to Phase II training.

(b) A student who fails in the II MBBS professional examination shall be permitted to carry the failed subjects to Phase III of the MBBS course but shall not be allowed to appear in III MBBS Professional Part I examination unless he/she passes all the subjects of the II MBBS Professional examination. Passing in II MBBS Professional examination is compulsory before entering Part II of Phase III (final year) of the course.

(c) Passing in III MBBS Professional (Part I) examination is not compulsory before entering for Part II training; however passing of III MBBS Professional (Part I) is compulsory for being eligible to appear for III MBBS Professional (Part II) examination.

4. CUT OFF DATES:

The candidates admitted from 1st July to 31st August will be registered to take up their I year examination in June of the next year.

The candidates admitted from 1st September to 31st December will be registered to take up their I year examination in November of the next year.

The candidates admitted on or after 1st January will be registered to the academic year concerned but they have to undergo the course and appear for the examination along with the subsequent year batch of students.

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

A. A successful candidate securing 75% or above of the marks in the aggregate in any subject in the first appearance will be declared to have passed the examination in that subject with distinction.

B. First Class may be awarded to such candidates who have passed all the subjects at the first appearance and obtained 60% of marks and above in the aggregate of all the subjects he/she had appeared in the particular phase of the MBBS course.

C. Candidates who have passed all the subjects at the first appearance and obtained 75% of marks and above in all the subjects he/she had appeared shall be awarded first class with distinction.

D. All other successful candidates shall be declared to have passed in second class.

IX. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATION

a) No candidate shall be permitted to any one of the parts of MBBS Examinations unless he/she has attended the course in the subject for the prescribed period in an affiliated institution recognised by this University and produces the necessary certificate of study, attendance and progress from the Head of the Institution.

b) A candidate is required to put in minimum 80% of attendance in both theory and practical/clinical separately in each subject before admission to the examination.

c) A candidate lacking in the prescribed attendance and progress in any one subject in the first appearance shall be denied admission to the entire examinations.

d) Failed candidates who are not promoted to the next phase of study are required to put in minimum 80% of attendance during the

extended period of study before appearing for the next examination.

e) Attendance earned by the student should be displayed on the Notice Board of the College at the end of every 3 months and a copy of the same should be sent to the University and parents of the student concerned.

X. REGULATIONS FOR CONDONATION OF LACK OF ATTENDANCE

Condonation of shortage of attendance upto a maximum of 10% in the prescribed minimum attendance for admission to an examination vests with the discretionary powers of the Vice-Chancellor. A candidate lacking in attendance should submit an application in the prescribed form and remit the stipulated fee 15 days prior to the commencement of the theory examination. The Head of the Department and Head of the Institution should satisfy themselves on the reasonableness of the candidates request while forwarding the application with their endorsement to the Controllor of Examinations who would obtain the Vice-Chancellor's approval for admission to the examination. No application would be considered if it is not forwarded through proper channel.

Condonation for lack of attendance shall be taken up for consideration under the following circumstances:

a) Any illness afflicting the candidate. (The candidate should submit through the Head of the Institution a Medical Certificate from a registered Medical Practitioner soon after he returns to the Institution after treatment). Any candidate going on leave on medical grounds should report to the University as well as to the College immediately within 3 weeks for record.

(b) Any unforeseen tragedy in the family, (The parent/guardian should give in writing the reason for the ward's absence to the Head of the Institution).

(c) Participation in NCC/NSS and other co-curricular activities representing the institution or University. (The Head of the Institution should instruct the concerned officers in-charge of the student activities in their institution to endorse the leave application).

(d) Any other leave the Head of the Institution deems reasonable for condonation.

XI. RE-ADMISSION AFTER BREAK OF STUDY

a) Candidates having a break of study of 5 years and above from the date of admission and more than two spells of break will not be considered for re-admission.

b) The calculation of the break of study of the candidate for re-admission be taken from the date of first discontinuance of the course instead of from the date of admission for all the courses including Under-Graduate and Post-Graduate courses.

c) If any candidate discontinued the course due to various reasons and the break of study of the candidate is for more than 6 months, the candidate should get prior permission from the University for continuing the course, if the vacancy remains unfilled.

d) Any candidate who does not appear for the examination due to lack of attendance shall be permitted to appear for the examination in the subsequent examination, if the candidate has satisfied the attendance requirements.

e) If the candidate had completed one year and appeared for an examination during the course of study, he/she is exempted from the duration of the course and also be exempted from appearing for the examination, if he/she had passed the subject.

f) The candidates having a break of study of 6 months and above shall apply for re-admission in the prescribed form by remitting the stipulated fee for condonation of break of study to the Academic Officer

of this University. If the period of break of study does not exceed one calender year the candidates may be re-admitted in the corresponding course of study at the commencement of the session and shall undergo a minimum period of study of 3 months and after fulfilment of the regulations of this University be admitted to the examination. The candidates shall be granted exemption in the subjects they have already passed.

g) If the break of study exceeds one year, the candidates may be permitted to re-join the course at the beginning of the pre-clinical (Phase-I) or Clinical (Phase-II) course, as the case may be, with the condition that these candidates will have to undergo the full prescribed period of study in the pre-clinical or clinical course on re-admission and will not be granted any exemption in any subject they have already passed. They shall subscribe to the regulations of this University governing the batch the candidate joins on readmission.

XII. MIGRATION / TRANSFER OF CANDIDATES

(1) Migration from one medical college to another is not a right of a student. However migration of students from one medical college to another medical college within India may be considered by the Medical Council of India only in exceptional cases on extreme compassionate grounds, provided the following criteria are fulfilled. (Routine migrations on other grounds shall not be permitted).

i) Both the Colleges are recognised by the Medical Council of India.

ii) The applicant should have passed first professional MBBS examination.

iii) The application for Migration, complete in all respects is submitted to all authorities concerned within a period of one month of passing the first professional Bachelor of Medicine and Bachelor

of Surgery (MBBS) examination, the period being counted from the date of declaration of results.

iv) The applicant must submit an affidavit stating that he/she will pursue 18 months of prescribed study before appearing for the II professional Bachelor of Medicine and Bachelor of Surgery (MBBS) examination at the transferee Medical College. The affidavit should be duly certified by the Dean of the College concerned and the Registrar of the concerned University to which transfer if sought.

