



**BHARATH INSTITUTE OF HIGHER EDUCATION
AND RESEARCH**

MBBS CURRICULUM

(Revised with effect from 2019-2020 onwards)

INTERNATIONAL CODE OF MEDICAL ETHICS

The International Code of Medical Ethics is a code based on the Declaration of Geneva. It was adopted by the General Assembly of the World Medical Association at London in 1949, amended in 1968, 1983 and 2006.

Duties of Physicians in General

A PHYSICIAN SHALL always exercise his/her independent professional judgment and maintain the highest standards of professional conduct.

A PHYSICIAN SHALL respect a competent patient's right to accept or refuse treatment.

A PHYSICIAN SHALL not allow his/her judgment to be influenced by personal profit or unfair discrimination.

A PHYSICIAN SHALL be dedicated to providing competent medical service in full professional and moral independence, with compassion and respect for human dignity.

A PHYSICIAN SHALL deal honestly with patients and colleagues, and report to the appropriate authorities those physicians who practice unethically or incompetently or who engage in fraud or deception.

A PHYSICIAN SHALL not receive any financial benefits or other incentives solely for referring patients or prescribing specific products.

A PHYSICIAN SHALL respect the rights and preferences of patients, colleagues, and other health professionals.

A PHYSICIAN SHALL recognize his/her important role in educating the public but should use due caution in divulging discoveries or new techniques or treatment through non-professional channels.

A PHYSICIAN SHALL certify only that which he/she has personally verified.

A PHYSICIAN SHALL strive to use health care resources in the best way to benefit patients and their community.

A PHYSICIAN SHALL seek appropriate care and attention if he/she suffers from mental or physical illness.

A PHYSICIAN SHALL respect the local and national codes of ethics.

Duties of Physicians to Patients

A PHYSICIAN SHALL always bear in mind the obligation to respect human life.

A PHYSICIAN SHALL act in the patient's best interest when providing medical care.

A PHYSICIAN SHALL owe his/her patients complete loyalty and all the scientific resources available to him/her. Whenever an examination or treatment is beyond the physician's capacity, he/she should consult with or refer to another physician who has the necessary ability.

A PHYSICIAN SHALL respect a patient's right to confidentiality. It is ethical to disclose confidential information when the patient consents to it or when there is a real and imminent threat of harm to the patient or to others and this threat can be only removed by a breach of confidentiality.

A PHYSICIAN SHALL give emergency care as a humanitarian duty unless he/she is assured that others are willing and able to give such care.

A PHYSICIAN SHALL in situations when he/she is acting for a third party, ensure that the patient has full knowledge of that situation.

A PHYSICIAN SHALL not enter into a sexual relationship with his/her current patient or into any other abusive or exploitative relationship.

Duties of Physicians to Colleagues

A PHYSICIAN SHALL behave towards colleagues as he/she would have them behave towards him/her.

A PHYSICIAN SHALL NOT undermine the patient-physician relationship of colleagues in order to attract patients.

A PHYSICIAN SHALL when medically necessary, communicate with colleagues who are involved in the care of the same patient. This communication should respect patient confidentiality and be confined to necessary information.

MEDICAL UNDERGRADUATE CURRICULUM

Medical Council of India Regulations on Graduate Medical Education, 1997

Medical Council of India is the statutory body which regulates the standard of medical education in India. The MCI regulations prescribe specifications regarding the conduct of medical courses and examinations. In 1997 MCI has made new regulations for the graduate curriculum.

The MBBS Course which spreads over 4½ academic years is divided into 9 semesters of six months duration. The first two semesters form the Phase I. Mainly the basic subjects of Anatomy, Physiology and Biochemistry are taught in the first phase. Instruction in the subject Community Medicine also begins in Phase I and extends up to the VII semester. Phase II consists of three semesters viz. III, IV and V. Pathology, Microbiology, Pharmacology and Forensic Medicine are the subjects included in the course of instruction. Clinical posting in Medicine, Surgery and Obstetrics & Gynaecology begin in the III semester. Phase III consists of semester VI, VII, VIII and IX. General Medicine and Medical specialities, General Surgery and Surgical specialities and Obstetrics & Gynaecology are taught during this phase. Exposure to Dentistry, Anaesthesiology and Emergency medicine is also given. Clinical postings in all the clinical specialities are included in this phase.

Educational methodology adopted for training the learners gives less importance to didactic lectures. To promote active learning the teaching sessions will be more interactive. The basic disciplines will impart integrated teaching in relevant subject areas. Emphasis will be given to vertical and horizontal integration. During the study of basic sciences applied clinical aspects will be given more importance. Modern teaching tools like audiovisual aids, computer aided teaching, self learning packages will be incorporated in the teaching programmes. Students will be exposed to modern trends and recent advances in computer informatics. Mini research projects will be given to students to familiarize with the research methodology and Clinical Epidemiology.

Periodical evaluations will be conducted to assess the performance of the learners. Weightage for the internal assessment will be 20% of the total marks in each subject. A student must secure at least 35% marks of the total marks fixed for internal assessment (for theory and practical) in a particular subject in order to be eligible to appear in the final university examination of that subject.

University examinations in theory and practical/clinical will be held at the end of Semesters II, V, VII and IX. The evaluation will be objective. The items will be objective/objective structured to assess the knowledge and skills of the students. Viva voce examination will be conducted in all the subjects to assess the attitude and communication skills, management abilities and ability in problem solving.

The first professional examinations will be conducted in the last month of semester II. A student has to pass all the Phase I subjects viz. Anatomy, Physiology and Biochemistry before joining the Phase II training.

Failed candidates will have to undergo additional course in the failed subjects. A supplementary examination will be conducted within six months in the failed subjects. The candidates who fail again will have to join their junior batch and appear for the next University examination along with them.

The II Professional examination will be held in the last month of Semester V. The student has to appear for Pathology, Microbiology, Pharmacology and Forensic Medicine. III Professional examination has 2 parts. Part I will be held at the end of Semester VII. The subjects are Ophthalmology, Otorhinolaryngology and Community Medicine. Students have to secure a pass in all the subjects of the second Professional examination before appearing for the Part I subjects of III Professional examination. But the students can undergo the Phase III training. A pass in the Part I subjects of the II Professional examination is not compulsory to continue the Phase III training. But before appearing for the III Professional part II subjects viz. Medicine, Surgery, Obstetrics & Gynaecology and Paediatrics, passing all the part I subjects is compulsory.

MBBS COURSE – GENERAL RULES FOR THE UNIVERSITY EXAMINATIONS

1. Eligibility to Appear for the University Examination

1.1 Attendance

A minimum of 75% attendance in a subject including attendance in non-lecture teaching, i.e. semi-nars, group discussions, tutorials, demonstrations, practical, hospital (Tertiary, Secondary, Primary) posting, bed side clinics etc. is compulsory to appear for the University Examination.

75% of attendance (physical presence) in Practical/Clinical and 75% in Theory is mandatory. Medical leave or other types of sanctioned leaves will not be counted as physical presence.

Attendance will be counted from the date of commencement of the session to the last day of the-ory classes/practical classes/clinical posting. In case a student joins the course late, the attendance will be counted from date of commencement of the course and not from the date of his/her join- ing it. Hence, students joining late should take special care to attend classes regularly and thereby obtain the minimum percentage of attendance (physical presence).

The Repeaters (additional students) also should obtain the same attendance for the additional term by attending extra classes like tutorials, assignments, special classes etc. Such extra classes will be arranged by the HODs concerned in accordance with the facilities in the Departments and the spe- cial needs of the students.

1.2 Internal Assessment

The student must secure a minimum of 35% of the total marks allotted for Internal Assessment in a subject to appear for the University Examination in that subject. The Repeaters are required to appear for periodical class tests conducted for them by the HODs. If they improve their previous Internal Assessment marks, such improved marks will be taken as the Internal Assessment for the ensuing examination. In case any student absents from such class test or secures less mark than the one scored in the previous term, the Internal Assessment secured in the previous regular term will be considered as the Internal Assessment for the ensuing examination.

2. Valuation of Theory – Written Papers

2.1 Internal Examiners Meeting

Internal Examiner's meeting will be arranged by the Head of the Department concerned immedi- ately after the University Theory examination. Scheme of valuation and guidelines will be prepared and the same will be communicated to the External Examiners before valuation. This procedure is to ensure uniformity in valuation.

2.2 Central Valuation:

Valuation work will be undertaken by the examiners in the premises of the Examination Control Division in the Health Care Campus.

2.3 Single Valuation with Provision for Revaluation (on the Request of a Failed Candidate) Revaluation is only for failed candidates. After revaluation, the higher mark will be considered. If the difference is more than 20%, answer paper will be subjected to third valuation.

3. Criteria for Pass:

Minimum marks required for a pass in the University examination is as follows:

Theory	- 45%
Theory + Viva Voce	- 50%
Practical/Clinical	- 50%
Aggregate of Theory + Viva Voce + Practical + Internal Assessment marks (Theory & Practical)	- 50%

Subject : ANATOMY

Distribution of Marks for University Examination and Internal Assessment

		Mark	Total Mark	Minimum for a pass
University	Theory 1 Theory 2	50 50	100	45
	Theory + Viva		120	60
	Practical	40		20
Internal Assess- ment	Theory	20		
	Practical	20		

3.1 Pass with Merit:

A candidate passing the entire professional examination is placed in one of the following classes based on the percentage of the grand total of marks in all the subjects of that examination:

Second Class	:	Less than 65 %
First Class	:	65 % or more, but less than 75 %
Distinction	:	75 % and more

A candidate passing the entire course is placed in Second class/First class/Distinction based on the cumulative percentage of the aggregate marks of all the subjects in the I, II and III (Final) professional examinations.

3.2 Criteria for granting Grace Marks:

As per MCI regulation, 5 marks can be awarded as grace mark in one subject only in order to enable the candidate to pass one segment of examination.

The above rules are made applicable for the MBBS course for all the University Examinations conducted by the Bhaarith medical college and hospital.

GENERAL CONSIDERATIONS AND TEACHING/LEARNING 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 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.
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 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 recognized. This aspect of education and 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 experience should be available throughout all the three phases of education and training. This has to be further emphasized and intensified by providing exposure to field practice areas and 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 experience 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 graduates of modern scientific medicine shall endeavour to become capable of functioning independently in both urban or rural environment. They 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 analyse 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 first hand 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 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 exporting 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 discussion and seminars to enable them to develop personality, character, expression and other faculties which are necessary for medical graduate

MEDICAL UNDERGRADUATE TRAINING PROGRAMME: OBJECTIVES

National Goals

At the end of undergraduate program, the medical student shall endeavour to be able to:

- a. Recognise 'health for all' as a national goal and health right of all citizens and by under- going training for medical profession fulfill his/her social obligations towards realiza- tion 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, preven- tive, 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 profes- sional obligations, so as to respond to national aspirations.

Institutional Goals:

I. These institutional goals were evolved by our medical institution in consonance with the national goals to define the kind of trained manpower (or professionals) we intend to produce. The undergraduate students coming out of our institute should:

- a. Be competent in diagnosis and management of common health problems of the indi- vidual 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 admini- stration 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 attitudes towards the patients in discharg- ing one's professional responsibilities.
- e. Possess the attitude for continued self learning and to seek further expertise or to pur- sue 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 Maternal and Child Health
 - 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.

The Medical Graduate Should be Equipped to Acquire the Skills as Detailed Below:

I. Clinical Evaluation

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

II. Bed side Diagnosis Tests:

- To be and interpret Haemoglobin (Hb), Total Count (TC), Erythrocytic Sedimentation Rate (ESR), blood smear for parasites and urine examination/albumin/sugar/ketones.
- Stool exam for ova and cysts.
- Gram staining and Ziehl- Nielsen staining for AFB.
- To do skin smear for lepra bacilli.
- To do and examine a wet film vaginal smear for Trichomonas.
- To do a skin scraping and Potassium Hydroxide (KOH) stain for fungus infections.
- To perform and read Mantoux Test.

III. Ability to carry out Procedures:

- To conduct CPR (Cardiopulmonary Resuscitation) and First aid in newborns, children and adults.
- To give Subcutaneous (SC)/Intramuscular (IM)/Intravenous (IV) injections and start Intravenous (IV) infusions.
- To pass a Nasogastric tube and give gastric lavage.
- To administer oxygen-by mask/catheter.
- To administer enema.
- To pass a urinary catheter - male and female.
- To insert flatus tube.
- To do pleural tap, ascitic tap & lumbar puncture, insert intercoastal tube to relieve tension pneumothorax.
- To relieve cardiac tamponade.
- To control external Haemorrhage.

IV. Anaesthetic Procedure:

- Administer local anaesthesia and nerve block.
- Be able to secure airway potency, administer Oxygen by Ambu bag.

V. Surgical Procedures:

- To apply splints, bandage and plaster of Paris (POP) slabs.
- To do incision and drainage of abscesses.
- To perform the management and suturing of superficial wounds.
- To carry on minor surgical procedures, e.g., excision of small cysts and nodules, circumcision reduction of paraphimosis, debridement of wound etc.
- To perform vasectomy.
- To manage anal fissures and give injections for piles.

VI. Paediatrics

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

VII. ENT Procedures:

- To be able to remove foreign bodies;
- To perform nasal packing for epistaxis;
- To perform tracheotomy;

XI. Ophthalmic Procedures:

- To invert eyelids;
- To give subconjunctival injection;
- To perform appellation of eye-lashes;
- To measure the refractive error and advise correctional glasses;
- To perform nasolacrimal duct syringing for potency.

X. Dental Procedures:

- To perform dental extraction

XI. Community Health:

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

XII. Forensic Medicine including Toxicology

- To be able to carry on proper medicolegal examination and documentation of injury and age reports.
- To be able to conduct examination for sexual offences and intoxications;
- To be able to preserve relevant ancillary materials for medico legal examination;
- To be able to identify important post-mortem findings in common unnatural deaths.

XIII. Management of Emergencies:

- To manage acute anaphylactic shock;
- To manage peripheral vascular failure and shock;
- To manage acute pulmonary oedema and LVF;
- Emergency management of drowning, poisoning and seizures;
- Emergency management of bronchial asthma and status asthmaticus;
- Emergency management of hyper pyrexia;
- Emergency management of comatose patient regarding airways, positioning prevention of aspiration and injuries;
- Assess and administer emergency management of burns.

PROGRAM OUTCOMES

PO1 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.

PO2 Learn every aspect of National policies on health and devote himself/herself to its practical implementation

PO3 Achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.

PO4 Develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.

PO5 Become an exemplary citizen by observation of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

PROGRAM SPECIFIC OUTCOMES

PSO1: 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.

PSO2: Be competent to practice preventive, promotive, curative and rehabilitative medicine in respect to the commonly encountered health problems.

PSO3: Appreciate rationale for different therapeutic modalities; be familiar with the administration of the "essential drugs" and their common side effects.

PSO4: 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.

PSO5: 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.

PSO6: Implementation of the National Health Programs including practical aspects of the following:

- (i) Family Welfare and Maternal 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.

PSO7: 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.

PSO8: be able to identify community health problems and learn to work to resolve these by de- signing, instituting corrective steps and evaluating outcome of such measures.

PSO9: be able to work as a leading partner in health care teams and acquire proficiency in communication skills.

PSO10: be competent to work in a variety of health care settings.

PSO11: 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.

PSO12: All efforts must be made to equip the medical graduate to acquire the skills as detailed in APPENDIX B of the Medical Council of India Regulations on Graduate Medical Education 1997.

PHASE I

Semester I & II

The Phase I subjects are Anatomy, Physiology, Biochemistry and Community Medicine. Training in Community Medicine extends from the 1st Semester to the 7th Semester. During the 1st semester, Community Medicine classes will be held on all Saturdays for 12 weeks. Therefore the teaching schedule changes from the 13th week.

The teaching programme of the basic sciences Anatomy, Physiology and Biochemistry extends over 40 weeks, excluding the last 8 weeks set apart exclusively for the final examinations. There will be 232 teaching days with 7 hours of instruction, from 8 am to 4 P.M. everyday. Approximately 1628 teaching hours will be available. In actual practice this may be less as holidays are to be excluded. The distribution of teaching hours is given below.

Total Hours of Lectures/Practical/Innovative Sessions:

Subject	Lectur Hours	Practical/ Innovative Sessions-Hours	Total
Anatomy	258	392	650
Physiology	160	320	480
Biochemistry	80	160	240
Community Medicine		6 0	60

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ANATOMY (U19MBB101)

Goal

The main aim of teaching Anatomy to undergraduate medical students is to provide comprehensive knowledge of gross and microscopic structures and development of the human body so as to understand the anatomical basis of various disease presentations, thus enabling them to practice medicine and communicate effectively.