2) Further Provided that-

(i) Migration during clinical course of study will not be considered by the University.

(ii) All applications for migration will be referred to Medical Council of India by college authorities. The University will not consider request for migrations without the approval of the Medical Council of India.

iii) The number of students migrating /transferring from one medical college to another medical College during one year will be kept to the minimum so that the training of the regular students of that college is not adversely affected. The number of students migrating/transferring from or to any one medical college shall not exceed the limit of 5% of its sanctioned intake in one year.

iv) All Migrations/Transfers are subject to the approval of the Vice-Chancellor of this University.

v) The following compassionate grounds shall be considered for the purpose of Migration.

(i) Death of a supporting guardian.

(ii) Illness of the candidate causing disability.

(iii) Disturbed conditions as declared by Government in the Medical College area.

CURRICULUM

I M.B.B.S.

(1) HUMAN ANATOMY

(i) Goal:

The broad goal of the teaching of undergraduate students in Anatomy aims at providing comprehensive knowledge of the gross and microscopic structure and development of human body to provide a basis for understanding the clinical correlation of organs or structures involved and the anatomical basis for the disease presentations.

(ii) Objectives:

(A) Knowledge:

At the end of the course the student shall be able to:

(a) comprehend the normal disposition, clinically relevant interrelationships, functional and cross sectional anatomy of the various structures in the body;

(b) identify the microscopic structure and correlate elementary ultrastructure of various organs and tissues and correlate the structure with the functions as a prerequisite for understanding the altered state in various disease processes;

(c) comprehend the basic structure and connections of the central nervous system to analyse the integrative and regulative functions of the organs and systems. He/She shall be able to locate the site of gross lesions according to the deficits encountered;

(d) demonstrate knowledge of the basic principles and sequential development of the organs and systems, recognise the critical stages of development and the effects of common teratogens. He/She shall be able to explain the developmental basis of the major variations and abnormalities.

(B) Skills:

At the end of the course the student shall be able to:

(a) identify and locate all the structures of the body and mark the topography of the living anatomy;

(b) identify the organs and tissues under the microscope;

(c) understand the principles of karyotyping and identify the gross congenital anomalies;

(d) understand the principles of newer imaging techniques like Ultra sound, Computerised Tomography Scan; Interpretation of plain and contrast X-rays.

(e) understand clinical basis of some common clinical procedures i.e.intramuscular and intravenous injection, lumbar puncture, kidney biopsy etc.

(C) Integration

From the integrated teaching of other basic sciences, student shall be able to comprehend the regulation and integration of the functions of the organs and systems in the body and thus interpret the anatomical basis of disease processes.

SYLLABUS

The course in Human Anatomy is to provide an understanding of the structure of the human body as a foundation for the scientific study and practice of medicine.

GENERAL ANATOMY

Descriptive terms; Classification of bones; Classification of joints; General features of muscle, fascia and general organisation of spinal nerve.

GROSS ANATOMY

(1) Importantant dissections to be done and prosected specimens to replace the rest of the dissections of the human body.

(2) Detailed origin and insertion of muscles to be replaced by essential attachments to understand the functions.

Upper and Lower extremities:

Muscles	:	Name; Location; Essential attachements to understand and analyse their functions.
Vessels and Nerves	:	Origin, Course, Important relations and distribution.
Lymphatics	:	Name of the lymph nodes and the areas drained by them.
Joints	:	Name and type of joint Movements to-gether with muscles responsible for the same. Special emphasis on hand movements; locking,unlocking at the knee joint;stages in walking; Name the joints involved in inversion and eversion.
Osteology	:	Name and side of the bone. Parts of the bone; Growing end of the bone.
Abdomen	:	Abdominal wall; Inguinal canal; Pelvic floor;Pertonial cavity-Greater sac; Lesser sac; Sub diaphragmatic spaces; Inchiorectal fossa; Basic knowledge of perineal spaces.

Viscera	:	Name; Position; Important interrelations; Blood supply, Nerve supply; Portal vein; Porto systemic anasmosis; Autonomic nervous system.
Osteology Sacrum;	:	Features of typical lumbar, vertebra; Pelvis.
Thorax	:	Walls of the thorax. Name and type of joints of the thorax; subdivisions and contents of mediastinum; Lungs.
Oasteology	:	Features of typical ribs, characteristics of typical thoracic vertebra; General features of sternum.
Head & Neck	:	Scalp; Face; Anterior triangle; Posterior triangle Suboacipital triangle; Structures in the neck; Cranial cavity; Orbit; Eyeball;. Temporal fossa; Parotidgland; Infratemporal fossa; Outline of the organs of hearing and equilibrium; Sub-mandibular region; Mouth; Tongue; Cavity of the nose.
Osteology	:	Names of the bones of the skull; Location; Cranial cavity; Subdivisions; Foraminae. General features of cervical vertebrae.
Brain & Spinal Cord	:	Contents of vertebral canal; Meninges; Blood vessels; Base of brain; Hind brain; Mid brain; Diencephalon; Cerebrum; Cerebellum.

EMBRYOLOGY

General : Oogenesis; Spermatogenesis; Fertilization; Bilaminar germ disc; Trilaminar germ disc; Embryonic period; Placenta; Amnion; Umbilical cord; Twinning; Basic teratology.

Special : Gastrointestinal system; Urinarysystem; Genital system; Spleen; Diaphram; Heart; 4th and 6th aortic archderivatives; Respiratory system; Face; Palate; Tongue; Visual apparatus; Branchial apparatus; Pharynx; Endocrine system; vertebral column; parts of neural tube and their derivatives.