Competencies

The Indian Medical Graduate will acquire the knowledge and skills necessary to attain the following competencies.

1. Identify the normal disposition, gross structure and clinically relevant inter-relationships of various structures in the human body and comprehend the functional correlations, and cross sectional anatomy, so as to apply the knowledge of the same in medical and surgical scenarios.
2. Identify, assign sides, state articulations and relevant attachments of all bones.
3. Mark the topography of clinically relevant structures on the living body and understand the contextual relevance of surface anatomy.
4. Should understand the principles of imaging techniques, and should be able to identify and locate structures in a given skiagram, CT scan etc.
5. Identify the microscopic structure of various tissues and organs in the human body and correlate the structure with the functions as a prerequisite for understanding their pathology in disease.
6. Should acquire basic knowledge of operating computers and should be able to make a powerpoint presentation for symposiums, seminars or conferences.
7. Demonstrate the ability to work as a team following professional etiquette and demeanour towards self, peers and guides/ facilitators.

Educational Objectives

A. Knowledge

At the end of first year, a graduating student should:

1. Be able to comprehend the structure, functions, and connections of the nervous system to analyse the integrative and regulative functions of organs and organ systems and should be able to localize the site of lesions according to deficits.
2. Have knowledge of basic principles of embryology and stages involved in the development of the organs and organ systems from the time of conception till birth so as to comprehend the developmental basis of occurrence of major variations, abnormalities and congenital anomalies.
3. Recognize the critical stages of normal human development and the effects of

common teratogens, genetic mutations and environmental hazards on the same.

4. Comprehend the basic principles of genetic inheritance, karyotyping genetic counselling and have basic knowledge of common genetic syndromes.
5. Have knowledge of the anatomical basis of common clinical procedures like injections, biopsies and diagnostic/interventional procedures.
6. Comprehend the sacredness of human body donation, follow bioethical principles and accord the cadaver the dignity and respect deserved.
7. Understand the principles of handling bio hazardous materials and policy of biomedical waste disposal.
8. Be aware as to how to handle a light microscope proficiently

B. Skills

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

- a) Localize pulsations of important arteries and also structures against which pressure can be applied in case of bleeding from a particular artery.
- b) To elicit superficial and deep reflexes, muscle power, and movements of joints.
- c) To locate the site of lumbar puncture, sternal puncture, pericardial tapping, liver biopsy etc.
- d) To locate veins for venipuncture.
- e) To locate sites for emergency tracheostomy.

C. Integration

Through horizontal integration with other basic sciences departments, the students should be able to comprehend the regulation and integration of functions of the organs and systems in the human body and through vertical integration with various clinical departments, interpret the anatomical basis of disease processes.

Course Outcomes

CO1: Attain comprehensive knowledge of gross and microscopic structures in the human body.

CO2: Attain comprehensive understanding of development of the human body.

CO3: Have an understanding of the anatomical basis of various disease presentations

CO4: Be able to use the anatomical knowledge in the practice of medicine.

CO5: Competency to identify the normal disposition, gross structure and clinically relevant inter-relationships of various structures in the human body and comprehend the functional correlations, and cross sectional anatomy, so as to apply the knowledge of the same in medical and surgical scenarios.

CO6: Ability to identify, assign sides, state articulations and relevant attachments of all bones.

CO7: Ability to mark the topography of clinically relevant structures on the living

body and understand the contextual relevance of surface anatomy.

CO8: Knowledge of the principles of imaging techniques, and should be able to identify and locate structures in a given skiagram, CT scan etc.

CO9: Competence to identify the microscopic structure of various tissues and organs in the human body and correlate the structure with the functions as a prerequisite for understanding their pathology in disease.

CO10: Ability to work as a team following professional etiquette and demeanor towards self, peers and guides/ facilitato

I. Syllabus

Details of the course

Duration	:	- 2 semesters (each of 120 working days)
Semester I		-24weeks
Semester II		-16weeks
Total number of hours	:	650
Lectures	:	236 hours
Integrated teaching	:	22 hours
Symposiums/group discussion	:	38 hours
Practicals (including innovative sessions)	:	328 hours
Formative assessment	:	26 hours approximately

Sl. No.	Schedule of Lectures	Hours
I	Introduction/General Anatomy	14 hrs
	1. Introduction to Anatomy	1
	2. Introduction to Anatomical Nomenclature	1
	3. Skin and fascia	1
	4. Cardiovascular system	1
	5. Lymphatic system	1
	6. Nervous system	2
	7. Muscular system	1
	8. Introduction to skeleton and classification of bones	1
	9. Osteology - Terminology	1
	10. Parts of a growing long bone and blood supply	1
	11. Ossification of bones	1
	12. Joints	2
II	Embryology (General & Systemic)	30 hrs
	1. Introduction to embryology	1
	2. Spermatogenesis	1
	3. Oogenesis	1
	4. Menstrual cycle	1

	5. Fertilization	1
	6. Implantation and cleavage	1
	7. Formation of germ layers to folding of embryonic disc	3
	8. Placenta and membranes	1
	9. Twinning	1
	10. Teratology	1
	11. Development of pharyngeal arches	1
	12. Development of pharyngeal pouches	1
	13. Development of face	2
	14. Development of CNS	1
	15. Development of respiratory system	1
	16. Development of heart	3
	17. Pharyngeal arch arteries	1
	18. Development of veins	1
	19. Foetal circulation	1
	20. Development of foregut	1
	21. Development of midgut	1
	22. Development of hindgut	1
	23. Development of kidney, ureter, urinary bladder	1
	24. Development of genital system	2
	Integrated Teaching	2 hrs
	Departments - Fetal Medicine, Genetics, Neonatology, Paediatric Surgery, Paediatric Cardiology	2
III	Upper Limb	21 hrs
	1. Pectoral region	1
	2. Mammary gland	1
	3. Axilla	1
	4. Brachial plexus	1
	5. Scapular region	1
	6. Shoulder joint	1
	7. Front of arm	1
	8. Back of arm	1
	9. Cubital fossa	1
	10. Front of forearm	1
	11. Palm	2
	12. Palmar spaces	1
	13. Back of forearm	1
	14. Elbow joint and radio- ulnar joints	1
	15. Wrist and first carpometacarpal joint	1
	16. Median and ulnar nerves	2
	17. Radial and axillary nerves	1

	18. Venous and lymphatic drainage of upper limb	1
	19. Brachial plexus injuries	1
	20. X-Rays of upper limb	1
	Integrated Teaching	2 hrs
	Departments – Radiology & Orthopaedics	2
	Symposiums/Group Discussions	5 hrs
	Brachial plexus injuries	1
	Nerves of upper limb	1
	Mammary gland	1
	Shoulder joint	1
	Intrinsic muscles of hand	1
IV	Lower Limb	17 hrs
	1. Femoral triangle	1
	2. Medial compartment of thigh	1
	3. Gluteal region	2
	4. Back of thigh	1
	5. Popliteal fossa	1
	6. Hip joint	1
	7. Front of leg & dorsum of foot	1
	8. Lateral compartment of leg	1
	9. Back of leg	1
	10. Venous and lymphatic drainage of lower limb	1
	11. Knee joint	2
	12. Ankle and subtalar joints	1
	13. Sole	1
	14. Arches of foot	1
	15. X-Rays of lower limb	1
	Integrated Teaching	2 hrs
	Departments – Radiology & Orthopaedics	2
	Symposiums/Group Discussions	5 hrs
	1. Femoral hernia	1
	2. Movements of hip joint	1
	3. Movements of knee joint	1
	4. Subtalar joints	1
	5. Venous drainage of lower limb	1
V	Abdomen	22 hrs
	1. Anterior abdominal wall	1
	2. Rectus sheath	1
	3. Inguinal canal	1
	4. Testis and spermatic cord	1

	6. Subphrenic spaces	1
	7. Stomach - Coeliac trunk	1
	8. Small intestine and superior mesenteric artery	1
	9. Large intestine, Caecum, appendix	1
	10. Duodenum	1
	11. Portal vein and porto- caval anastomosis	1
	12. Pancreas	1
	13. Liver	1
	14. Extrahepatic biliary apparatus	1
	15. Suprarenal gland	1
	16. Kidney	1
	17. Ureter	1
	18. Diaphragm including development	1
	19. Posterior abdominal wall	2
	20. X-Rays of abdomen	1
	Integrated Teaching	5 hrs
	Departments - General Surgery, OBG, Radiology, Urology, GI Sur- gery & Gastroenterology Physiology and Biochemistry	5
	Symposiums/Group Discussions	5 hrs
	1. Inguinal canal	1
	2. Rectus sheath	1
	3. Diaphragm	1
	4. Subphrenic spaces	1
	5. Prostate	1
VI	Pelvis and Perineum	11 hrs
	1. Introduction to perineum and perineal pouches	1
	2. Ischiorectal fossa	1
	3. Ovary and uterine tube	1
	4. Uterus	1
	5 Ureter	1
	6. Urinary bladder	1
	7. Prostate	1
	8. Urethra	1
	9. Anal canal.	1
	10. Pelvic diaphragm	1
	11. Vessels and nerves of pelvic cavity	1
	Integrated Teaching	1 hrs
	Departments - OBG, General surgery, Radiology, Urology,	1

VII	Thorax	12 hrs
	1. Introduction to thoracic wall & typical intercostal space	1
	2. Pleura	1
	3. Lung	1
	4. Introduction to mediastinum and superior mediastinum	1
	5. Pericardium	1
	6. Heart- surface features	1
	7. Right atrium	1
	8. Blood supply of heart	1
	9. Posterior mediastinum	2
	10. Thoracic sympathetic chain	1
	11. X-Rays of thorax	1
	Integrated Teaching	2 hrs
	Departments - C.V.T.S, Pulmonology, Cardiology & Radiology, Physiology and Biochemistry	2
	Symposiums/Group Discussions	6 hrs
	1. Typical intercostal space	1
	2. Heart-External features, blood supply, interior of chambers	1
	3. Lungs	1
	4. Oesophagus	1
	5. Azygos system of veins	1
	6. Superior mediastinum	1
VIII	Head and Neck	39 hrs
	1. Scalp	1
	2. Superficial dissection of face	1
	3. Deep cervical fascia	1
	4. Posterior triangle	2
	5. Suboccipital triangle	1
	6. Submental and digastric triangles	1
	7. Carotid and muscular triangles	2
	8. Hypophysis cerebri	1
	9. Dural folds	1
	10. Dural venous sinuses , cavernous sinus in detail	1
	11. Midline structures of neck, thyroid gland	1
	12. Scalenous anterior and its relations, subclavian artery	2
	13. Extraocular muscles	1
	14. Vessels and nerves of orbit	1
	15. Parotid gland	1
	16. Muscles of mastication	1
	17. Mandibular nerve	1
	18. Maxillary artery	1
	19. Temporomandibular joint	1

	20. Submandibular region	1
	21. Introduction to pharynx and nasopharynx	1
	22. Oropharynx and palatine tonsil	1
	23. Soft palate	1
	24. Nasal cavity, nasal septum	1
	25. Lateral nasal wall	1
	26. Maxillary nerve and pterygopalatine ganglion	1
	27. Paranasal air sinuses	1
	28. Larynx	1
	29. Tongue	1
	30. Middle ear	2
	31. Internal ear	1
	32. Eyeball	2
	33. Lymph nodes of head and neck	1
	34. X-Rays of head and neck	1
	Integrated Teaching	3 hrs
	Departments - Radiology, ENT, Neurosurgery, Ophthalmology, Head & Neck Surgery Physiology	3
	Symposiums/Group Discussions	8 hrs
	1. Cranial nerves-3,4,5,6 &7	5
	2. Cervical fascia	1
	3. Hyoglossus and its relations	1
	4. Nasal cavity	1
IX	Brain and Spinal Cord	37 hrs
	1. Introduction to brain	1
	2. Spinal cord – External features and blood supply	1
	3. Spinal cord – Internal features	1
	4. Ascending tracts of spinal cord and brain stem	2
	5. Descending tracts of spinal cord and brain stem	2
	6. Meninges of brain and cisterns	1
	7. Medulla	2
	8. Pons	1
	9. Midbrain	1
	10. Cerebellum	1
	11. 4 th ventricle	1
	12. Cerebrum – Sulci, gyri	2
	13. Cerebrum - Functional areas	2
	14. White matter of cerebrum	1
	15. Internal capsule	1
	16. 3 rd ventricle & Interpeduncular fossa	1

	17. Lateral ventricle	1
	18. Thalamus	1
	19. Metathalamus, epithalamus	1
	20. Basal ganglia	1
	21. Arterial supply of cerebrum	1
	22. Venous drainage of brain	1
	23. Oculomotor Nerve	1
	24. 4 th and 6 th cranial nerves	1
	25. 9 th cranial nerve	1
	26. 7 th cranial nerve	2
	27. 11 th and 12 th cranial nerve	1
	Integrated Teaching	3 hrs
	Departments –Medicine, Neurology, Neurosurgery, Radiology & Surgery Physiology	3
	Symposiums/Group Discussions	7 hrs
	1. Spinal Cord—Cross section – Cervical, Thoracic, Lumbar & Sac-ral levels	1
	2. Brain (i) Mid sagittal section, (ii) Horizontal at I.V. foramen	1
	3. Cross section of brain (iii) At anterior commissure, (iv) At mammillary body	1
	4. Medulla levels (i) Pyramidal decussation, (ii) Sensory decussation & (iii) Inferior olivary nucleus	2
	5. Pons levels (i) Upper part, (ii) Lower part	1
	6. Midbrain levels (i) Superior colliculus, (ii) Inferior colliculus	1
X	Histology (General & Systemic)	30 hrs
	1. Simple epithelium	1
	2. Stratified epithelium	1
	3. Connective tissue	1
	4. Cartilage	1
	5. Bone	1
	6. Muscle tissue	1
	7. Nervous tissue	2
	8. Blood vessels	1
	9. Lymph node and thymus	1
	10. Spleen and tonsil	1
	11. Skin	1
	12. Salivary glands	1
	13. General plan of GIT, Oesophagus	1
	14. Tongue	1
	15. Stomach - Fundus, pylorus	1
	16. Duodenum, Jejunum, Ileum	1
	17. Large intestine, Appendix	1

	18. Liver, gall bladder	1
	19. Pituitary and thyroid gland	1
	20. Suprarenal gland and Pancreas	1
	21. Trachea and lung	1
	22. Kidney, ureter, urinary bladder	1
	23. Testis, epididymis	1
	24. Prostate, Vas deference	1
	25. Uterus, uterine tube	1
	26. Ovary, Mammary gland	1
	27. Placenta, umbilical cord	1
	28. Retina, Cornea	1
	29. Cerebrum, Cerebellum	1
	Horizontal Integration Physiology	2 hrs
XI	Genetics	3 hrs
	1. Genetics	3

Sl. No	Schedule of Practical/Demonstrations	Hours
I	Upper Limb	37 hr
	1. Introduction to skeleton and classification of bones	2
	2. Osteology - Clavicle, Sternum	2
	3. Osteology - Scapula, Humerus	2
	4. Pectoral region	2
	5. Axilla	2
	6. Brachial plexus	2
	7. Scapular region	2
	8. Front of arm, cubital fossa	4
	9. Osteology – radius, ulna	2
	10. Front of forearm	2
	11. Palm	4
	12. Osteology – Skeleton of hand	1
	13. Back of arm	2
	14. Back of forearm	2
	15. Joints of upper limb	4
	16. X- rays & Surface markings	2
II	Lower Limb	34 hrs
	1. Introduction to bones of lower limb, hip bone	3
	2. Femur	2
	3. Front of thigh, Femoral triangle	4
	4. Medial compartment of thigh	2