HISTOLOGY

General : Cell; Epithelia; Glands; Connective tissue; Cartilage; Bone; Muscle; Nervous tissue; Lymphoid tissue; Skin and its appendages.

Special : Respiratory system; Vascular system; Gastro- intestinal system; Urinary system; Reproductive system (Male & Female); Endocrinesystem; Muco - cutaneous junctions;- Eyelid; Lip; Special senses:- Eyeball; Olfactory epithelium; Taste buds; Internal ear; CNS:-Medulla; Pons; Mid Brain; Cerebellum;

GENETICS

Structure of chromosome; Karyotype; Chromosomal aberrations - Numerical & Structural; Structure of gene; Mutation; Single gene inheritance - Autosomal & Sex linked.

SURFACE ANATOMY

Extremities : Bony land marks; Surface marking of important vessels and nerves.

Abdomen : Regions of the abdomen. Surface marking of superficial and deep inguinal rings; stomach Liver; Fundus of gall bladder; Base of appendix; Spleen; Abdominal part of ureter; Root of mesentary.

Head & Neck : Vertebral levels of - hypoid bone; thyroid cartilage; Cricoid cartilage; Larynx; Pharynx. Surface marking of common carotid artery; Internal jugular vein; Facial artery on the face; Parotid gland; Palatine tonsil; Inion; Nasion: Pterion.

Brain : Central sulcus.

RADIOLOGICAL ANATOMY

Plain X-ray; Contrast X-rays; Principles of ultrasound and CT scan. CT scan at T3,4 & L1 levels.

TEACHING SCHEDULE:

Introduction
General Anatomy
General Embryology
General Histology

Upper Extremity	- 6 weeks
Lower Extremity	- 5 weeks
Abdomen and Pelvis	- 9 weeks
Thorax	- 3 weeks
Head and Neck	- 11 weeks
Brain and Spinal cord	- 6 weeks.
	40 weeks.

Horizontal Integration

The preclinical departments together plan the Horizontal Integration.

To stress the importance of clinical and applied Anatomy:

1. Display study questions on the notice board weekly, pertaining to the region covered.

2. At the end of a region students be given cases of that region for study, presentation, analysis and discussion.

Example: Leprosy patients with nerve lesions of the Upper Extremity at the end of the study of Upper Extremity.

3. Invite clinicians to give guest lectures and demonstrations to highlight the anatomical basis of the clinical conditions.

Example:

a) Importance of the venous drainage of Lower Extremity and varicose veins

b) Anatomical basis of transplant

c) Anatomical basis of hernia and repair.

Books Recommended

1. Medical Embryology - Jan Langman
2. Human Embryology - Inderbir Singh
3. Text book of Human Anatomy - T.S.Ranganathan
4. Human Anatomy in volumes - Datta
5. A textbook of Human Neuroanatomy - Inderbir Singh
6. Clinical Anatomy - Snell
7. Clinically oriented Anatomy - Keithmoore
8. Essentials of Human Genetics - Bhatnagar, Kothari and Metha
9. Genetics - S.D.Gangane

EVALUATION

Internal Assessment

Theory 20 + Practical 20 = 40 marks

Practical 20 marks shall include 5 marks for record.

UNIVERSITY EXAMINATION PATTERN

THEORY - Two papers,each of 3 hours duration and carrying 50 marks.

Paper I	General Anatomy General Embryology General Histology Upper Extremity Lower Extremity Abdomen along with essential embryology and special histology

Paper II Thorax
Head and neck
Brain and Spinal cord
Including essential embryology and special histology of these regions.

Paper I

One essay from abdomen or Limbs = 10 marks

10 short notes with 2 1/2 marks each = 10 x 2 1/2 = 25 marks

Distribution:

General Anatomy	1	
General Embryology	1	
General Histology	1	
Upper Extremity		
Lower Extremity		
Abdomen along with essential embryology and special histology		3+3+1
(Less short notes from the region covered in the essay)		

Total - 35 marks

M.C.Q - 30 Questions, 1/2 mark each = 15 marks

Distribution:

General Anatomy	}	
General Embryology	}	4
General Histology	}	
Upper Extremity		8
Lower Extremity		8
Abdomen and pelvis		10

Total - 50 marks

Paper II

One Essay from Thorax or Head and Neck - 10 marks

10 short notes with 2 1/2 marks each - 10 x 2 1/2 = 25 marks

Distribution:

Thorax } 2 + 5
Head & Neck } (less from the region covered in the essay)

Brain & Spinal cord - 3

M.C.Q.

30 questions, 1/2 mark each = 15 marks

Distribution:

Thorax	- 10
Head & Neck	- 10
Brain & Spinal cord	- 10

Total - 50 marks.

PRACTICAL:

One mark for each spotter and two minutes per spotter. Each spotter may have two or more structured questions.

Gross spotters	- 20 marks
Histology spotters	- 20 marks
	40 marks

Gross spotters Distribution:

Upper Extremity	- 3
Lower Extremity	- 3

Thorax	- 3
Abdomen & Pelvis	- 3 + 1
Head & Neck	- 4
Brain & Spinal Cord	- 3

Histology Spotters Distribution:

General Histology	- 5
Special Histology	- 15

(Spotters should not be pre arranged. Marks are awarded for identification as well as discussion.)

VIVA:

Osteology	- 5
Radiology	- 5
Surface marking	- 5
Embryology	- 5
(including Karyotypes)	- 20 marks

Minimum for pass:

50% in Internal assessment	=	20/40
50% in Theory	=	50/100
50% in Theory including viva	=	60/120
50% in Practical	=	20/40

(2) HUMAN PHYSIOLOGY INCLUDING BIOPHYSICS

(a) PHYSIOLOGY

(i) GOAL :

The broad goal of the teaching of undergraduate students in Physiology aims at providing the students comprehensive knowledge of the normal functions of the organ systems of the body to facilitate an understanding of the physiological basis of health and disease.