	5. Gluteal region	4
	6. Back of thigh	2
	7. Osteology –Tibia, patella	2
	8. Osteology – Fibula	1
	9. Popliteal fossa	2
	10. Back of leg	2
	11. Front of leg & Dorsum of foot	4
	12. Lateral compartment of leg	2
	13. Osteology -Skeleton of foot	2
	14. X-rays & Surface markings	2
III	Abdomen	45 hrs
	1. Introduction to pelvis, sacrum, lumbar vertebrae	4
	2. Anterior abdominal wall	2
	3. Rectus sheath	2
	4. Inguinal canal	3
	5. Testis and spermatic cord	2
	6. Peritoneal folds	2
	7. Subphrenic spaces	2
	8. Stomach and coeliac trunk	2
	9. Small intestine and superior mesenteric artery	2
	10. Caecum and appendix	2
	11. Large intestine and inferior mesenteric artery	2
	12. Duodenum	2
	13. Pancreas	2
	14. Liver	2
	15. Extrahepatic biliary system	2
	16. Suprarenal gland	2
	17. Kidney	2
	18. Ureter	2
	19. Diaphragm	2
	20. Posterior abdominal wall	2
	21. X-rays & Surface markings	2
IV	Pelvis, Perineum	18 hrs
	1. Osteology of sacrum, bony pelvis	2
	2. Ischiorectal fossa	2
	3. Uterine tube and ovary	2
	4. Uterus	2
	5. Urinary bladder	2
	6. Prostate	2
	7. Pelvic diaphragm	2

	8. Vessels and nerves of pelvis	2
	9. Superficial and deep perineal pouches	2
V	Thorax	21 hrs
	1. Osteology of thorax	2
	2. Thoracic wall including osteology in detail	4
	3. Lungs & pleura	2
	4. Pericardium	2
	5. Heart including surfaces, chambers & blood supply	4
	6. Mediastinum	2
	7. Posterior mediastinum	3
	8. X-rays & Surface markings	2
VI	Head and Neck	85 hrs
	1. Introduction to skull	1
	2. Norma verticalis, norma occipitalis	2
	3. Scalp	2
	4. Norma frontalis	2
	5. Superficial dissection of face	2
	6. Posterior triangle	4
	7. Osteology – mandible	2
	8. Osteology – cervical vertebrae, hyoid bone	2
	9. Suboccipital triangle	2
	10. Submental triangle	2
	11. Digastric triangle	2
	12. Carotid and muscular triangle	4
	13. Cranial fossa	6
	14. Dural folds	2
	15. Dural venous sinuses	2
	16. Midline structures of neck	2
	17. Thyroid gland	2
	18. Scalenous anterior and its relations , subclavian artery	2
	19. Extraocular muscles	2
	20. Orbit-vessels and nerves	2
	21. Parotid gland	2
	22. Norma Lateralis	2
	23. Muscles of mastication	2
	24. Infratemporal fossa	3
	25. Submandibular region	2
	26. Pharynx	2
	27. Norma basalis	4
	28. Nasal septum	2

	1. Lateral nasal wall	2
	2. Larynx	2
	3. Tongue	2
	4. Middle ear	2
	5. Eyeball	2
	6. Parietal and occipital bone	2
	7. Frontal, Maxilla	2
	8. Sphenoid & Temporal bone	2
	9. Foetal skull	1
	10. X-Rays & Surface markings of head and neck	2
VII	Brain	26 hrs
	1. Spinal cord	2
	2. Medulla	1
	3. Pons	1
	4. Midbrain	1
	5. Cerebellum	1
	6. 4th ventricle	2
	7. Cerebrum – sulci, gyri and functional areas	4
	8. White matter of cerebrum	2
	9. Lateral ventricle	2
	10. Third ventricle	2
	11. Interpeduncular fossa & circle of willis	2
	12. Thalamus, metathalamus	2
	13. Arterial supply of cerebrum	2
	14. Brain sections	2
VIII	Histology (General & Systemic)	60 hrs
	1. Simple epithelium	2
	2. Stratified epithelium	2
	3. Connective tissue	2
	4. Cartilage	2
	5. Bone	2
	6. Muscle tissue	2
	7. Nervous tissue	4
	8. Blood vessels	2
	9. Lymph node and thymus	2
	10. Spleen and tonsil	2
	11. Skin	2
	12. Salivary glands	2
	13. General plan of GIT, Oesophagus	2
	14. Tongue	2

	15. Stomach - Fundus, pylorus	2
	16. Duodenum, Jejunum, Ileum	2
	17. Large intestine, Appendix	2
	18. Liver, gall bladder	2
	19. Pituitary and thyroid gland	2
	20. Suprarenal gland and Pancreas	2
	21. Trachea and lung	2
	22. Kidney, ureter, urinary bladder	2
	23. Testis, epididymis	2
	24. Prostate, Vas deference	2
	25. Uterus, uterine tube	2
	26. Ovary, Mammary gland	2
	27. Placenta, Umbilical cord	2
	28. Retina, Cornea	2
	29. Cerebrum, Cerebellum	2
IX	Genetics Chart Discussion	2 hrs

Distribution of Marks for Internal Assessment and University Examinations.

University Examination					Internal Assessment		
Theory-I	Theory-II	Viva	Practical	Total	Theory	Practical	Total
50	50	20	40	160	20	20	40

Total final marks = University examination marks + internal assessment marks = 160 + 40 = 200 marks

Ist MBBS Degree Examination in Anatomy (1st Professional Examination in Anatomy). Theory – Division of Topics

Paper I (50 Marks)	Paper II (50 Marks)
Section -A Abdomen, pelvis & perineum -25 marks (Including relevant embryology and histology) Section -B Lowerlimb - 12 marks General embryology } General anatomy } 13 marks General histology }	Section -A Head & Neck, Brain & Spinal cord - 28 marks * Including relevant embryology & histology Section -B Upperlimb&Thorax -20-marks Genetics - 3marks * Including relevant embryology & histology from the above topics.

Distribution of Practical Topics and Marks

Practical No.	Name of the practical	Marks	
Practical - I	Gross Anatomy/Dissection		
	a) Spotting – 10 numbers		10
	b) Discussion – 2 prosected specimens		10
	1) Above diaphragm	5	
	2) Below diaphragm	5	
Practical - II	Histology		
	a) Spotting – 09 numbers + 1 genetics card		10
	b) Discussion – 2 slides		10
	1) General histology	5	
	2) Systemic histology	5	
	Grand Total		40

Viva Voce : Total 20 marks added to theory score .

Four stations - 5 marks each.

1. Osteology
2. Embryology
3. Radiology
4. Surface Anatomy

Items for Histology Practicals:

1. Heamtoxylin and Eosin pencils
2. Histology Record

Recommended Books				
Name of the Books		Author	Edn	Publishers
Gross Anatomy				
Textbooks:				
*	Cunningham's Manual of Practical Human Anatomy Regional & Applied - Vol: I, II & III*	G.J. Romanes	Latest	Oxford Medical Publications
*	Clinical Anatomy for Medical Students*	B.D. Chaurasia	Latest	CBS Publishers & Distributors
Reference Books:				
	Clinical Anatomy for Medical Students	Richard Snell A. Halim	Latest	Lippincott Williams & Wilkins
	Clinically Oriented Anatomy	Keith L. Moore	Latest	Modern Publishers, New Delhi
	Clinical Anatomy (A problem solving approach) –Volume- I & II	Neeta V.Kulkarni	Latest	Jaypee publishers
	Essentials of Human Anatomy - 3 Volumes	A.K.Dutta	Latest	Lippincott Williams & Wilkins
	Human Anatomy- Volume I,II & III.	Inderbir singh	Latest	Current Book International
	Textbook of Anatomy-3 volumes	Peter L. Williams	Latest	Jaypee
	Gray's Anatomy	Anne M. R. Agur	Latest	Churchill Livingstone
	Atlas of Human Anatomy	Frank H.Netter	Latest	Elsevier
	Gray's Anatomy for Students	Richard L. Drake, A.Wayne Vogt, Adam W.M. Mitchell	Latest	Elsevier
Embryology				
Textbook:				
*	Human Embryology*	Inderbir singh	Latest	Macmillan
Reference Books:				
	Langman's Medical Embryology	T.W.Sadler	Latest	Lippincott Williams & Wilkins
	The Developing human clinically oriented embryology	Keith L. Moore K. V.N. Persaud	Latest	Elsevier
Neuro Anatomy				
Textbook:				
*	Text book of Human Neuro Anatomy*	I.B. Singh	Latest	Jaypee
Reference Books:				

	Clinical Neuroanatomy for Medical Students	Richard Snell	Latest	Lippincott Williams & Wilkins
	Neuro Anatomy Textbook	Vishram Singh	Latest	Elsevier
Histology				
Textbook:				
*	Histology*	I.B. Singh	Latest	Jaypee
Reference Books:				
	Atlas of Histology with Functional Correlations	De Fiore	Latest	Lippincott Williams & Wilkins
	Histology a Text and Atlas	Michael H. Ross Edward J Reith	Latest	Lippincott Williams & Wilkins

***The students need to buy ONLY the books marked**

HUMAN PHYSIOLOGY (U19MBB102)

GOAL

The broad goal of teaching Physiology for undergraduate students aims at providing the student

1. Comprehensive knowledge of the normal functions of all organ systems of the body.
2. Facilitate an understanding of the physiological basis of health and disease.
3. Understand basic biophysical principles involved in functioning of body organs in normal and diseased conditions

COMPETENCIES

The Indian Medical Graduate will acquire the knowledge and skills necessary to attain the following competencies.

Core competencies

- Ability to explain the normal functioning of all organs and organ systems in human body and its alterations in diseased state, correlating the same with classical clinical features and outline the basic principles of management.
- Ability to perform detailed clinical examination of each system in a systematic manner and interpret the findings.
- Ability to accurately measure blood pressure in humans.
- Ability to perform all basic haematology laboratory tests and interpret the results and outline the possible causes for the abnormal results.
- Ability to draw and explain normal recordings of ECG, Spirogram, Audiogram, Stethography, Perimetry, Physiograph and interpret basic abnormalities.
- Draw and explain normal skeletal muscle and cardiac muscle graphs and variations in different physiological states.

Non core competencies

- Ability to explain the technical aspects of all lab tests in haematology and principles underlying the test.
- Ability to explain how to perform human physiology experiments like ECG, Spirogram, Audiogram, Stethography, Perimetry, Physiograph.

- Ability to explain method of recording of amphibian skeletal and cardiac muscle graph.

OBJECTIVES

Knowledge

- Outline the structure and function of cell membrane (briefly) and the physiological role of different organelles.
- To explain functional anatomy of all organs and organ systems, specific functions of each and the role in homeostasis.
- Interactions of different organ system for well co-ordinated total body functions (maintenance of milieu interior)
- Outline the basic physiological responses and adaptations to exercise, altitude and gravitational forces.

Skills

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

- Conduct experiments designed for study of physiological phenomena.
- Interpret experimental / investigative data.
- Distinguish between normal and abnormal data derived as a result of tests which he/ she has performed and observed in the laboratory.

Integration

Minimum of 6 vertical integration sessions per year and horizontal integration and when feasible.

Course Outcomes

CO1: Ability to describe the structure of cell membrane with reference to ion channels. Homeostasis, Transport across cell membrane and Bioelectric potentials

CO2: Ability to discuss the classification of muscles-Morphology of skeletal muscle, Mechanisms of muscle contraction

CO3: Ability to explain the Morphology and properties of a neuron. Neuroglia, Action potential, Nerve injuries.

CO4: Ability to discuss the Body fluid compartments, Homeostasis, Plasma proteins, RBC, WBC, Platelets, Coagulation of Blood, Blood Group, Lymph and Tissue fluid.

CO5: Ability to explain Mechanism of Breathing, surfactant. Ventilation, Pulmonary Circulation, Transport of gases, Regulation of respiration, Hypoxia, exercise, artificial respiration

CO6: Ability to describe Functional anatomy of heart and blood vessels, Properties of Cardiac muscle, Cardiac cycle, Normal ECG, Cardiac output, Haemodynamics. Blood pressure, Regional circulation, Shock.

CO7: Ability to discuss organisation of nervous system and functions. Synapse, Reflex action. Sensory system, Motor System, and higher functions of brain.

CO8: Ability to describe the physiology of vision, audition, smell and taste

CO9: Ability to discuss the secretory and motor functions of gastrointestinal tract

CO10: Ability to explain the role of kidney in formation of urine, regulation of pH and body fluid volume and also clinical implications

CO11: Ability to describe the mechanism of action, functions and abnormalities in secretion of endocrine glands.

CO12: Ability to describe the development of male and female characteristics, hormonal changes, menstrual cycle, fertilization, pregnancy and contraceptive methods.

CO13: Ability to perform common hematological tests and interpret the results.

CO14: Ability to perform common human physiology experiments and interpret the results

CO15: Ability to draw amphibian skeletal and cardiac muscle graphs and discuss the physio- logical basis.

Teaching Schedule Duration of the Course: 2 Semesters

Teaching

Hours

Total teaching hours	480		
Lectures	: 160 Hrs.	Practicals	320
Innovative sessions*	: Part of practicals		
(*Tutorials, seminars, structured discussion, integrated teaching, formative evaluation and revision)			

Schedule of Lectures

Topic

1. General and Nerve-Muscle Physiology 12 Hr

Structure of cell membrane with reference to ion channels. Transport across cell membrane, simple diffusion, facilitated diffusion, uniport, antiport, primary active transport, secondary active transport, endocytosis, exocytosis. Bioelectric potentials-RMP, Action potential- definition, ionic basis, measurement.

2. Nerve Physiology

Morphology and properties of a neuron. Stimulus-definition & types, Neuroglia-classification and functions – Action potential, Ionic basis, measurement and properties (monophasic and bi - phasic APs). Propagation of action potential. Conduction of im- pulses in Myelinated and unmyelinated nerve fibres. Velocity of conduction of nerve im- pulses. Classification of nerve fibres. The peripheral nerve. Compound action potential. Nerve injuries. Degeneration and regeneration of nerve fibres.

Muscle Physiology

Classification of muscles-Morphology of skeletal muscle, Mechanisms of muscle contraction- Excitation, Contraction coupling, Sliding filament mechanism, Changes during muscle contraction- Chemical , Thermal, Mechanical.

Types of contraction: Relationship between length and tension during contraction, Effect of load etc., Properties of skeletal muscle. [(simple muscle twitch, effect of two successive stimuli, beneficial effect, tetanus, fatigue, fasciculation and fibrillation–(to be studied in practicals)], Neuro muscular junction -in detail including drugs affecting it and diseases. Cardiac muscle - basic structure & comparison with skeletal muscles. (Details to be taken along with CVS). Smooth muscles structure, innervation, properties neuro- muscular transmission, mechanism of contraction, plasticity, tonus.

3. Haematology

18 Hr

Homeostasis : Body fluid compartments. Blood– normal volume, composition and functions

Plasma proteins: Types, quantity, functions, applied aspects.

Red blood cells : Morphology, Count & its variations, functions, ESR and

PCV Definition normal values, factors affecting, variations. Fragility of RBC. Haemoglobin – outline of normal basic structure, derivatives, functions, Haematological indices. Erythropoiesis - stages, factors regulating, life span of RBC and its destruction - Reticulo-endothelial system (mention only) Anaemias - Definition, Classification. Physiological basis of anaemias (very briefly) Iron deficiency anaemia, Pernicious anaemia, Aplastic anaemia, Haemolytic anaemia, polycythaemia, Jaundice (briefly).

White blood corpuscles: Morphology, life span, classification and functions of different WBC's, normal count and variations of WBC's, Agranulocytosis, leukemias (mention only) Leucopoiesis. Tissue macrophage system

Immunity : Types and mechanism of immunity, role of different WBCs in immune mechanism, mention important abnormalities, e.g.: AIDS.

Platelets : Structure, normal count, properties and functions, Abnormalities, Thrombopoiesis. Haemostasis mechanisms.

Coagulation of Blood : clotting factors, intrinsic and extrinsic system of clotting, Tests for clotting, Anti-coagulants. Factors preventing intravascular clotting. Basis of Haemorrhagic disorders.

Blood Group : ABO system. Landsteiner's laws, method of determination. Importance, Rh blood group, Rh incompatibility, Erythroblastosis foetalis. Other blood group systems. Inheritance of blood group. Blood transfusion, indications, precautions, Complications of incompatible blood transfusion. Blood banking, preservation injuries Lymph and Tissue fluid formation, Starling hypothesis, Circulation and functions, oedema.

4. Respiratory System

16 Hrs

General Organisation

Structure and Functions of Respiratory tract. Mechanics of respiration.

Mechanism of Breathing : Pressure changes in the pleural cavity and lungs. Spirometry. Lung volumes and capacities, Pressure volume relationship, compliance, work of breathing, Airway resistance, Bronchial tone (role) Surface tension of the lung and surfactant. Application of Law of Laplace in alveolar stability.

Pulmonary Ventilation & Alveolar Ventilation: Dead space volume and measurement. Pulmonary Circulation: Special features, Ventilation – perfusion ratio. Respiratory membrane – Diffusion of gases and factors affecting it. Transport of O₂ & CO₂. Factors affecting the transport of O₂ & Control of respiration – Neural and chemical.