(ii) OBJECTIVES:

(a) KNOWLEDGE :

At the end of the course the student shall be able to :

(1) explain the normal functioning of all the organ systems and their interactions for well coordinated total body function;

(2) assess the relative contribution of each organ system to the maintenance of the milieu interior;

(3) elucidate the physiological aspects of normal growth and development;

(4) describe the physiological response and adaptation to environmental stresses;

(5) list the physiological principles underlying pathogenesis and treatment of disease.

(b) SKILLS:

At the end of the course the student shall be able to:

(1) conduct experiments designed for the study of physiological phenomena;

(2) interpret experimental/investigative data;

(3) distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory.

(c) INTEGRATION:

At the end of the integrated teaching the student shall acquire an integrated knowledge of organ structure and function and its regulatory mechanisms.

(B) BIOPHYSICS

(a) GOAL AND OBJECTIVES: The broad goal of teaching Biophysics to undergraduate students is that they should understand basic physical principles involved in the functioning of body organs in normal and diseased conditions.

Total time for teaching Biophysics = 5 hours

Out of which:
1. Didactic lectures = 3 hours
2. Tutorial/group discussion = 1 hour
3. Practical = 1 hour

(b) Topic distribution:

(1) Lectures:

(i) Physical principles of transport across cell membranes and across capillary wall.

(ii) Biopotentials.

(iii) Physical principles governing flow of blood in heart and blood vessels. Also physical principles governing flow of air in air passages.

(2) Tutorial/group discussion: on the topics covered in didactic lectures.

(3) Practicals :

Demonstration of:

(a) Biopotential on oscilloscope

(b) Electroencephalogram (E.E.G.)

(c) Electromyogram (E.M.G.)

(d) Electrocardiogram (E.C.G.)

SYLLABUS OF PHYSIOLOGY

THEORY

GENERAL PHYSIOLOGY:

Introduction

1. Cell Function: Morphology of cell components & Functions
2. Body Fluids - compartments - volume and composition Units for measuring concentration of solutes.
3. Transport across the cell membrane-Homeostasis- Intra cellular communication.

TISSUES (HISTOPHYSIOLOGY):

Introduction

1. Epithelium - Properties, types, specialisations, functions - Modes of secretion - classification of glands.
2. Connective tissue - classification - Types of cells and fibres - Brown and white adipose tissue - functions. Supporting tissue - Cartilage and bone-types, properties.

3. Muscle - Structure of skeletal and cardiac muscle - Neuro muscular junction - Excitation-contraction coupling-muscle contraction. Types of skeletal muscle fibres changes induced by training. Types of smooth muscle-Structure and function-Properties - Innervation.

4. Nerve - Neurons and Neuroglia - Nerve fibre - Excitation and conduction - Ionic basis - Measurements of Electrical Events. Classification of Nerve fibres.

BLOOD:

Introduction

1. Composition, Function, Volume & Measurements of Blood and Plasma. Functional characterisation of plasma proteins. Oncotic Pressure.

2. R.B.C.: - Morphology, Function, Erythropoiesis, Anaemias, Reticulocytes, Haemoglobin.

3. W.B.C.: -Morphology, Fuction, Leucopoiesis, Immune Mechanism.

4. Platelets - Morphology, Function,Formation.

5. Blood types - A B O system
   Rh system
   Blood transfusion.

6. Haemostasis - Anticoagulants

7. Lymph - Reticulo Endothelial system

DIGESTION:

Introduction

1. Salivary Digestion - Deglutition

2. Digestion in stomach,Movements, Vomiting.

3. Pacreatic juice

4. Bile - Liver and gall bladder

5. Succus Entericus

6. Motility of small intestine

7. Digestion and Absorption of various food stuffs - Carbohydrate, Protein and fat;mineral and vitamin absorption.

8. Large Intestine - Secretion and Motility-Dietary Fibre - Defaecation.

9. Gastro-Intestinal Hormones

EXCRETION:

Introduction:

1. Functional Anatomy of Excretory system - Nephron in detail.

2. Renal Circulation - Auto regulation - Renal function Tests.

3. Glomerular Filtration - Tubular function-Water excretion,counter current mechanism

4. Acidification of urine & Bicarbonate Excretion Regulation of Na+, K+, C1-, H+Ions.

5. Innervation and function of bladder; Micturition - Filling and emptying; diuretics.

6. Structure and functions of Skin.

ENDOCRINE GLANDS:

Introduction - Hormonal regulation

Receptors - Second messengers.

1. Pituitary gland:

Introduction

Physiological Anatomy of Pituitary gland.

Anterior.Pituitary Hormones - Physiology of Growth - clinical correlates. TSH, ACTH, LH, FSH, PL Hormones and Functions.

Intermediate Lobe - Proopiomelanocortin-Products.

Posterior Pituitary Hormones : Synthesis,secretion, actions.

2. Hypothalamus - Hormones - Functional anatomy.

Interrelationship between Hypothalamus, Anterior & Posterior Pituitary and target organs.

Clinical correlation - Hypo & Hypersecretion.

3. Thyroid gland - Physiological Anatomy. Formation, Secretion, Transport and Metabolism of T3 & T4- Effects of Thyroid Hormone & Regulation of its secretion- Hypo & Hypersecretion - Clinical Correletion Calcitonin.

4. Parathyroid Glands -

Ca. & Phosporus Metabolism - Bone Physiology - Vit.D & Calcitriol.

Physiological Anatomy, Secretions.Transport and Functions of Parathormone

Effect of other hormones and hormonal agents on calcium homeostasis - Hypo & Hypersecretion - clinical correlation.

5. Pancreas:

Introduction - Islet structure - Biosynthesis and secretion of insulin.

Fate, effects, mechanism of action of insulin - clinical correlation - Hypo & Hypersecretion-Diabetes Mellitus.

Regulation of Insulin secretion.

Glucagon, other islet cell hormones and their effects.