Hypoxia: Definition, classification. Effects of hypoxia. Mountain sickness. Acclimatization at high altitude, Therapeutic uses of O₂.

Disturbance in Respiratory Functions: Periodic breathing, Apnoea and breath holding, Dyspnoea, Orthopnoea, hyperpnoea, Decompression sickness, cyanosis, asphyxia. Respiratory changes during exercise, artificial respiration (mouth-to-mouth breathing, Mechanical methods ventilators briefly.)

Non Respiratory Functions of Lung:

5. Cardiovascular System

20 Hrs

Functional anatomy of heart and blood vessels. Properties of cardiac muscles, conducting system of heart, original spread of cardiac impulse.

Cardiac cycle - Events of cardiac cycle, pressure changes in ventricle, atria, jugular vein, aorta and pulmonary artery, volume changes in ventricle, heart sounds, murmurs, cardiac catheterization (principle only), arterial pulse, Echocardiography (principle only).

Normal ECG - waves, segments, leads, classical changes in myocardial infarction, arrhythmias, heart block (mention only).

Cardiac output - Normal values and regulation through stroke volume and heart rate.

Blood pressure - systolic pressure, diastolic pressure, pulse pressure, mean arterial pressure, measurement (details in practical class), determinants, regulation of blood pressure (short term, long term), hypertension.

Regional circulation - coronary, cerebral, cutaneous, splanchnic.

Shock - definition, classification, pathophysiology, treatment (principles only). Effect of exercise and g-forces on CVS.

Haemodynamics: physical principles governing blood flow in heart and blood vessels.

Foetal Circulation - Brief outline only.

6. Renal System

10 Hrs

Role in homeostasis, role as an endocrine organ. Functional anatomy, Renal circulation, special features, Renal blood flow, regulation, measurement. Glomerular filtration: Definition, measurement, calculation, normal value, Factors governing GFR, Filtration fraction. Tubular reabsorption – general mechanisms, reabsorption of sodium & glomerulo-tubular balance, glucose reabsorption, Tubular maximum, renal threshold & splay in glucose titration curve, water reabsorption and concentration mechanism in urine formation, Tubular secretion of K^+ & H^+ ions, Acidification of urine and its significance, buffers in urine. Urinary bladder : Innervation Cystometrogram (mention), micturitione flex and its higher control, abnormal bladder function. Disorders of renal function. Mention normal and abnormal constituents of urine & basis of albuminuria, Diuretics, Artificial Kidney & Dialysis (Mention principle only)

7. Skin and Temperature Regulation

1 Hr

Biophysics (to be taken along with the relevant systems): Physical principles of transport across cell membranes and across capillary wall. Bio potentials. Physical principles governing flow of blood in heart and blood vessel; Also physical principles governing flow of air in air passages.

8. Gastrointestinal System:

11 Hrs

Functional Anatomy, Enteric nervous system, General principles of exocrine secretions. Composition, functions and regulation of Salivary secretion, Gastric secretion, Pancreatic secretion, Intestinal secretion, Biliary secretion. Functions of gall bladder. Gastric acid secretion and its regulation in detail, Gastric mucosal barrier, peptic ulcer-Physiological basis of genesis & management.

Endocrine functions of G. I. tract.

Motor Functions of G. I. Tract. Mastication, Deglutition, Movements of stomach, Small intestinal movements, Large intestinal movements, Defaecation reflex. Gall bladder filling and emptying, gall stones. Vomiting, Dumping syndrome, paralytic ileus.

Absorptive Functions of G. I. Tract. Absorption of Carbohydrates, protein, fat.

8 . Nervous System

34 Hrs

Introduction. Organisation of nervous system and functions. General morphology of Brain, Spinal cord including Lamination. Cranial nerves (practicals) and spinal nerves - origin from spinal cord.

Synapse Definition, classification, functional anatomy. Mechanism of Synaptic transmission, EPSP, IPSP and Ionic basis and properties of synapse.

Reflex action. Definition, Reflex arc and its components, Bell- Magendie Law, Properties of reflex action. Mono and Polysynaptic reflexes.

Sensory system : Classification of senses – conscious and unconscious sensations. Physiology of receptor –Types ,classification and properties – Two important sensory pathways. Sensory pathways for different sensations from body and face. Pain – Types, Receptor, different pathways, visceral pain in detail –Referred pain and its basis. Pain modulation in the body and abnormalities of pain sensation. Synthetic senses. Sensory cortex, thalamus.

Motor System: 3 levels of integration, spinal integration – spinal reflexes, Muscle spindle

- Stretch Reflex and inverse stretch reflex, its higher control and role in muscle tone. Cortical integration – voluntary activity. Motor cortex. Pyramidal and extrapyramidal tracts. Effect of lesions of motor pathways and effect of lesions of spinal cord. Basal ganglia, Reticular formation, Cerebellum. Vestibular apparatus – Posture regulation. Cerebral cortex and Prefrontal lobe. Higher function- speech, learning, memory, sleep. Autonomic nervous system and its higher control. Hypothalamus, limbic system. Cerebrospinal fluid. EEG- standard waves, pattern in sleep, clinical uses.

Special Senses

10 Hrs

Vision: Functional anatomy of the human eye, intraocular tension and variations (mention). Refractory media of the eye, extra ocular muscles Visual pathway, Visual cortex, Accommodation of the eye, Refractory errors of eye and its correction. Far and near points, Retina and image formation, visual acuity, Photochemistry of vision, adaptation of receptors, Colour vision and colour blindness. Field of vision, electroretinogram. Pupillary reflex.

Audition: External ear, Middle ear–Structure and functions, Inner ear-structure and function of Organ of Corti, auditory pathway, mechanism of hearing. Tests for hearing. Audiometry (briefly).

Smell and taste : Receptor organs and pathways. Primary taste sensations, after taste ionic basis.

9. Endocrinology

18 Hrs

Introduction- Endocrine glands in the body. Hormones – definition, Chemical nature of hormones – mechanisms of action, actions of hormones in general, Regulation of glands in general, Radio immuno assay, paracrine secretions.

Pituitary gland: Functional anatomy, Anterior lobe, Cell types, hormones secreted by anterior lobe. Growth hormone -physiological actions, Regulation of secretion. Physiology of growth – growth curves, factors influencing growth and development, dwarfism. (other pituitary hormones to be dealt along with target glands.) Beta Lipotropin, Intermediate lobe hormones. Effects of hypophysectomy. Clinical disorders – gigantism, acromegaly. Neurohypophysis – hormones – physiological actions – regulation of secretions-disorders.

Thyroid: (Anatomy and histology) Hormones, synthesis, transport, metabolism, Actions in detail, Regulation of secretions, thyroid function tests, abnormalities of thyroid function
Adrenal cortex: Histology (to be mentioned) Adrenal cortical hormones, classification, biosynthesis (to be mentioned), Glucocorticoids - Actions, regulation of secretion, Excess secretion, Cushing syndrome. Mineralocorticoids – Actions, regulation of secretion, effects of hypersecretion (primary and secondary). Adrenal androgens– Physiological significance, abnormalities of secretions, enzyme deficiency, effects of adrenalectomy, adrenal cortical insufficiency.

Adrenal Medulla : Hormones, Biosynthesis, metabolism, Physiological actions, Epinephrine, Norepinephrine, dopamine, uses, regulation of secretion. Abnormal rate of secretion, Pheochromocytoma.. Role of adrenal medulla and adrenal cortex in counter-acting stress.

Pancreas- Cell types, Hormones, Physiological actions, Regulation of secretion, hormonal control of blood glucose level. Insulin deficiency. Pathophysiology of Diabetes mellitus, oral hypoglycemic agents, Insulin excess – symptoms.

Local Hormones: Ectopic hormones, thymus, pineal (very briefly).

10. Reproductive System

10 Hrs

Introduction, development and differentiation of male and female characteristics. Role of genetic and hormonal factors. Sex chromatin. Male reproductive system - functional anatomy, spermatogenesis and regulating factors. Semen – composition and function of constituents - Hormonal functions of testes, testicular abnormalities. Female reproductive system - functional anatomy, onset of puberty, menstrual cycle-ovarian and uterine cycle and their hormonal basis. Fertilisation, implantation, foeto placental unit; Physiology of pregnancy - placenta and its functions, Tests of pregnancy (Immunological tests.). Parturition and its regulation, Lactation and its regulation. Contraception - basic principles.

Schedule of Practicals

Haematology

110 Hrs

1. Use and care of compound microscope and microscopic examination of blood.
 1. PCV, ESR
 2. Haemoglobin estimation and blood indices.
 3. RBC count.
 4. WBC count.
 5. Examination of peripheral blood smear.
 6. Differential WBC count.
 7. Bleeding time, clotting time, blood grouping and Rh typing.

System Examination

General examination

1. Examination of respiratory system.
2. Examination of CVS.
3. Examination of higher functions and sensory system.
4. Examination of motor system.
5. Examinations of reflexes.
6. Examination of cranial nerves 1-6 & 7-12

Experimental Physiology – only Photo/Video Graph Discussions 30 hrs

1. Appliances in experimental physiology laboratory including Physiograph, student's stimulator and Kymograph.
2. Pithing, nerve muscle preparation, mounting, effects of different types of stimuli.
3. Simple muscle twitch.
4. Two successive stimuli.
5. Fatigue and recovery.
6. Genesis of tetanus and Starling's law of muscle.
7. Effects of variations of temperature on muscle contraction.
8. Velocity of nerve impulse.
9. Normal cardiogram of frog's heart.
10. Effects of heat and cold.
11. Stannius ligatures.
12. Demonstration of extra systole, compensatory pause.
13. Effects of vagal stimulation on heart.

Human Physiology Practical 10 hrs

1. Record of Blood Pressure and its variations with posture and exercise.
2. Demonstration of a) ECG b) Perimetry (optional to have demonstration of EEG, EMG, Ophthalmoscopic examination.) c) Physiograph d) Spirometry e) Stethography.

Innovative Teaching: Seminars/Group Discussions etc.

List of seminars 30 hrs

Blood

1. Haemostasis
2. Blood groups

Muscle and Nerve

3. Mechanism of muscle contraction.
4. Neuromuscular junction.

Endocrinology

5. Calcium homeostasis
6. Hormonal control of blood glucose

Reproductive System

7. Physiology of lactation, menstrual cycle, ovulation.

Renal System

8. Renal concentration mechanism of urine

Central Nervous System

9. Hypothalamus – connection, nuclei and functions
10. Skin and temperature regulation.

Cardio Vascular System

11. Cardio respiratory changes during exercise

Respiratory System

12. High altitude physiology and acclimatization
13. Pulmonary function tests

Special senses

14. Colour vision
15. Tests for hearing

Topics for Tutorials/ Group Discussions

100 hrs

1. Cell structure, transport across cell membrane
2. Action Potential
3. Erythropoiesis.
4. Immunity.
5. Body fluids – Composition and regulations of volume.
6. Cardiac cycle – phases and pressure changes.
7. Blood pressure.
8. Shock and compensatory mechanism.
9. Pressure changes and volume changes.
10. Gas exchange, Oxygen transport and CO transport.
11. Renal blood flow and autoregulation.
12. Reabsorption of glucose.
13. Movements of GIT.
14. GIT Hormones.
15. Endocrine pancreas.
16. Actions of Thyroid Hormone.
17. Properties of synapse and reflexes.
18. Pain pathway.
19. Functions of thalamus.
20. Cortico spinal tract.
21. Basal ganglia.
22. Hypothalamus.
23. Neuromuscular junction.
24. Visual pathways.
25. Errors of refraction.
26. Functions of Middle ear.
27. Tests for hearing.
28. Mechanism of hearing.

Clinical Orientation/Vertical Integration – Videos of Cases/Procedures to be Shown to Students.

Vertical integration for Haematology, CVS, Respiration, GIT, Nervous System, Endocrinology and Special Senses (at least 6 sessions).

Distribution of Marks for Internal Assessment and University Examination:

University Examination					Internal Assessment		
Theory I	Theory II	Practical	Viva voce	Total	Theory	Practical	Total
50	50	40	20	160	20	20	40

Internal Assessment

Internal assessment should be based on the performance in the regular periodical sessional examinations, practical, Viva, Tutorials and seminars.

Weightage for the internal assessment shall be 20% of the total marks of each subject. There will be periodic revision sessions both for theory and practicals.

Internal Assessment examinations will be of three hours duration each. Final internal assessment examination will be of the same pattern as the University examination.

University Examination Pattern:

Theory

Paper I

Blood, CVS, Respiration (including environmental physiology), Renal system and skin and temperature regulation, Digestive system. (50 marks, 3 hours)

Paper II

Nervous System, Special Senses, Muscle and nerve, Endocrinology, Growth and development, Reproductive system. (50 marks, 3 hours)

The weightage for each topic should be proportional to the number of hours allotted.

Practical - Total : 40 marks

Practical I

		Marks
Short Experiments:	One amphibian graph:	5
	One haematology short experiment.	5
Spotters	Two Calculations, Two observations, Three interpretations, 10 2 Graphs, One Clinical skill test. (total ten stations X 1)	

Practical II

Long Experiment:	One Haematology Experiment	10
	One System Examination (write full format, demonstrate as required by examiner).	10

Total **40**

Viva -voce **: 20 marks**

Four examiners – Topics to be divided and all examiners to examine each student.

Textbooks Recommended

1. Review of Medical Physiology: W. F. Ganong - (Lange Medical Book).
2. Text Book of Medical Physiology : Guyton & Hall - W.B Saunders (Elsevier)

Reference Books

1. Text Book of Medical Physiology: N. Geetha - (Paras Publications)
2. Berne & Levy Physiology -(Mosby).
3. Textbook of Medical Physiology: G.K. Pal - (Universities Press India, Private Limited)
4. Essentials of Medical Physiology: Indu Khurana - (Elsevier)
5. Textbook of Medical Physiology: Venkatesh & Sudhakar - (HH Lippincott)

BIOCHEMISTRY (U19MBB103)

Goal

The broad goal of teaching undergraduate 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.

Competencies:

1. Estimate the levels of blood urea, Creatinine, Glucose, Total protein and Albumin using colorimeter in a given sample and interpret its results.
2. Identify the biologically important substance in a given sample and interpret its results.
3. Demonstrate the normal constituents of urine.
4. Detect any abnormal constituents in a given urine sample and interpret its results.
5. Interpret specific gravity of a given urine sample using urinometer.
6. Interpret problem solving data on Jaundice, Diabetes mellitus, Myocardial Infarction, Nephrotic syndrome etc.

Objectives

Knowledge

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

- Describe the molecular and functional organization of a cell and list its subcellular components.
- Delineate structure, function and inter-relationship of bio molecules and consequences of deviation from normal.
- Summarise the fundamental aspects of enzymology and clinical application wherein regulation of enzymatic activity is altered.
- Describe digestion and assimilation of nutrients and consequences of malnutrition.
- Enumerate biochemical role of vitamins and minerals.
- Integrate the various aspects of metabolism and their regulatory pathways.

- Outline the structure and function of Hb and abnormal Hb.
- Explain the biochemical basis of inherited disorders with their associated sequelae.
- Outline the molecular mechanisms of gene expression and regulation, the principles of genetic engineering with applications and modern techniques in molecular biology with application in medicine.
- Describe mechanisms involved in maintenance of body fluid and pH homeostasis.
- Familiarise with the principles of various conventional and specialized laboratory investigations and instrumentation analysis and interpretation of a given data.
- Outline the biochemical basis of environmental health hazards, biochemical basis of cancer and carcinogenesis, biochemistry of AIDS.
- Summarise the molecular concepts of defense and their application in medicine.
- Suggest experiments to support theoretical concepts and clinical diagnosis.

Skills.

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

- Make use of conventional techniques and instruments to perform biochemical analysis relevant to clinical screening and diagnosis.
- Analyse and interpret investigative data.
- Demonstrate the skills of solving scientific and clinical problems and decision making.

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.

Course Outcomes

CO1: Knowledge about the cell and subcellular organelles, molecular functions and membrane transport, digestion and absorption of nutrients, chemistry & metabolism of biomolecules and in- born errors.

CO2: Knowledge about fat and water soluble vitamins, macro and trace minerals, Enzymes and Clinical enzymology, TCA cycle, ETC ,integration of metabolism, immunology, plasma proteins. **CO3:** Knowledge of the structure and function of Hemoglobin, abnormal Hb, thalassemias, function tests- LFT, TFT, RFT, PFT, maintenance of homeostasis- acid base and fluid and electrolyte.