6. Adrenal Glands:

Introduction

Adrenal Medulla - Morphology-Biosynthesis functions and regulation of adrenal medullary hormones - Phaeochromocytoma

Adrenal cortex - Structure - Biosynthesis of Adrenal cortical hormones - Transport, Metabolism and Excretion of adrenal Cortical Hormones.

Effects of Adrenal Androgens and Oestrogens.

Glucocorticoids - Physiological effects -

Regulation of secretion.

Mineralocorticoids - Regulation of Aldosterone secretion- Role played by it in the regulation of salt balance.

Adrenocortical hypo & hyperfunction in humans.

7. Minor Endocrine glands: Kidney, Pineal body, Thymus, Atrium of heart.

8. Local hormones - bradykinin, substance P, Prostaglandin, Histamin, Serotonin, etc.

REPRODUCTION:

1. Introduction - Sex differentiation and chromosomal sex in brief- factors influencing differentiation of genitalia.
2. Male Gonads and genitalia - structure - Gametogenesis - Erection, Emission and Ejaculation - Semen composition Endocrine function of Testis - Biosynthesis, secretion and actions of hormones control of Testicular function - Abnormalities.
3. Female gonads and genitalia - ovarian function - menstrual cycle: Hypothalamus, Pituitary, Ovary, Uterus, Vagina cyclic changes - Biosynthesis, secretion and actions of oestrogens and progesterone.
4. Fertilization and conception - contraception-corpus luteum of pregnancy - Chorion and Placenta - hormones - Pregnancy tests - Physiology of Pregnancy - Labour - Lactation.

RESPIRATION:

1. Introduction - Functional Anatomy of Respiratory system.
2. Mechanism of Respiration - Diffusion and Transport of Gases.
3. Regulation of Respiration, Neural and Chemical.
4. Pulmonary Circulation.
5. Respiratory adjustments in Health and Disease

Hypoxia - types, Oxygen therapy, periodic breathing Asphyxia, Dysbarism, Cyanosis, Effect of Exercise, high altitude Phys - Mountain sickeness - Space Physiology.

6. Artifical Respiration.

CARDIO VASCULAR SYSTEM:

Introduction

1. Structure and Properties of Cardiac muscle - Action potential.
2. Origin and spread of cardiac impulse. Sinus arrhythmia.
3. E.C.G. - 12 Leads - Tracing in Lead II, correlation with action potential and cardiac cycle.
4. Cardiac cycle - mechanical events - JVP and radial arterial pulse tracing.
5. Cardiac output - Measurement - factors affecting.
6. Haemodynamics - Pressure at different segments of vasculature.
7. Arterial Blood Pressure - systolic pressure , diastolic pressure, pulse pressure, Mean arterial pressure - normal values, methods for evaluating blood pressure - Factors for maintenance and regulation - Hypertension - Nervous and humoral regulation of Blood Pressure.
8. Starling forces - Formation and reabsorption of tissue fluid. Patho Physiology of shock.
9. Regional circulation - Pulmonary, cerebral, coronary, splanchnic, cutaneous & foetal circulations.
10. Cardio Vascular changes during exercise.

SPECIAL SENSES:

Introduction

1. Vision - Functional Anatomy - Aqueous humour - Glaucoma Image forming mechanism - Refractory error. Layers of Retina - Photoreceptors - Photochemistry of vision - Light and Dark adaptation - Electrical responses, Electro Retinogram - Visual Pathway, Lesions - colour vision - Movements.

2. Hearing - Functional Anatomy - Middle ear function - Cochlea - Auditory Pathway - Hearing defects - Tests for hearing, Audiogram

3. Smell - Receptor Organ and Pathway
Physiology of olfaction - Abnormalities

4. Taste - Receptor Organ and Pathway
Physiology of Taste - Abnormalities.

CENTRAL NERVOUS SYSTEM:

General Neurophysiology:

1. Neuron - Structure, types-Neuroglia- Nerve Degeneration, regeneration - Denervation hypersensitivity.

2. Sensory Receptors - Classification and Function. Electrical and Ionic events in receptors-Receptor potential

3. Synapse and junctional transmission - Properties.Neuro transmitters-synaptic plasticity and learning

4. Reflexes - Introduction - Mono and Poly synaptic reflexes-properties.

5. Spinal cord - Groups of cells - Transverse section - Anterior Nerve root, Posterior Nerve root- Ascending tracts: Posterior column & Anterolateral systems, Spinocerebellar tracts.

6. Pain - types - Pathways - Referred Pain - Pain inhibiting pathways.

7. Descending tracts - Pyramidal and extra pyramidal tracts - complete section and hemisection of spinal cord.

Special Neurophysiology:

1. Cerebral cortex - layers, lobes, methods of study, function of each lobe.

2. Thalamus - Thalamic nuclei, connections, functions, thalam syndrome.

3. Basal Ganglia - Nuclei, connections, circuits, functions, Lesion of Basal Ganglia - clinical correlates.

4. Hypothalamus - Nuclei, connections, functions - Lesions Experimental and clinical syndromes.

5. Reticular formation - Ascending and Descending Pathway ARAS & E E G.

6. Sleep - Theories - Physiological Changes during sleep - REM NREM Sleep - Disorders of sleep.

7. Cerebellum - lobes - cortex, circuitry - Deep Nuclei, connection functions cerebellar syndrome - cerebellar function tests.