CO4: Understanding of molecular biology- replication,transcription,translation, gene expression mutation, Molecular techniques and gene therapy.

CO5: Understanding of biochemistry and immunology of cancer and AIDS, Study of xenobiotics, biochemistry practicals-identification of biomolecules, spotters, lab data interpretation, quantitative experiments.

Teaching Hours

Duration of the course - 2 semesters

No. of hours - 240

Lectures - 80

Practicals - 160

Innovative session (projects, seminars, structured discussion, integrated teaching, formative evaluation and revision - Along with practicals).

1. **Cell structure & function**, sub cellular organelle, bio membrane (transport and ion channels. Will be covered in Physiology. So to be excluded from biochemistry.) **1 hr**
2. **Digestion and absorption of nutrients** discussed in details in physiology so to be excluded from biochemistry. **2 hrs**
 - a. Glucose Transporters
 - b. Disorders of digestion and absorption
 - c. Malnutrition – PEM
3. **Enzymes** **10 Hrs**
 - Nature of enzymes, coenzymes and cofactors, classification 1 hr
 - Mechanism of action, specificity of enzymes, active site. 1 hr
 - Enzyme kinetics, factors affecting enzyme activity, Km value and significance (derivation not required) 1 hr
 - Enzyme inhibition – competitive, noncompetitive, allosteric, feed back, therapeutic agents like antimetabolites as examples 2 hrs
 - Enzyme regulation in biological systems – allosteric regulation. 1 hr
 - Covalent modification, zymogen activation, induction and repression (mention only) 1 hr
 - Isoenzymes and their significance with suitable examples 1 hr
 - Clinical enzymology – Diagnostic importance of enzymes (LDH, CPK, AST, ALT, ACP, GGT, GPD, 5’Ntase, Cholinesterase, Amylase, Lipase) 2 hrs
4. **Chemistry and metabolism of Proteins** **18 Hrs**
 - (i) **Chemistry**
 - a. Classification based on structure, ionic properties of amino acids, isoelectric pH, buffering action of amino acids and proteins 1 hr
 - b. Structural organization of proteins – primary, secondary, tertiary and quaternary forces involved in maintaining . Examples–Insulin, collagen. 2 hrs
 - c. Protein denaturation, coagulation, isoelectric precipitation using salt solutions, classification of proteins (colour reactions to be covered with practicals) 1 hr
 - d. Electrophoresis and chromatography – brief mention on separation techniques (details of techniques and application in practical demonstration)

(ii) Metabolism

- a. Body amino acid pool, dynamic state of body proteins, inter - organ transport of amino acids, nitrogen balance, glucogenic and ketogenic amino acids. 1 hr
- b. Transamination (reaction only), decarboxylation, oxidative deamination, trans deamination, formation of ammonia. Disposal of Ammonia, Urea cycle, Hyper -ammonemias 2 hrs
- c. Metabolism of glycine, compounds synthesized, creatine and creatinine, Heme and glutathione, hyper – glycinemias 2 hrs
- d. Metabolism of sulphur containing aminoacids, (methionine and cysteine), trans sulphuration, transmethylation reactions, formation of taurine, PAP, excretion of sulphur, homocystinuria, cystinuria and cystinosis. 2 hrs
- e. Phenyl-alanine and tyrosine – metabolism, PKU and alkaptonuria, synthesis of thyroid hormones , synthesis and catabolism of catecholamines, albinism, tyrosinemia 2 hrs
- f. Tryptophan – formation of NAD (important steps only), serotonin and 5 HIAA xanthurenic acid, melatonin, formation of indican, Hartnup's disease. Branched chain amino acids- MSUD (pathway not required) 1 hr
- g. Glutamic acid, glutamine, GABA, aspartic acid, asparagine, serine (metabolic role and compounds synthesized using these amino acids), poly- amines.

5. Chemistry and metabolism of Carbohydrates 17 hrs

(i) Chemistry

- a. Classification – monosaccharides- glucose, fructose, galactose and mannose. Reactions, (reducing property, oxidation, reduction), isomers, anomers and epimers. Derivatives like amino sugars and deoxy sugars. Glycosidic bond. 2 hrs
- b. Disaccharides- lactose, sucrose, maltose. Polysaccharides-starch, glycogen, dextrins, glycosaminoglycans (basic structural features and functions only) , blood group antigens. 2 hrs

(ii) Metabolism

- a. EMP Pathway: Reactions, regulation in brief, energetics, Rapaport leubering cycle, fate of pyruvate in aerobic and anaerobic conditions, PDH reaction. 3 hrs
- b. Gluconeogenesis-key enzymes, regulation and significance. Cori's cycle 1 hr
- c. Glycogen synthesis and degradation, regulation (brief), inborn errors associated

6. Vitamins	8 hrs
a. Classification, chemical nature (detailed structure not required), coenzyme forms, biochemical role, sources, requirements, deficiency and toxicity of the following vitamins (briefly only) A, D, E, K and free radicals	4 hrs
b. Biochemical role, co-enzyme function, sources ,requirement and deficiency of thiamine, riboflavin, niacin, biotin, pyridoxine, pantothenic acid, folic acid, one carbon groups, B-12 and ascorbic acid	4 hrs
7. Minerals	5 hrs
a. Sources, requirement, absorption, biochemical role ,deficiency and toxicity of the following minerals - calcium, sodium, potassium, sulphur, chloride and phosphorus – role of PTH, 1,25 DHCC.	4 hrs
b. Iron, copper and anemia	1 hr
8. Haemoglobin	4 hrs
a. Synthesis and degradation	3 hrs
b. Haemoglobinopathies, thalassemias and porphyrias (brief mention only as examples in each case).	1 hr
9. Liver function Tests:	3 hrs
Including formation of bilirubin, hyper bilirubinemias and differential diagnosis of jaundice (S. bilirubin, enzymes, A/G ratio, BSP test, urine test)	
10. Specialized Laboratory investigations	1 hr
RIA, ELISA, principles of colorimetry	
11. Radioactivity	1 hr
Applications-Diagnostic, research and therapeutic. Radiation hazards	
12. Chemistry and metabolism of Lipids	13 hrs
(i) Chemistry of Lipids	
a. Definition, classification with example, saturated and unsaturated fatty acids, triacyl glycerol, phospholipids. Structure and function of biomembrane.	
(ii) Metabolism of Lipids	
a. Beta oxidation of fatty acids, role of carnitine, regulation and energetics	
b. Synthesis of fatty acids, fatty acid synthase complex , regulation, elongation and desaturation	
c. Formation and utilization of ketone bodies, ketoacidosis in diabetes and starvation	

	d. Transport of plasma lipids, lipoprotein metabolism, apoproteins, functions, lipid profile and dyslipidemias, atherosclerosis, biochemical basis of management of hyperlipidemias – diet, PUFA, dietary fibre and hypo-lipidemic drugs. Lipid storage diseases.	2 hrs
	e. Eicosanoids – prostaglandins, thromboxanes and leukotrienes.	1 hr
	f. Phospholipids and sphingolipids - Inborn errors.	1 hr
13.	TCA Cycle	4 hrs
	a. Reactions, regulation and energetics	1 hr
	b. Interrelation of carbohydrate, lipid, and amino acid metabolism. Anaplerotic reactions, amphibolic role of TCA cycle and metabolic adaptations during fed state and starvation.	1 hr 2hrs
	c. Electron transport chain - components and sites of ATP synthesis, inhibitors and uncouplers of ATP synthase complex and mechanism of oxidative phosphorylation (Briefly)	
14.	Maintenance of homeostasis	6 hrs
	a. Acid base regulation, acid and bases, pH, buffers, Henderson-Hasselbach's equation, (derivation not necessary) buffer capacity	1 hr
	b. Acid and Bases in the body, plasma buffers, respiratory and renal regulation of pH	2 hrs
	c. Acidosis and alkalosis, major causes and compensatory mechanism, anion gap, assessment of acid base status.	2 hrs
	d. Fluid and electrolyte balance – distribution of body water and disorders (Hormonal regulation covered in Physiology)	1 hr
15.	Nucleic Acids (Chemistry and metabolism)	17 hrs
	a. Structure of purines, pyrimidines, nucleosides and nucleotides	1 hr
	b. Purine – Nucleotide synthesis and catabolism (Synthetic pathway need not be considered in detail with names of intermediates. Only the source of different atoms and sequence of addition). salvage pathway and regulation, hyper-uricemia and gout, Lesch Nyhan syndrome.	2 hrs
	c. Pyrimidine – nucleotide synthesis, regulation, orotic aciduria, formation of deoxyribonucleotide, thymidylate synthase reaction, folic acid antagonist, nucleotide analogues as chemotherapeutic agents	1 hr
	d. Nucleic acid – structure of DNA, different types of DNA, mitochondrial DNA, base pairing rule, difference between DNA and RNA, mention different types of RNA.	2 hrs
	e. DNA replication, DNA polymerase, DNA repair	1 hr
	f. Genetic code, transfer RNA, mRNA, rRNA.	1 hr

16. Biochemistry of Cancer	2 hrs
Mutagens, carcinogens and its role in carcinogenesis, viruses in carcinogene- sis, tumour markers and oncogenes.	
Vertical Integration Classes:	10 hrs
a. Malnutrition and PEM (Pediatric department)	1hr
b. Diabetes mellitus (Internal Medicine)	1hr
c. Jaundice (Internal Medicine)	1hr
d. Clinical enzymology (Internal Medicine)	1hr
e. Inborn errors of carbohydrates and protein metabolism(Pediatric)	1hr
f. Calcium and phosphorus metabolism-derangement (Orthopaedics)	1 hr
g. Atherosclerosis – Ischemic heart diseases (Cardiology)	1 hr
h. Acid base balance in clinical settings (Internal Medicine)	1 hr
i. Etiology and management of cancers (Oncology)	1 hr
j. AIDS (Internal medicine)	1 hr
Seminar/ Tutorials	27 hrs
a. Cell structure, function and abnormalities	1 hr
b. Biomembrane structure and transport mechanism	1 hr
c. GIT enzymes, digestion and absorption of carbohydrates, lipids and pro- teins	2hrs
d. Disorders of digestion and absorption	1 hr
e. Clinical enzymology, isoenzymes	2h
f. Fat soluble vitamins	1hr
g. Thiamine, riboflavin, niacin, biotin, pyridoxine, panthothenic acid	3hrs
h. Folic acid, Vitamin B 12, Ascorbic acid	1 hr
i. Minerals: Macro elements	1 hr
j. Microelements	1 hr
k. Glycolysis, gluconeogenesis, keyenzymes and regulation	2hrs
l. Regulation of glycogen metabolism	1 hr
m. Diabetes mellitus, glycosurias, GTT , glycated Hb	1 hr
n. Formation and disposal of ammonia	1 hr
o. Inborn errors of amino acid metabolism	2 hrs
p. Formation and fate of bilirubin & jaundice	1 hr
q. Steroid hormones	1 hr

r. Mutation	1 hr
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Project work

Iron deficiency in women and children of Elamakkara	1 week
Vitamin & mineral deficiency in children	1 week

Horizontal Integration

a. Haemoglobin (Physiology)	4hrs
b. Liver Function Tests (Anatomy and Physiology)	4hrs
c. Synthesis of thyroid hormones (Anatomy and Physiology)	5 hrs

Schedule of Practicals

(80 hrs)

1.	Reactions of Carbohydrates: Glucose 1 session	2 hrs
2.	Reactions of Carbohydrates: Fructose 1 session	2 hrs
3.	Reactions of Carbohydrates: Lactose 1 session	2 hrs
4.	Reactions of Carbohydrates: Sucrose 1 session	2 hrs
5.	Identification of unknown Carbohydrate 2 sessions	4 hrs
6.	Reactions of Proteins: Colour reactions 1 session	2 hrs
7.	Reactions of Proteins: Precipitation reactions 1 session	2 hrs
8.	Reactions of Albumin 1 session	2 hrs
9.	Reactions of urea and uric acid (Specific urease test for urea. Benedict's uric acid test and Schiff's test for uric acid.) 1 session	2 hrs
10.	Identification of biologically important compounds in given solution 2 sessions	4 hrs
11.	Normal urine : organic constituents 1 sessions	2 hrs
12.	Normal Urine: inorganic Constituents 1 session	2 hrs
13.	Abnormal urine: Report	4 hrs
14.	Introduction to clinical chemistry, collection of samples, anticoagulants and pre- servatives , principles of colorimetry	2 hrs
15.	Estimation of glucose in blood 1 session	2 hrs
16.	Estimation of urea in serum, calculation of clearance from given values of U, V and P	2 hrs
17.	Estimation of creatinine in serum. 1 session	2 hrs
18.	Estimation of total protein and albumin in serum– A/G ratio 1 session	2 hrs
19.	From given values of HDL and TAG, lipid profile data interpretation 1 session	2 hrs
20.	Spotters (demonstration): simple instruments, graphs, tests etc. 2 sessions	4 hrs

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| 21. | Charts 2 sessions | 4 hrs |
| | a. Problem solving exercises: short history of different conditions are given and students will be asked to suggest investigations to arrive at a diagnosis. | |
| | b. Laboratory data interpretation- liver diseases, renal diseases, acid-base dis- turbances, diabetes mellitus, lipid disorders | |
| 22. | Revision: Identification of unknown substance. 4 sessions | 8 hrs |

1. Distribution of Marks for Internal Assessment and University Examination

University Examination				Internal Assessment			
Theory I 50	Theory II 50	Practicals 40	Viva Voce 20	Total 160	Theory 20	Practicals 20	Total 40

University Examination– Division of topics

Theory paper I

(50 Marks)

1. Cell structure and functions, biomembrane
2. Digestion and absorption of nutrients
3. Enzymes
4. Chemistry and metabolism of carbohydrates and proteins
5. Vitamins and minerals
6. Hemoglobin
7. Liver Function Tests and Special Laboratory investigations (RIA, ELISA, Colorimetry)
8. Radioactivity

Theory Paper II

(50 Marks)

1. Chemistry and Metabolism of lipids
2. TCA cycle, electron transport chain, integration of metabolism
3. Maintenance of homeostasis- acid base balance, fluid and electrolyte balance
4. Nucleic Acids -structure and function, biosynthesis of purines and pyrimidines
5. Molecular genetics including techniques
6. Biochemistry of HIV, cancer and cell cycle
7. Pancreatic and renal function tests
8. Xenobiotics and biotransformation

Practical Examination

(40 marks)

Practicals I

- a. Quantitative experiment:** Estimation of blood urea, creatinine, glucose, total protein and albumin (skills and interpretation) 10 marks
- b. Interpretation of data/problem solving exercise** (data on jaundice, Diabetes mellitus, myocardial infarction, nephrotic syndrome etc.) 10 marks

Practicals II

- a. Qualitative experiment:** Identification of biologically important substance, demonstration of normal constituents in urine, detection of abnormal constituents etc. (skills and interpretation) 10 marks
- b. Spotters** 10 marks

Theory/ Viva Voce (4 examiners) Topics to be divided and all examiners to examine each student. (Maximum marks 20)

Textbooks Recommended

Prescribed Books

1. Textbook of Biochemistry for Medical students - Dr. D.M. Vasudevan, Dr. S. Sree-kumari (J.P Brothers).
2. Text book of Biochemistry – Dr. U .Sathyanarayana
3. Harper's Biochemistry-Murray, Rodwell

Reference Books

1. Biochemistry with Clinical Correlation - Devlin.
2. Biochemistry - Stryer
3. Principles of Biochemistry - Lehninger
4. Biochemistry – A case oriented approach - Montgomery

COMMUNITY MEDICINE (U19MBB104)

1. Vision

The Department of Community Medicine at Bhaarith School of Medicine, shall be recognized nationally and internationally for its:

- 1.1. Innovative, rural based, Primary Health Care oriented, value based medical education to train the medical students as “Five Star Doctors” as envisaged by the World Health Organization, who are competent to work as
 - *Care providers*
 - *Decision makers*
 - *Communicators*
 - *Community leaders and*
 - *Managers*
- 1.2. Provision of Cost effective Health Care delivery strategies characterized by equity, inter sectoral co-ordination, community participation and appropriate technology.
- 1.3. Innovative curriculum enriched with the principles of human values, love and empathy encompassing the spiritual dimensions of health and delivered with state of the art Information Technology through Searching, Sharing, Observation, Participation and Action.