8. Vestibular Apparatus - Semicircular canal, otolith organs Mechanism of equilibrium

9. Maintenance of posture, tone, equilibrium - Muscle spindle type

10. Autonomic Nervous system - Organisation, division wi examples of autonomic reflexes, chemical transmission.

11. Limbic system - Parts, circuits, functions.

12. Higher functions: Mechanism of speech - mechanism of learnir - mechanism of memory, types - conditioned reflexes.

13. C.S.F. formation, circulation, absorption, function, lumb puncture.

PRACTICAL PHYSIOLOGY

EXPERIMENTS

1. Erythrocyte Count
2. Leucocyte Count
3. Leucocyte Differential Count
4. Eosinophil Count
5. Clinical Examination of Cardio vascular system
6. Clinical Examination of Respiratory system
7. Clinical Examination of Sensory Nervous system
8. Clinical Examination of Motor Nervous system
9. Effect of posture/exercise on Pulse and Blood pressure

MINOR EXPERIMENTS

1. Estimation of Hb
2. Packed cell volume
3. Erythrocyte sedimentation rate
4. Blood groups -Rh factor, OAB system.
5. Osmotic fragility of blood
6. Specific Gravity of blood
7. Bleeding time & Clotting time
8. Respiratory efficiency test(Spirometer/Peakflowmeter)
9. Recording of Respiratory movements with stethograph
10. Clinical Examination of any one or more cranial nerves

11. Clinical Examination of superficial reflexes.
12. Clinical Examination of deep reflexes.
13. Cerebellar Function Tests

CHARTS:

1. Discussion of Comments - Problem Oriented
2. Discussion of Calculation

EVALUATION

Internal Assessment:

Theory 20 + Practical 20 = 40 marks
Practical 20 marks shall include
5 marks for record.

UNIVERSITY EAMINATION PATTERN:

THEORY: Two papers of 3 hours duration and 50 marks each.

Theory systems covered:

Paper I

Muscle & Tissue

Blood

Digestion

Excretion & Body fluids

Endocrinology

Reproduction

Paper II

Respiration.

CVS

Special senses

CNS.

Pattern of Question paper:

One Essay	= 10 marks
Ten short notes x 2 1/2 marks	= 25 marks
M.C.Q : 30 questions x 1/2 mark	= 15 marks
Maximum	= 50 marks.

PRACTICAL:

Practical I 1 1/2 hours.

1. Haematology Major expt.	- 10 marks
2. Haematology Minor expt.	- 5 marks
3. Chart-Comment/calculation	- 5 marks
	20 marks.

Practical II 1 1/2 hours

1. Clinical Physiology Major expt.	- 10 marks
2. Clinical Physiology Minor expt.	- 5 marks
3. Chart - Comment/calculation	- 5 marks
	20 marks.

Grand Total for University practical examination = 40 marks.

Minimum for Pass:

50% in I.A.	= 20/40
50% in written paper	= 50/100
50% in Written + Oral	= 60/120
50% in Practical	= 20/40

(3)BIOCHEMISTRY

Biochemistry includes(medical Physics and) Molecular Biology.

(i) GOAL

The broad goal of the teaching under-graduate students in 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 shall be able to:

(1) describe the molecular and functional organisation of a cell and list its sub-cellular components;

(2) delineate structure, function and inter-relationship of 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 consequently or malnutrition 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 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 molecular concept of body defences 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) suggest experiments to support theoretical concepts and clinical diagnosis.

(B) SKILLS:

At the end of the course, the student shall 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.

(C) INTEGRATION:

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

THEORY SYLLABUS

I. CELL:

Subcellular components - Molecular and functional organization.

Plasma membrane, cytoplasm, Nucleus and subcellular components like Mitochondria, Endoplasmic reticulum, lysosomes, peroxisomes, cytoskeleton, Golgi apparatus etc.

II. BIOMOLECULES:

Introduction

a) Chemistry of Carbohydrates - Monosaccharides, disaccharides - homo and hetero polysaccharides.

b) Chemistry of Lipids - Classification, fatty acids Eicosanoids and derivatives.

Triglyceride, Phospholipids, Cholesterol, and lipoprotein.

c) Chemistry of protein - classification of amino acids; peptides, peptide hormones eg. Insulin, glucagon,parathyroid hormone, and few pituitary harmones. Plasma proteins - classification, method of Separation and Electrophoretic pattern of plasma protein in health and disease. Protein structure and function.

d) Nucleic acids: Nucleotides - DNA & RNA Structure, Nucleic acid analogues of medical importance.

e) Structure of Haemoglobin, Myoglobin- structural relationship with the function. Abnormal haemoglobin - Congenital and acquired;

f) Vitamins and Minerals -(in brief details in Nutrition).

III ENZYMES:

a) Fundamental aspects of enzymology - definition, classification, mechanism of action, factors affecting enzyme activity - Enzyme regulation- Coenzymes - Isozymes - enzymes of clinical importance.

IV. NUTRITION:-

Digestion and assimilation of Nutrients:-

- Carbohydrates, proteins, lipids, vitamins and minerals.
- Nutritional reguirements - RDA, SDA, Balanced diet and limiting amino acid.
- Vegetarianism
- Consequences of malnutrition: Marasmus, Kwashiorkor, over nutrition.

V. METABOLISM AND REGULATORY PATHWAYS

1) Introduction to metabolism

a) Emphasize the purpose of metabolism like energy production, interconversion and synthesis of important bio molecules etc.

b) High energy compounds

c) Biological oxidation - enzymes involved - oxidative phosphorylation - theories - shuttles.

2) Metabolic pathways, regulation and metabolic errors:-

a) **Carbohydrates**: - glycolysis - HMP pathway - gluconeogenesis - uronic acid pathway - glycogen metabolism - fructose and galactose metabolism and TCA cycle. Regulation of blood glucose - Diabetes Mellitus - Hypoglycaemia - Hyper glycaemia. Inborn errors of carbohydrate metabolism.

Clinically important investigations pertaining to carbohydrate metabolism - reduction test of urine, differential diagnosis for glycosuria including chromatography. Blood sugar values, GTT, glycosylated haemoglobin, fructosamine.

b) **Lipid metabolism** :- Synthesis of fatty acid - Fatty acid oxidation - energetics of oxidation, ketone bodies, metabolism of unsaturated fatty acids - prostaglandine - prostacycline - Thromboxanes - Triglycerides - phospholipids - sphingolipids - Cholesterol and its derivatives. apoproteins - Fatty liver lipotropic factors.