2. Mission

The mission of the Department of Community Medicine is :

- 2.1. To provide value based, rural oriented medical education to produce doctors who have the knowledge, attitude, and skills to provide Primary Health Care as per the National Health Policy.
- 2.2. To demonstrate that positive health can be achieved only through total development and community participation.
- 2.3. To demonstrate that spiritual dimension of health is also important while developing health care delivery strategies.
- 2.4. To provide need based refresher training on Continuous Professional Development (CPD) to all categories of health care providers.
- 2.5. To undertake research on health and develop low cost logistics for delivery of Primary Health Care
- 2.6. To bring the benefits of the advancements in technology to the people in the villages.

3. Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies.

- To deliver evidence based, need oriented Primary Health Care in the context of the prevailing socio-cultural settings.

- To identify community health problems, prioritize them and chalk out solutions with local resources and community participation.
- To communicate effectively and appropriately with people at large and patients and their family in particular.
- To collect, compile, analyze and interpret health related data for disease surveillance using epidemiological and biostatistical principles.
- To give health education using appropriate tools and educational methods with special reference to national health issues.
- To implement, monitor and evaluate national health programmes.
- To undertake multi-disciplinary programmes to achieve healthy environment for sustainable development.

4. Departmental Objectives

4.1. General Objectives

To train medical students with knowledge, attitude and skills required to function as basic doctors with empathy, compassion and love and who can effectively function as care providers, decision makers, communicators, community leaders and managers in the rural and urban settings

4.2. Specific Objectives

At the end of the course, the student shall acquire:

4.2.1. Knowledge

- To Identify the multi-factorial determinants and dimensions of health and disease, dynamics of community behavior and human society
- To understand the structure and process of the health care delivery system in India in general and Kerala in particular.
- To identify the health needs of the community in general and small vulnerable groups in particular.
- To understand the science of applied Epidemiology and Research tools for health promotion initiatives.
- To apply principles of Biostatistics to study the phenomenon of health and disease, and to draw conclusions and to formulate policies

4.2.2 Attitude

- To provide health care in an environment of love and compassion.
- To provide evidence based and need oriented health care.
- To see the 'man in disease' against 'disease in man'.
- To perceive health as part of total development.
- To work with community hand in hand with the various sectors.
- To work in rural, tribal and urban slum areas where the services are most needed.
- To give more emphasis on prevention thereby averting the need for expensive curative care.
- To disseminate the message that positive health can be achieved through life style modifications.
- To allocate resources efficiently and cost effectively and allocate resources on the basis of contribution to health promotion.

- To imbibe the concept of essential drugs and rational drug prescription.

4.2.3. Skills

The skills shall include, but not limited to:

- Basic clinical skills including essential nursing skills.
- First aid.
- Communication skills including group interaction skills.
- History taking skills • Listening skills
- Memorizing skills • Documentation skills • Use of essential drugs
- Use of Biostatistics and Epidemiological methods to study health and diseases.
- Application of appropriate technology in preventive and promotive services.
- Use of electronic media in primary health care.
- Research skills including protocol writing, project preparation, documentation and literature search, writing a scientific paper for publication etc.
- Low cost nutrition skills and diet planning.

Course Outcomes

CO1: Knowledge, attitude and skills required to function as basic doctors with empathy, compassion and love.

CO2: Ability to effectively function as care providers, decision makers, communicators, community leaders and managers in the rural and urban settings

CO3: Competency to deliver evidence based, need oriented Primary Health Care in the context of the prevailing socio-cultural settings.

CO4: Competency to identify community health problems, prioritize them and chalk out solutions with local resources and community participation.

CO5: Competency to communicate effectively and appropriately with people at large and patients and their family in particular.

CO6: Competency to collect, compile, analyze and interpret health related data for disease

surveillance using epidemiological and biostatistical principles.

CO7: Competency to give health education using appropriate tools and educational methods with special reference to national health issues.

CO8: Competency to implement, monitor and evaluate national health programmes.

CO9: Competency to undertake multi-disciplinary programmes to achieve healthy environment for sustainable development.

Curriculum Map

Semester	Nature of Academic Activity	Course Strength (in Contact Hours)			Frequency of the Activity	
		Interactive Lectures*	Community Exercises**	Total	Day	Time
S1	Interactive Lectures/Family/Community Exposure	30	30	60	Saturday (First 4 months)	8AM - 1PM
S3	Interactive Team Teaching	24		24	Tuesday	1 - 2 PM
S4	Interactive Team Teaching	24		24	Thursday	1 - 2 PM
S5	Interactive Team Teaching	16		16	Thursday	1 - 2 PM
S6	Interactive Team Teaching	24		24	Monday	1 - 2 PM
S7	Integrated Team Teaching	32		32	Wednesday	1 - 2 PM
R1 4 weeks in S4	Innovative community problem solving exercises & skills training		92	92	Daily	8AM - 12PM
R2 4 weeks in S6	Project work in Research Methodology and group exercise in BCC		92	92	Daily	8AM - 12PM

R3 4 weeks in S7	Communit y action programm es & Clinico social case study		92	92	Daily	8AM - 12PM
Total		150	306	456		

S1, S2– Semester ONE, Semester TWO

R1, R2....- FIRST clinical rotation, SECOND clinical rotation... etc.

* Interactive learning which includes, but not limited to group teaching by faculty and stu- dents tutors.

** Training in the department includes, but not limited to, family visits, seminars, symposia, group interactions in the community as well as in the class rooms, debates, brain storming ses- sions, skills learning, problem based learning, clinico-social case studies, epidemiological investigations, health delivery system and management disease surveillance, health mapping, participation in national health programmes, disaster management, health screening, school health, research projects, presentations/ discussions, updating, must know rapid revision, for- mative assessments, documentation, BCC group exercises etc.

5. Profile of the Syllabus of Community Medicine:

Sl No:	Topics	Strength in Contact Hour		
		Interactive Learning*	Community based problem solving exercises**	Total
1.	Concept of health and disease and community medicine	4	5	9
2.	Basic epidemiology and screening	5	10	15
3.	Bio statistics	7	15	22
4.	Demography and National Population Pol- icy	7	6	13
5.	Environment and Health including Medical Entomology	6	24	30
6.	Health Care Waste Management	2	2	4
7.	Disaster Management	3	4	7
8.	Communicable diseases and Non-Communicable diseases	18	15	33
9.	National health programmes	10	15	25
10.	Emerging and Re-emrging diseases	2	10	12
11.	Occupational Health	3	4	7
12.	Communication for health education	4	22	26
13.	RCH and MCH including fertility regulation	6	14	20
14.	Genetics including Human Genome Project	2	2	4
15.	Nutrition in Health & Disease	4	12	16
16.	Health planning, management & health economics including Panjayati Raj & National policies.	8	14	22

17.	Health care of the community including Mil- lennium development goals, Public health standards & Health care delivery system- public private sectors	12	16	28
18.	International Health	2	4	6
19.	Mental Health	2	4	6
20.	Geriatric Health care	2	4	6
21.	Health Legislations	2	2	4
22	Implementation of Health programs in the state level	2	2	4
23	Alternate Medicine - Role in National Health	1	1	2
24	Community dentistry , Community Nursing and Community Pharmacy	1	1	2
22.	Medicine and Social Sciences including Medico- Social and ethical issues in Healthcare	2	5	7
23.	Social security, Role of NGOs, CBOs and Social Welfare organizations	2	8	10
24.	Gender issues and women empowerment	3	4	7
25	Essential medicines & counterfeit medicines	1	3	4
26	Research Methodology and Project Work	2	20	22
27	Community Diagnosis and Management	4	40	44
28	Basic Clinical Skills and First Aid	5	20	25
29	Spiritual dimension of Health - Stress Management and Personality Development	2	2	4
30	Guest lectures, Integrated teaching, ' <i>Must know</i> ' revision, Updates in Community Medicine.	18	-	18
	Total Strength	154	310	464

Interactive learning which includes, but not limited to group teaching by faculty and students tutors.

** Training in the department includes, but not limited to, family visits, seminars, symposia, group interactions in the community as well as in the class rooms, debates, brainstorming sessions, skills learning, problem based learning, clinico-social case studies, epidemiological investigations, health delivery system and management disease surveillance, health mapping, participation in national health programmes, disaster management, health screening, school health, research projects, presentations/discussions, updating, must know rapid revision, formative assessments, documentation, BCC group exercises etc.

6. Academic Programmes

- 6.1. Special Care is taken to ensure that all academic sessions are conducted in a **stress free, student- friendly** environment.
- 6.2. All academic sessions (in-house as well as in the community), will be interactive, anchored to the learning objectives at the MUST KNOW level To facilitate this, learning objectives for each academic session is prepared (and maintained updated).
- 6.3. Periodic course evaluation and teaching evaluation are part of the academic programme Input from the students is respected and appropriate changes made.
- 6.4. Didactic lectures are minimized though not eliminated. Interactive
- 6.5. **team teaching** and learning through **student tutors**, are the main methods of teaching/learning
- 6.6. For all in-house academic activities, **white board** (which is the choice of the students) and OHP are often used. Computer and LCD is reserved for pictures, films/video- clippings, computer assisted learning (CAL), net based education etc.
- 6.7. Special care is taken to develop **skills** and **competencies** to solve problems in the community set up instead of overloading the students with theoretical knowledge. This includes exercises on applications of research methodology, applications of IT in medical education.
- 6.8. **Integrated teaching** (vertical and horizontal) with guests from appropriate department (in-house as well as extramural) are arranged as and when required.
- 6.9. Daily **documentation** of academic activities in the practical record is mandatory.
- 6.10. All **strategies**/modalities and gadgets available in the departments are used to facilitate learning in the class room as well as in the community. This includes, but not limited to

health news, health bits and health flash displayed in the wall bulletin, wall book, IEC materials in the museum, indigenously made skills training/health education film, flip charts flash cards etc.

- 6.10 For **health education** and **counseling** in the community, the students are encouraged to make their own health education materials. This is one of the important academic exercises on BCC strategies

7. Lectures

The curriculum map is prepared in such a way that lectures are minimized to less than 1/3rd of the total course strength. The traditional didactic lectures are replaced by interactive sessions through *group teaching* and *student tutor*. Primary focus shall be to facilitate the learning process that will help to develop the required skills and competencies needed to deliver Primary Health Care.

8. Integrated Teaching

Horizontal as well as vertical integrated teaching are conducted with in-house sister departments and extramural organizations (Government and Non Government) which are involved in the delivery of primary health care, implementation of National Health Programmes and/or running social welfare institutions.

9. Guest Lectures

Guest lectures are arranged by inviting guest faculties from sister departments of other Medical Colleges and/or other institutions as and when required. This will facilitate sharing of academic as well as strategic experiences.

10. Practicals

The curriculum are primarily oriented to the concept of community laboratory (as against the traditional hospital laboratory). As such, the training shall be residential. The practicals are designed to develop the skills and competencies required to deliver Primary Health Care to the rural as well as urban families. These skills shall include, but not restricted to, basic clinical skills, communication skills, management skills, problem solving skills, decision-making skills, health care documentation skills, Community health programmes (organization, implementation and evaluation) skills with special reference to National Health Programme, leadership skills, appropriate use of essential drugs skills, community based research skills etc.

11. Record of Academic Exercises

All academic exercises (in-house as well as extramural) are documented in the Comprehensive Record of Academic Exercises on a daily basis. The records are valued concurrently after each exercise by the faculty concerned. The aggregate score gained by the student, shall be computed out of 10, which shall be directly added to the internal assessment for practicals. (See computation of internal assessment)

Community based. Total Contact hours (S4 & S6)

184 hours

(Actions and/or participatory and/or observational learning and hands on exercises (at the rate of 4 hours per day (i.e. 8–12) for 4 weeks each during S4 & S6).

12. 2. THIRD TO SIXTH Semesters (S3 to S6) Methods of Teaching/Learning
Class room based. Total Contact hours (S3-S6) **88**

hours (Interactive group teaching / learning in the class room and/or small groups at the rate of one hour per week).

The traditional didactic lectures are minimized. **Team teaching** and **Student Tutor** concept is introduced. The students are encouraged to utilize the different types of **learning resource materials** like poster presentations, health news, wallpaper, health bits, wall book, album of action, museum and the department library.

There are two **sessional exams** officially scheduled by the Principal during this period of S3- S5. In addition, end of semester assessments shall also be conducted by the department using appropriate tools covering smaller portions. All assessments shall be designed to measure the problem solving skills of the students.

Course evaluation is done at the end of each semester. Appropriate changes are introduced based on the input received from the students.

Clinical rotations during S4 & S6

The students are posted in Community Medicine in groups of 15-20 for 4 weeks each during 4th & 6th semesters. Every day, the programme starts with innovative learning like reading **health news** followed by discussion. (this includes but not limited to articles on health and related topics appearing in the news papers, journals, internet etc.). Topic discussions on eminent personalities in the field of public health is also carried out. The daily activities/learning objectives achieved, are documented in the record on the same day. The major academic assignments during the clinical rotations of S4 and S6 are

- **R1 – Four weeks during 4th semester** (92 contact hours)

This is residential training. The students shall stay in the rural and/or urban field train-

ing centers. The main academic activities shall include but not limited to

1. Family studies – Community diagnosis and diet survey - Presentation
2. Nutrition - Basic concepts
3. Sociology – Basic concepts
4. Biostatistics - Basic concepts
5. Demography – basic concepts
6. Basic Clinical Skills Training
7. Entomology including field assignments
8. Visits to public health related institutions (Water treatment plant, sewage treatment- plant, biomedical waste management plant)
9. Hands on exercises in the Nutrition Skills Lab
10. Community interaction, identification and solving community health problem
11. BCC (IEC) strategies – individual & group assignments
- **R2 – Four weeks during 6th semester (92 contact hours)**
 1. Family studies – follow up – Community action programme
 2. Biostatistics – hands on exercises
 3. Search for Research Initiatives - Hands on exercise on Research Methodology with groups of 2 to 3 students undertaking a research study.
 4. Health indices – hands on exercises on collection and calculation
 5. Participation in health related activities in the community
 6. BCC / IEC Strategies

12. 3. SEVENTH Semester

Method of Learning/Teaching:

Classroom based -32 hours at the rate of 2 hours per week.

Integrated teaching with in-house as well as extramural departments related to public health, guest faculty from other Medical Colleges, rapid revision, problem based learning and related exercises, information update, presentation of research projects, recap assessments, model examination, question paper discussion, the learners choice etc.

Community based action oriented programmes (R3) 92 hours

The students are posted for 4 weeks during 7th semester every day 8-12

Highlights of R3 clinical rotation

- Epidemiological exercises
- Biostatistics and vital statistics.
- Clinico – social case studies
- Visit to Public Health Institutions implementing National Health Programmes
- Review of museum specimens, wall book, academic album, poster presentations etc.
- Objectively structured physical examination exercises.
- Review of current health issues and policies.

13. ASSESSMENT SYSTEM

13.1. Concurrent Assessment

13.1.1. The formal concurrent assessment of a student (in-house as well as community) shall start on the first day and ends with the last day in the department. All types of assessment tools shall be used for this. It shall be documented in the Register of Academic Performance of students maintained in the Department.

assessment (OSPE)/viva voce and /or any other tool developed by the department from time to time. The marks scored by the students in each assessment, is documented in the Register of Academic Performance of the students. All these marks shall be considered while computing the final internal assessment marks for theory and practical, which shall be forwarded to the University.

13.2. Formative assessment

13.2.1. Written

13.2.1.1. There will be **4 formal internal assessments** centrally scheduled by the Principal.

13.2.1.2. The 4th and the final assessment scheduled by the principal is a **model assessment** of the University examination pattern.

The students are given the chance to peruse their answer books after discussing the question papers and expected answers in the class. This gives a chance for the students for self assessment and improvement.

13.2.2. Practical Assessment

13.2.2.1. There shall be minimum one practical assessment at the end of every clinical rotation (i.e., R1, R2 & R3) utilizing different assessment tool.

13.2.2.2. In addition, there will be a formal practical assessment of the university pattern conducted along with the model assessment at the end of 7th semester.

13.2.2. Viva voce

There will be a viva voce conducted along with the model assessment. Each student shall be assessed separately by each examiner. Viva voce shall be structured as far as possible.

14. INTERNAL ASSESSMENT

14.1. Strength of internal assessment

The strength of internal assessment is 40 marks, divided equally into
Written and Practical **20**

14.2. Computation of Internal Assessment – Written

Marks scored for various written internal assessments:	20
TOTAL:	20

Marks scored for various written internal assessments is calculated as follows:

Best two of three internal assessments

Marks of model assessment under 13.2.1.2. are computed to **15** to which the marks (max **5**) awarded for viva voce under 13.2.2, shall be added to make the total 20 marks. This shall be presented to the University as the **Internal Assessment for Theory**.