Clinically important investigation pertaining to lipids and lipoproteins.

c) **Protein metabolism**: - Dynamic state of body proteins - Interorgan transport of amino acids - Ammonia production - Transport and body amino acid pool - its disposal - Urea cycle.

Metabolism of individual amino acids

Biologically important compounds obtained from amino acids including Gamma aminobutyric acid and Polyamines.

Clinically important investigations pertaining to protein metabolism - Total protein - albumin - globulin - A.G.ratio - Serum protein electrophoresis - Blood urea - BUN - Serum creatinine - urea and creatnine clearances - Amino acid chromatography for screening inborn errors.

d) **Integration of Metabolism**

Main control sites of Metabolic pathways and key enzymes.

Metabolic adaptation during fed state and starvation

Metabolism in Principal organs like liver, RBC, adipose tissue, muscle, kidney, heart and brain.

e) **Nucleic acid metabolism**

Purine and pyrimidine synthesis and Degradation - Salvage pathways - Abnormalities of Nucleic acid metabolism

f) **Metabolism of Haemoglobin, Porphyrias and Bilirubinaemia**

Porphyrias, Abnormal Hemoglobin and Jaundice and investigations pertaining to these disorders.

VI.GENE EXPRESION AND REGULATION.

1) Principles of Genetic Engineering and their application in Medicine.

Basics of Genetics - Chromosomal structure - arrangment of coding sequence and genetic code.

Biosyntheis of Proteins with Posttranslational modification

2) Cell Cycle

DNA Replication and its repair - RNA Synthesis and Processing - Mutation.

3) Gene Expression and Regulation.

Operon concept, genetic switch - Gene rearrangement - gene amplification - Gene protein Interaction.

4) Genetic engineering techniques and their application in medicine.

Restriction enzymes, Vectors genome library - DNA probes- Blot transfer techniques

Recombinant DNA technology, PCR- Polymerase Chain Reaction - Clinical application of genetic engineering.

VII INBORN ERRORS:-

Biochemical basis of inherited disorders with their associated sequelae.

Introduction: to various types of inheritance and types of mutation defect in relation to various inherited disorders.

a) Carbohydrates:-

Glycogen storage disease, galactosaemia G6PD deficiency. Lactose Intolerence, Fructose intolerance, Fructosuria, Pentosuria.

b) Lipids:-

Disorders of FA Oxidation, Sphingolipidosis, dyslipoproteinaemias,

c) Proteins:

Urea cycle disorders, inborn errors associated with each aminoacid.

d) Porphyrias, hyper bilirubinemia(congenital and acquired)

e) Hyperuricaemia, Gout, Orotic Aciduria, Lesch Nyhan Syndrome.

f) Neonatal screening for and prenatal diagnosis of inborn errors.

VIII HOMOEOSTASIS

Mechanisms involved in the maintenance of body fluids and pH homeostasis.

Metabolism of water and electrolytes homeostasis of pH - buffer system, Role of Kidney and Lungs - Acid base disorders.

Blood gas analysis and its interpretation and correlation to acid base disorders.

IX IMMUNITY

Molecular concept of body defence and application in medicine.

Immunoglobin structure, type, synthesis and function - Antigen binding - monoclonal anti bodies - Hyper and Hypogamma globulinaemia Immunodeficiency and AIDS - Biochemical methods of assessing the Immunoglobulin RIA, ELISA.

X.ENVIRONMENTAL HAZARDS AND CANCER

1) Biochemical basis of Environmental Hazards - occupational hazards(lead, organo phosphorus compounds etc.)Hazards due to modern industrialisation (H S) and traffic pollution(CO) Xenobiotics.

2) Biochemical basis of cancer and carcinogenesis - Tumour markers

XI LABORATORY INVESTIGATION;-

Principles of Various conventional and specialised Laboratory investigations and Instrumentation analysis and interpretation of data.

1) Principles of conventional and specialised Lab investigation including instrumentation analysis.

a) Conventional: manual colorimetric methods for biochemical parameter (dealt with in practical classes).

Flame photometer

Spectroscopy

b) Specialised: automated techniques Semi and random auto analyser - ELISA - RIA - Fluorimetry-Blood Gas Analyser

2) Interpretation of data:

Normal ranges of biochemical parameters - Causes for deviation from normal

XII CLINICAL CHEMISTRY:

Experiments to support theoretical concept and clinical diagnosis.

1) a) Biochemical tests to determine the functional ability of an organ - Liver function test - Renal function test - Pancreatic function test.

b) Investigations pertaining to hormones - Mode of action of hormone and its function - Thyroid function tests -Parathyroid function tests - Adrenal function tests.

2) Biochemical tests to confirm the clinical diagnosis of a disease and their interpretation.

Jaundice (haemolytic, hepatic and obstructive) -Cirrhosis liver - Acute Renal failure, chronic Renal failure, Nephrotic syndrome - Myocardial infarction - Diabetes mellitus,(mild,moderate and severe.) - Renal glycosuria - Alimentary glycosuria - Rickets - Hypo and hyperparathyroidism - Hypo and hyper thyroidism - Pancreatitis

Metabolic acidosis
alkalosis)
Respiratory acidosis)
alkalosis)
} both uncompensated and compensated.

BIOCHEMISTRY PRACTICAL SYLLABUS

Spotters and Clinical Chemistry Exercises:-

1. SPOTTERS:-

The student must identify the spotter and write one most important use of the spotter.