14.3. Internal Assessment for Practicals:

Day-to-day community health activities/exercises done and documented in the Record (which starts in the beginning of the first semester and ends at the end of seventh semester) as mentioned under 13.1.1.	10 marks
Marks of end of rotation assessments (R1, R2 R3) and model examination is computed to	10 marks
Total Practical Marks	20 marks

The practical assessments shall include, but not limited to, Biostatistical exercise, epidemiological exercises, clinico-social/family case discussion, OSPE, identifications of specimens of public health importance. To this, *state-of-the-art* assessment tools to measure the skills/competencies are also applied. (see 16.5 for details).

15. UNIVERSITY EXAMINATION

16. 1. Number of written papers

There shall be two papers of three hours duration, each paper carrying 60 marks.

16.2. Distribution of topics for Theory

PAPER – I

1. Concepts of Health & Disease and Community Medicine.
2. Basic Epidemiology & Screening.
3. Biostatistics.
4. Mental Health.
5. Environment & Health including Medical Entomology.
6. Health care waste management.
7. Disaster management.
8. Communicable & Non communicable diseases and their National Health Programmes.
9. Emerging and Re-emerging diseases

PAPER – II

1. Demography.
2. RCH & MCH including fertility regulation.
3. Genetics including Human Genome Project.
4. Nutrition in Health & Disease.
5. Health Planning, Management & health Economics including Panchayati Raj & National policies.
6. Health care of the community including Millennium Development Goals, Sustainable development goals, Public health standards & Health care delivery system - public & private sectors.
7. International health.
8. Occupational health.
9. Geriatric Health care.
10. Health legislations.
11. Medicine and Social sciences.
12. Communication for Health Education.

16.3. Valuation of answer books

Valuation of answer books shall be as per the existing policy, rules and regulations of AVV.

16.4. Viva Voce

Each student shall be individually assessed by each of the four examiners. The evaluation shall be structured and shall primarily focus on the problem-solving competency of the candidate. (as against the traditional knowledge based assessment). Identification and discussion on specimens, models, charts, photographs, video clippings etc. are also included under viva voce.

The viva voce shall be conducted in an informal, student friendly environment. The marks awarded by each examiner shall be pooled and finally computed to 10.

16.5. Practical

There shall be six practical assessments bearing a total of 30 marks the distribution of which is shown below:

Practical I	Clinico-social	case/family	health	10marks
Practical II	discussion			3 marks
	Spotters			
Practical III	OSPE			3 marks
Practical IV	Epidemiological exercises			5 marks
Practical V	Statistical Exercise			5 marks
Practical VI	Project discussion			4 marks

Each practical shall be conducted separately.

16.6. Rounding off Marks

Rounding off marks shall be done to the final total only. For this purpose, decimals of

0.5 and above shall be rounded off to the next higher digit and decimals of less than 0.5 shall be rounded off to the next lower digit.

Reference Books

1. Park's Textbook of Preventive and Social Medicine
2. Textbook of Community Medicine- Sunder Lal
3. Introduction to Biostatistics & Research Methods- Sunder Das

MEDICAL INFORMATICS & TELE MEDICINE (U19MBB105)

Elective

Goals

The digital revolution has dramatically changed society, and India is at the forefront of this movement. For a variety of reasons, despite the enormous volumes of data generated in health care and the sometimes life-and-death nature of the field, healthcare systems and providers have been slow to adopt information technology as an adjunct to help them manage data to the best advantage. The broad goal of incorporating medical informatics and tele medicine in the undergraduate curriculum is to create in young physicians a solid understanding of how these important elements of information technology can help them in clinical practice and in maintaining their skills and knowledge while keeping in mind the principles of Evidence-based Medicine.

Objectives

Knowledge

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

- Understand basic computing functions.
- Appreciate the methodology for literature retrieval and analysis.
- Enhance skills in clinical practice through exposure to effective clinical simulation.
- Describe how informatics can help in public health.
- Obtain an exposure to practical aspects of Tele medicine.
- Describe the utilization, benefits and challenges of an Electronic Medical Record (EMR)

Skills

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

- Perform basic computer related tasks such as Internet, e mail and use of MS office applications.
- Retrieve literature using the Internet.
- Critically appraise literature using principles of Evidence-based Medicine.
- Demonstrate proficiency at basic clinical procedures like urinary bladder catheterization and ophthalmoscopy, as well as fundamental skills like clinical cardiac examination using simulation technology.
- Utilize an EMR system for retrieval of relevant clinical information

Integration

This course shall integrate with the skills learned by students in community medicine, general medicine and general surgery. It will also show students how elements of IT like Tele medicine and EMR can help in integrating the process of healthcare information capture and delivery of services.

Course Outcomes

CO1: Understanding of how information technology can help them in clinical practice.

CO2: Knowledge of the methodology for literature retrieval and analysis.

CO3: Skills in clinical practice through exposure to effective clinical simulation.

CO4: Knowledge of practical aspects of tele medicine.

CO5: Familiarity with Electronic Medical Record

Topic	Hours
Medical informatics	1hrs
Introduction to Health Informatics	
Medical databases	
Information filtering and information retrieval Dataware housing, data mining for public health care Remote sensing and geo graphical information system Standards in Hospital information system.	
Electronic Medical records	2hrs
Introduction to EMR	
Structure of a Hospital Information System (HIS) Advantages and disadvantages of EMR systems Decision support systems and Artificial Intelligence (AI) Principles of good medical documentation and communication skills.	
Medical Simulation	1hrs
Overview	
Case studies	
Tele Medicine	2hrs
Clinical application of Tele Medicine	
Choosing the right technology	
Ethical and legal aspects of telemedicine	
Future trends of telemedicine	
Scope, benefits, limitations of telemedicine development	

Textbooks Recommended

- 1) Introducing telemedicine by B.D Gupta
- 2) Computers in Medicine by R D Lele
- 3) Essentials of Telemedicine and Tele care by A C Norris
- 4) Clinical Research Methodology and Evidence-based Medicine: The basics by Ajit N Babu

SIMULATION BASED MEDICAL EDUCATION (U19MBB106)

Elective

Objective

Acquisition of clinical skills is an essential part of clinical medicine and plays quite an important role in the Medical education. Acquisition of skills has three stages. The first is learning by imitation. Second level is practice under guidance and the third is to practice independently and acquire proficiency. Traditional medical education is facing many challenges. There are few opportunities for the students to practice their clinical skills and their dexterities are generally at a low level. Medical simulation based education is a new teaching modality and helps to improve medical students' clinical skills to a large degree. Simulation is the modern technique to replace or amplify real experiences with guided experiences on mannequins. Medical simulation based education has many significant advantages. It is mainly dedicated to enhancing hands-on medical education performance assessment, evaluation, improving clinical and communication skills, assuring patient safety and quality of care.

Medical Council of India has suggested Clinical Skill labs mandatory for all Medical colleges in India.

Course Outcomes

CO1: Understanding the method of examination of Cardiovascular and Respiratory system. Skills like aspiration of pleural effusion, pneumothorax, pericardiocentesis etc.

CO2: Skill of palpation, incisions, suturing, intravenous and intramuscular injections, catheterization of male and female, examination of breasts, PR examination, and practice of minor surgical procedures.

CO3: Palpation identifying presentations and positions of the foetus, conduct of all types of deliveries, episiotomy, foetal heart monitoring, CPR of mother as well as the neonate, pervaginal and bimanual examination.

CO4: ATLS, Intubation and Lumbar Puncture. Emergency Stroke Management. ATLS, Intubation and Lumbar Puncture. Emergency Stroke Management.

CO5: ENT and Ophthalmology Examination.

CO6: BCLS and ACLS (with defibrillation)

Materials and Methods

Mannequins are artificial human body parts made up of silicon rubber and PVC, mimicking accurate anatomical structures. These mannequins can be fitted with electronic devices to produce normal /abnormal heart, lung and abdominal sounds. Palpation of abdomen to appreciate normal/abnormal liver, spleen, intestines, male and female pelvic organs and different positions of foetus. CPR mannequins are used in basic and advanced life support skills training. Various clinical conditions and scenarios can be programmed on these simulaids. It can be used to evaluate the performance of skills, especially for the Post Graduate students of Emergency medicine.

Simulaids are utilized for basic and advanced surgical skills, various non invasive procedures as well as different surgical operations. Students can engage in repetitive practice with increasing levels of difficulty. Students can repeatedly practice skills to acquire proficiency.

The simulaids with programmed clinical conditions to conduct undergraduate and postgraduate practical examinations instead of live patients.

The following Simulation Stations with mannequins can be used for the following teaching/ learning programmes:

I. General Medicine: Examination of Cardiovascular and Respiratory system with provision for detecting pneumothorax etc. With the help of Simulaids aspiration of pleural effusion, pneumothorax, pericardiocentesis etc. can be practiced.

II. Surgery: Simulaids can be used for acquiring basic surgical skills such as palpation of normal viscera, making incisions and putting sutures, practicing intravenous and intramuscular injections, catheterization of male and female and examination of breasts. PR examination, examination of prostate and practice of minor surgical procedures.

III. Obstetrics & Gynecology: Palpation of abdomen for identifying various presentations and positions of the foetus inside the uterus can be practiced with the help of mannequins. Simulaids also help in practicing the conduct of all types of deliveries including normal delivery, breech and other abnormal presentations and obstructed labour. Episiotomy can be practiced in the mannequins. Foetal heart can be monitored with provision for CPR of mother as well as the neonate. Simulaids also help in learning all pathological conditions of the uterus and fallopian tubes by pervaginal and bimanual examination.

IV. Paediatrics: With the help of baby mannequins intravenous and intramuscular injections can be practiced. Neonatal baby care can also be practiced with the help of simulaids.

V. Orthopedic procedures: joint examinations, intra articular injections, arthroscopy.

VI Trauma mannequins. These mannequins are used for administration of first aid and performing different types of bandaging. ATLS can be practiced.

VII. ENT : Various ENT examinations can be practiced with simulaids. Different conditions of the tympanum can be visualised through the autoscope.

VIII- Emergency Medicine /Anaesthesia : Intubation and Lumbar puncture.

VIII. Intensive Care Unit set up: With Adult CPR mannequins for cardiopulmonary resuscitation with monitors , provision for creating artificially various cardiac conditions. For BCLS and ACLS training (with defibrillation facilities).

PHASE II

Semester III, IV and V

The students who pass the Phase I Subjects are permitted to enter the Phase II; which extends to semesters III, IV and V. The subjects taught in this Phase are Pathology, Microbiology, Pharmacology and Forensic Medicine, Community Medicine which extends up to semester VII is also dealt within phase II. These subjects are generally called Para clinical subjects.

During this phase, the students get exposure to clinical subjects like General Medicine, General Surgery, Obstetrics & Gynaecology, Paediatrics, Psychiatry, Radiology, Dermatology, Pulmonology, Orthopaedics, Ophthalmology, Otorhinolaryngology, Anaesthesiology and Dentistry. Every forenoon, the first hour is devoted for clinical lectures. The remaining hours are devoted for clinical teaching. The student will be posted to various clinical units, outpatient departments, emergency departments, operation theatres, clinical laboratories.

Subject	Lecture Hrs	Practical/ Clinical	Innovative Sessions	Total
Pharmacology	106	128	86	320
Pathology	100	100	104	304
Microbiology	80	80	80	240
Forensic Medicine	34	20	50	104
Community Medicine	64		192	256

There will be three internal assessment examinations for the Phase II subjects. The final internal examination will be conducted during the 1st week of fifth month of semester V. The 2nd Professional University examination will be held in the first week of sixth month of semester V.

PATHOLOGY (U19MBB201)

1. Goal

:

The goal of teaching pathology is to provide undergraduate students comprehensive knowledge of the causes and mechanisms of disease, in order to enable them to achieve complete understanding of the natural history and clinical manifestations of the disease.

2. Competencies:

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Understand the various processes and their mechanisms which govern general pathology.
- Apply their knowledge of mechanisms to disorders arising in the major organ systems.
- Understand the epidemiology, gross and microscopic features, as well as the presentation, the natural history and complications when untreated.
- Understand the basic pathology in blood disorders, identify and interpret the tests.
- Apply knowledge of disease mechanisms and processes to the unique patient at hand in the clinicopathological correlations.
- Identify, perform and interpret the different diagnostic tests in clinical pathology.
- Understand the basics of transfusion medicine to enable him/her to perform basic tests, order appropriate blood products and recognize laboratory support in adverse reactions.
- Know how to perform autopsy and correlate the various pathology in different organ systems in order to provide cause of death.
- Be aware of the newer advances in pathology and their applications in relation to important diseases
- Be able to engage in group learning, peer teaching and understand the value of working effectively in a multi disciplinary team meeting.

3. Educational Objectives:

a. Knowledge:

At the end of one and half years, the student shall be able to:

- Describe the structure and ultrastructure of a sick cell, the mechanisms of the cell degradation, cell death and repair. And be able to correlate structural and functional alterations in the sick cell.
-
- Explain the pathophysiological processes which governs the maintenance of homeostasis, mechanism of their disturbances and the morphological and clinical manifestation associated with it.
- Describe the mechanisms and patterns of tissue response to injury to appreciate the pathophysiology of disease processes and their clinical manifestations.
- Correlate the gross and microscopic alterations of different organ systems in common diseases to the extent needed to understand disease processes and their clinical significance.
- Develop an understanding of neoplastic change in the body in order to appreciate need for early diagnosis and further management of neoplasia.
- Understand mechanisms of common haematological disorders and develop a logical approach in their diagnosis and management.

b. Skills:

At the end of one and half years, the student shall be able to:

1. Describe the rationale and principles of technical procedures of diagnostic laboratory tests.
2. Interpret diagnostic laboratory tests and correlate with clinical and morphological features of diseases.

3. Perform simple bedside tests on blood, urine and other biological fluid samples.
4. Draw a rational scheme of investigations aimed at diagnosing and managing common disorders.
5. Recognize morbid anatomical and histopathological changes for the diagnosis of common disorder.

c. Attitude: At the end of one and half years the student develops an ability to integrate the causes, mechanisms of disease, biobehavioural and clinical sciences to analyse and solve problems related to the diagnosis, treatment and prevention of diseases.

4. Teaching hours:

Total duration of teaching of Pathology is 300 hours in 3 Semesters of III, IV and V put together.

Distribution of Teaching Hours:

- A. Theory (Didactic lectures, Symposiums) 140 hrs.
- B. Practicals -100 hrs.
- C. Clinical Pathology -40hrs
- D. Revisions - 20hrs.

5. Syllabus:

The Broad area of study shall be:

- I. General Pathology
- II. Systemic Pathology
- III. Haematology
- & IV Clinical Pathology

Course Outcomes

CO1: Comprehensive knowledge of the causes and mechanisms of disease.

CO2: Understanding of the various processes and their mechanisms which govern general pathology and the ability to apply the knowledge to disorders arising in the major organ systems.

CO3: Knowledge of the epidemiology, gross and microscopic features, as well as the presentation, the natural history and complications of diseases when untreated.

CO4: Knowledge of the basic pathology in blood disorders, identify and interpret the tests.

CO5: Application of the knowledge of disease mechanisms and processes to the unique patient at hand in the clinicopathological correlations.

CO6: Competency to identify, perform and interpret the different diagnostic tests in clinical pathology.

CO7: Knowledge of the basics of transfusion medicine to enable him/her to perform basic tests, order appropriate blood products and recognize laboratory support in adverse reactions.

CO8: Knowledge of how to perform autopsy and correlate the various pathology in different or- gan systems in order to provide cause of death.

CO9: Awareness of the newer advances in pathology and their applications in relation to important diseases

I GENERAL PATHOLOGY :

1. Cell Injury:

Must know: Causes and mechanisms of cell injury.
Responses to cell injury-Adaptations,
Reversible, Intracellular accumulations.
Irreversible: Necrosis Apoptosis; Gangrene;
Free radical injury & ischemia-Reperfusion injury and
antioxidants Pathological calcification.

Desirable to know: Subcellular changes in reversible injury,
Autophagy Necroptosis & Pyroptosis Telomeres
and cellular aging

2. Inflammation & Repair:

3.