1. pH paper
2. Colorimeter
3. Centrifuge
4. Ryle's tube
5. Urinometer
6. Copper Sulphate
7. Spectroscope
8. Electrophoresis apparatus
9. Oxyhaemoglobin
10. Methaemoglobin
11. Carboxyhaemoglobin
12. Glucosazone/Fructosazone
13. Lactosazone
14. Maltosazone
15. Haemin crystels

16. Electrophoresis paper-normal pattern
17. Electrophoresis paper-nephrotic syndrome
18. Electrophoresis paper-cirrhosis of liver
19. Electrophoresis paper-multiple myeloma
20. Chromatography paper
21. Picric acid
22. Benedict's qualitative reagent
23. Structure of t RNA
24. Structure of cholesterol
25. Structure of glucose
26. Structure of fructose

2. Suggest investigations for a case of

1. Jaundice
2. Diabetes mellitus
3. Acute renal failure
4. Proteinuria
5. Oedema
6. Rickets
7. Myocardial infarction

8. Acidosis
9. Alkalosis
10. Glycosuria
11. Aminoaciduria
12. Hyper and Hypo parathyroidism
13. Hyper and hypothyroidism

3. Calculate

1. Albumin Globulin ratio with total protein and albumin values
2. Calculate minute volume from 24 hour urine volume
3. Calculate creatinine clearance with the required parameters given.

4. Interpret

1. Electrophoresis patterns- normal, cirrhosis liver, hepatic syndrome Multiple myeloma
2. Normal GTT and diabetes mellitus glycosurias
3. Acute pancreatitis
4. Myocardial infarction
5. Acute renal failure and nephrotic syndrome.
6. Acidoses, alkaloses

7. Hypo and hyper thyroidsm

8. Hypo and hyper parathyroidism

9. Rickets

10. Jaundice.

EVALUATION:

Internal Assessment
Theory 20+Practical 20
= 40 Marks

: Theory 20 marks includes
10 marks for Written tests
conducted periodically as per
University model,
5 marks for orals and
5 marks for assignments

Practical 20 marks is arrived
from -5 marks for practical
record and -15 marks for model
practical examination
including charts and spotters.

UNIVERSITY EXAMINATION PATTERN

THEORY: Two papers of 3 hours duration and 50 marks each.

The following topics shall be covered in each question paper.

Paper I

1. Molecular and functional organisation of cell and its subcellular components.

2. Chemistry, Digestion, Absorption and metabolism of carbohydrate and metabolic errors

3. Chemistry, Digestion, Absorption and metabolism of lipids and metabolic errors.

4. Enzymes

5. Vitamins

6. Electron transport chain and biological oxidation

7. TCA cycle and integration of metabolism

8. Nutrition

9. Porphyrins, Haemoglobin and Bilirubin metabolism

Marks: Total 50 MCQs 30 x 1/2 = 15 marks
Duration: 3 hours. Essay question: 1x10 = 10 marks
short questions:5x5 = 25 marks

PAPER II

1. Chemistry, digestion, absorption and metabolism of Protein and inborn errors of metabolism

2. Chemistry and metabolism of Nuclecic acids and errors of metabolism

3. Molecular Biology

4. Water, Electrolytes

5. PH and its regulation

6. Cancer Xenobiotics

7. Minerals

8. Hormones

9. Laboratory instrumentation, investigation and interpretation.

Marks: Total 50 — MCQs 30x1/2 = 15 marks
Duration: 3 hours — Essay question 1x10 = 10 marks
Short questions: 5x5 = 25 marks.

PRACTICAL:

Practical I 1 1/2 hours.

Qualitative experiment 15 marks

Spotters 5 5 marks

20 marks

Practical II 1 1/2 hours

Quantitative experiment 15 marks

Chart-calculation/ Interpretation 5 marks

20 marks

Grand Total for University Practical Examination = 40 marks

Minimum for pass

50% in I.A. = 20/40

50 % in Written paper = 50/100

50% in Written + Oral = 60/120

50% in Practical = 20/40

COMMUNITY MEDICINE

SYLLABUS FOR I & II Semesters

LIST OF TOPICS FOR LECTURES AND SEMINARS - 30 HOURS.

1. Introduction to Community Including evaluation of medicine and Community Medicine.
2. Concept of Health and disease.
3. Seminar on above topic.
4. Mode of transmission of disease and dynamics of diseases.
5. Natural history of disease and concept of prevention.
6. Seminar on above topics.
7. Introduction to health delivery system in rural and urban area in India.
8. Concept of primary health care - compounds of primary health care - Health for all.
9. Seminar on above topics.
10. Demography and demographic level in India and other countries.
11. National demographic goal.
12. Seminar on the above topics.
13. National population policy of India.

14. Family Planning Programme of India - achievement and failure. Sociology and family planning

15. Seminar on the above topics.

16. Social factors and morbidity pattern in rural area and urban area.

17. Seminar on the above topic.

18. Impact of industralisation and urbanization as health and diseases

19. Seminar on the above topic.

20. Introduction to National Health Programme.

21. Health and social programme in urban slums and methods of alleviation of poverty including urban basic services for the poor.

22. Seminar on the above topics.

23. & 24. Hospital management (by RMO) - 2 hours.

25&26. Elementary Nursing practice-(By Nursing faculty)2hrs.

27 to 30. Behavioural Science & Psychology - 4 hours.

I & II Semester - List of visits to Institutions

1-3. Primary Health Centres - 3 centres

4-6. Urban Health posts - 3 centres

7. Water works

8. Sewage farming

9. Water & Food analysis Laboratory

10. Institute/Department of Mental Health.

11. Regional Department/Directorate of Health and Family Welfare

12. Institute of Rehabilitation.

13. Milk Dairy.

14. Nutrition Rehabilitation centre.

15. MRL/Malaria Laboratory.

Suggested Time-Table

As per Medical Council of India

i). Theory, Seminars, Practicals - 30 Hours.

ii). Visits to Institutions of Health - 30 Hours.

(Field visit)

Adapted Time-Table

Starting from August, two continuous Hours of classes per week (11.00 A.M. to 1.00 P.M.) on any day of the week for 15 weeks (2 Hours x 15 weeks = 30 Hours as per recommendation of Medical Council of India) should be conducted upto the end of November. Also 5 field visits of 6 hours duration (7.00 A.M. to 1.00 P.M.) Forenoon should be organised once a month from September to January.