Must know: Define and describe causes, features, vascular and cellular events,
morphological types, Chemical mediators & fate of acute inflammation
Definition, causes and features of Chronic inflammation;
Granulomatous inflammation. & Granulation tissue;
Regeneration and Repair; Wound healing by primary and secondary in-
tention; Fracture healing; Factors promoting and delaying the process and
com- plications Systemic effects of Inflammation.

Desirable to know: Neutrophil Extracellular Traps; Defects in leukocyte
function

4. Hemodynamic Disorders:

Must know: Edema –Pathogenesis and types ;Exudate and Transudate.
Hyperemia & Congestion; CVC Lung, liver and spleen
Thrombosis –etiopathogenesis, morphology effects and fate of
throm- bosis Embolism & infarction :Definition, types of
embolism & infarction; morphological changes and clinical
significance
Shock: Define, classify, understand pathogenesis, stages &
morphologi- cal changes in shock

5. Genetic disorders:

Must know: Normal karyotype, classification of genetic disorders,
inheritance pat- tern of non-Mendelian disorders; Down's
syndrome, Klinefelter's syndrome, Turner's syndrome; Marfan's;
Gaucher, Nieman Pick, Meth- ods of disease diagnosis
including FISH, PCR

Desirable to know: Glycogen storage disorders; Other Lysosomal storage disorders, Single gene disorders; genomic imprinting; Microarray.

6. Immunopathology:

Must know: Hypersensitivity reactions; Autoimmune diseases-SLE; Amyloidosis; AIDS-Pathogenesis, investigations, infections & malignancy associated.

Desirable to know: Immunodeficiency syndromes. Transplant rejection; GVHD.

7. Neoplasia:

Must know: Definition, Nomenclature and classification; differentiate benign from malignant Neoplasms; Hallmarks of cancer; Precancerous conditions; Carcinogenesis-etiological agents & steps involved in chemical carcinogenesis; by radiation & microbial agents
Metastasis, grading and staging
Molecular basis of cancer –Oncogenes, Proto-oncogenes, Tumour suppressor genes
Anti-apoptotic genes; Oncoproteins; Paraneoplastic syndromes; Lab diagnosis of tumours.

Desirable to know: Carcinogenesis by hereditary & occupational causes. Genomic instability; Epigenetics; Tumour immune surveillance and cancer Knudson's theory

8. Infectious diseases:

Must know: TB, Leprosy, Typhoid fever, Syphilis. Histoplasmosis, Actinomycosis, Fungal diseases – Aspergillosis, Candidiasis, Mucormycosis & opportunistic infections, Malaria, Filariasis, Amoebiasis, Rhinosporidiosis, Herpes, Measles, CMV, EBV.

9. Environmental and Nutritional diseases:

Must know: Radiation injury, air & food pollution, PEM, Vitamin & Zinc deficiency disorders,

Desirable to know: Obesity

10. Diseases of Infancy & Childhood:

Must know: Cystic fibrosis, Hyaline membrane disease; fetal hydrops; Malignant tumours- Neuroblastoma, Nephroblastoma, Retinoblastoma.

Desirable to know: Congenital anomalies; Prematurity

II. Hematopathology:

Must know: **RBC:** Hematopoiesis, Anemia and its classification, iron deficiency anemia; Megaloblastic anemia, Hemolytic anemia- classification, workup, Thalassemia, Hereditary spherocytosis, SCA, AIHA; Aplastic anemia. **WBC:** Leukocytosis, Leukopenia, Leukemoid reaction, Acute and chronic leukemias; Multiple myeloma, Myeloproliferative disorders: Polycythemia & myelofibrosis Hemostatic disorders: Platelet deficiency, ITP Coagulation disorders: Hemophilia, DIC

Desirable to know: MDS, G6PD deficiency, PNH, TTP/HUS, MAHA, Hairy cell leukemia.

III Systemic Pathology:

11. CVS:

Must know: Atherosclerosis; Hypertension; vasculitis, aneurysms, vascular tumours Ischaemic heart disease; Rheumatic heart disease: Infective endocarditis, Differential diagnosis of cardiac vegetations; Heart failure.

Desirable to know: Congenital heart disease; Cardiomyopathies; Cardiac tumours; Pericardial disease;

12. Renal and Urinary Tract Pathology:

Must know: Structure of glomeruli, renal function tests & urine analysis, Glomerulonephritis –Primary proliferative and non proliferative, Sec- ondary (SLE, Amyloidosis, Diabetes) Nephrotic syndrome and the nephritic syndromes Pyelonephritis , reflux nephropathy, Nephrolithiasis & obstructive nephropathy Cysts of the kidney; Renal failure; Acute tubular injury; Tumours of Kidney and Pelvis

Desirable to know: Hypertensive renal disease; Thrombotic microangiopathies, drugs and toxins causing renal injury.

13. GIT:

Must know: Precancerous lesions and carcinoma of Oral cavity; Salivary gland tu- mours. GERD ; Ca oesophagus. Gastritis, Peptic Ulcer, Carcinoma stomach, Ulcers of Intestines- Typhoid, tubercular, amoebic ulcers and bacillary dysentery. Ulcerative colitis and Crohn's; Appendicitis; Intestinal polyps; malabsorption syndromes-coeliac disease, Whipples Carcinoma colon; GI stromal tumours.

Desirable to know Odontogenesis cysts and tumours; Hirschsprung disease; Tumours of the appendix

14. Liver and Gall Bladder:

Must know: Jaundice; Viral Hepatitis; NASH; Alcoholic liver disease; Cirrhosis.

Gall bladder: Cholecystitis, cholelithiasis and tumours Hepatocellular carcinoma.

Desirable to know Wilson's disease, Hemochromatosis, Portal hypertension, Autoim- mune hepatitis, primary biliary cirrhosis, primary sclerosing cholangitis Autoimmune hepatitis. Tumours of exocrine and endocrine Pancreas.

15. MGS and Lower Urinary Tract:

Must know: . Cryptorchidism; Tuberculous epididymo orchitis, Tumours of testis Benign prostatic hyperplasia; Carcinoma Prostate and urinary bladder; Carcinoma Penis

Desirable to know Congenital anomalies of MGS; Malakoplakia; Prostatitis, Metaplas- tic lesions of bladder.

7. FGS and Breast:

Must know: Carcinoma Cervix; Carcinoma Uterus; Leiomyoma; Endometriosis and adenomyosis.

Tumours of Ovary; Complete and Partial Hydatidiform mole; Chorio- carcinoma, Fibroadenoma, Phyllodes tumour, & Carcinoma breast

Desirable to know: Tumours of Vulva and Vagina; Pagets disease of Vulva; Endo- metrial polyps & hyperplasia; PCOD; PID

18. Endocrine system:

Must know: Diffuse & multinodular goiter; Hashimoto's thyroiditis; Grave's disease; carcinoma of thyroid
Diabetes mellitus
Parathyroid hyperplasia and tumours
Pheochromocytoma ; Cushing's syndrome

Desirable to know Addison's disease; MEN syndromes; Pituitary adenomas;
Prolactinoma

19. Bones Joints and Soft Tissue Pathology:

Must know: Osteomyelitis-acute chronic, tuberculous,
Rickets/osteomalacia; Osteoporosis; Paget's disease, Rheumatoid arthritis,
Osteoarthritis & Gout
Bone tumours - Osteosarcoma, Osteoclastoma, Ewing's sarcoma; Plasmacytoma
Soft tissue tumours -Lipoma, Neurofibroma, Schwannoma, Hemangioma

Desirable to know: Fibrous dysplasia; Aneurysmal bone cyst;
Osteochondroma; Chondrosarcoma ; Synovial sarcoma;

20. Lymphoreticular System:

Must know: Common causes of lymphadenopathy and Splenomegaly
Hodgkin's lymphoma-classification, morphology and staging
Non Hodgkin's lymphoma: classification ,Lymphoblastic, Burkitt's, DLBCL, Follicular
Mycosis fungoides, Sezary syndrome

Desirable to know: Anaplastic large cell lymphoma; Hypersplenism, Thymomas

21. CNS:

Must know: Inflammatory disorders: various types of Meningitis, brain abscess, Tuberculoma
WHO classification of brain tumours; Gliomas, Meningioma Cerebrovascular disease: atherosclerosis, thrombosis, embolism, aneurysm, hypoxia, infarction, hemorrhage;
Alzheimer's disease

Desirable to know: Degenerative brain disease

22. Dermatopathology:

Must know: Psoriasis, Lichen planus , Skin tumours: SCC, BCC, Nevus, Malignant melanoma

PRACTICAL:

Practical classes will have slide/specimen discussion along with clinicopathological correlation (CPC) discussions at the end of each chapter. The list of histopathology slides and specimens shown to them are given below.

Histopathology slides:

1. Fatty liver 2. Monckebergs sclerosis 3. Hyaline change 4. Coagulative necrosis 5. Fat necrosis 6. Acute appendicitis 7. Osteomyelitis 8. TB intestine 9. TB lymphnode 10. FB granuloma 11. Tuber- culoid leprosy 12. CVC lung 13. CVC spleen 14. Amyloid kidney 15. Lipoma 16. Squamous cell papilloma 17. Fibroadenoma breast 18. Capillary hemangioma 19. Cavernous hemangioma 20. Se- rous cystadenoma 21. Benign cystic teratoma 22. Leiomyoma 23. Actinomycosis 24. Rhinosporidi- osis 25. Atheroma 26. Pneumonia 27. Pleomorphic adenoma 28. Signet ring cell carcinoma stom- ach 29. Adenocarcinoma colon 30. Cirrhosis liver 31. Chronic pyelonephritis 32. Nephroblastoma 33. Renal cell carcinoma 34. Transitional cell carcinoma 35. Seminoma 36. Colloid goitre 37. Hashimoto's thyroiditis 38. Papillary carcinoma thyroid 39. Hodgkin's disease 40. Secondaries lymphnode, 41. Squamous cell carcinoma 42. Basal cell carcinoma 43. Malignant melanoma 44. Os- teosarcoma 45. Osteoclastoma 46. Meningioma 47. Schwannoma

Gross specimens:

1. Stones. 2. Staghorn calculi. 3. Acute Appendicitis. 4. Acute cholecystitis. 5. TB lymphnode. 6. Gangrene intestine 7. Gangrene foot 8. CVC spleen 9. Infarct spleen 10. Hydatid cyst 11. Li- poma 12. Ca..Larynx 13. Cavity lung 14. Carcinoma lung 15. FAP colon 16. Amoebic ulcer colon 17. Carcinoma colon 18. Cirrhosis liver 19. Polycystic kidney 20. Renal cell carcinoma 21. Carci- noma bladder 22. Malignant melanoma 23. Ca penis 24. Serous pap. cyst adenoma, ovary 25. Tera- toma ovary 26. Leiomyoma uterus. 27. Carcinoma cervix 28. Carcinoma uterus 29. Fibroadenoma breast 30. Ca breast 31. MNG-thyroid. 32. Osteosarcoma 33. Osteoclastoma.

Haematology Slides:

1. Neutrophil 2. Eosinophil 3. Iron deficiency anemia 4. CML 5. AML 6. Normoblast 7. Sick cell 8. LE cell 9. Plasma cell 10. Malarial parasite 11. Megakaryocyte 12. Spherocyte 13. Elliptocyte. 14. Target 15. Acanthocyte 16. Burr cell

Charts:

1. Iron deficiency anemia 2. Megaloblastic anemia 3. Haemolytic anemia 4. Thalassemia 5. Sick cell anemia 6. Acute leukemia 7. AML-M4 8. CML 9. Obstructive jaundice 10. Haemolytic jaundice 11. Hemophilia 12. CSF- bacterial meningitis 13. CSF -viral meningitis 14. CSF -TB meningitis 15. Acute glomerulonephritis 16. Nephrotic syndrome 17. GTT 18. Semen analysis

Instruments:

1. LP needle 2. BM needle 3. Liver biopsy (trucut) needle 4. Albuminometer 5. L block

6. Block holder 7. Cassette 8. Ayre's spatula 9. Paraffin block 10. FNAC model 11. ESR tube 12. RBC pipette 13. WBC pipette 14. Counting chamber 15. PCV tube 16. HB pipette 17. Urinometer

18. Automatic Tissue Processor

AUTOPSY:

To study and describe two autopsy reports.

DETAILS OF PRACTICALS (100 hrs)

General Pathology, Haematology, Clinical Pathology and Systemic Pathology. The practical classes include.

1. Gross specimens
2. Microscopic slides for identification
3. Identification of instruments with their uses
4. Discussion on charts
5. Peripheral smear- staining and reporting of the given smear
6. Hb estimation and blood group examination
7. Total WBC count and PCV estimation
8. Routine urine examination including Microscopic examination
9. ESR estimation from the given sample of blood

The student has to write clinical pathology, histopathology, Post Mortem findings of 2 cases in record. Clinical Pathology Posting for 15 days will be set apart, where the students will be posted to the different labs.

Distribution of Marks for University Examination:

Theory Paper I	Theory Paper II	Practical	Viva voce	Total
40	40	25	15	120

University Examination

Theory:

Division of topics:

Paper I- General Pathology, Hematology and Clinical Pathology

Paper II-Systemic Pathology

Each paper will have 2 sections- Section-A & Section –B (see model question papers on pages 177 & 178)

Practicals:

1. Spotters at 20 stations which include histopathology & haematology slides, instruments, charts, gross specimens, urine and haematology tests.
2. Peripheral smear preparation and staining
3. Peripheral smear reporting
4. Blood grouping
5. WBC count/Hb estimation

Evaluation of Practicals:

Spotters (20) 20x2	Peripheral Smear Preparation & Staining	Reporting of Peripheral Smear	Blood Grouping	Hb/ WBC Estimation	Urine Analysis	Record	Total Score	Total Marks
40	10	10	10	10	10	10	100	25

Viva voce: All examiners will individually assess each candidate. It is conducted at 4 stations covering all the topics in Hematology, Clinical Pathology, General Pathology and Systemic Pathology.

Textbooks Recommended

1. Pathological basis of disease. - Robbins and Cotran
2. General and systemic Pathology – JCE Underwood
3. Clinical Haematology in medical practice – De Gruchy- Livingston
4. Hematology - Dr. Tejinder Singh
5. Textbook of pathology by Dr. Harsh Mohan
6. Preparatory manual of Pathology for undergraduate students by Dr. Ramdas Naik
7. Text book of Hematology and clinical Pathology by Dr. Ramdas Naik

MICROBIOLOGY (U19MBB202)

Goal

The broad goal of teaching undergraduate students in Microbiology is to provide an understanding of the natural history of infectious disease in order to deal with etiology, pathogenesis, laboratory diagnosis, treatment and control of infections in the community.

Competencies:

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies.

- To describe the morphology of bacteria.
- To demonstrate the various methods of sterilisation practiced in the microbiology laboratory.
- To interpret the various antigen antibody reactions
- To identify various hypersensitivity reactions.
- To diagnose Mycobacterium tuberculosis infection using laboratory techniques.
- To diagnose the syphilis using laboratory techniques.
- To diagnose MRSA infection using laboratory techniques.
- To diagnose Hepatitis B using laboratory techniques.
- To diagnose HIV using laboratory techniques.
- To diagnose intestinal parasitic infections using wet mount of stool.

Objectives

The objective of teaching medical microbiology is to enable the student to understand the natural history of infectious diseases in order to deal with the etiopathogenesis, laboratory diagnosis and

control of infections in the community and the hospital set up as well..

Knowledge:

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

- State the infective micro-organisms of the human body and describe the host parasite relationship;
- List pathogenic micro-organisms (bacteria, viruses, parasites, fungi) and describe the pathogenesis of the diseases produced by them.
- State or indicate the modes of transmission of pathogenic and opportunistic organisms and their sources, including insect vectors responsible for transmission of infection;
- Describe the mechanisms of immunity to infections;
- Acquire knowledge on suitable antimicrobial agents for treatment of infections and scope of immunotherapy and different vaccines available for prevention of communicable diseases;
- Apply methods of disinfection and sterilization to control and prevent hospital and community acquired infections;
- Recommend laboratory investigations regarding bacteriological examination of food.

Skills:

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

- Plan and interpret laboratory investigations for the diagnosis of infectious diseases and to correlate the clinical manifestations with the etiological agent.
- Identify the common infectious agents with the help of laboratory procedures and use antimicrobial sensitivity test to select suitable antimicrobial agents;
- Perform commonly employed bed-side tests for detection of infectious agents such as blood film for malaria, filarial, gram staining and Acid Fast Bacilli (AFB) staining and stool sample for ova cyst etc.;
- Use the correct method for collection, storage and transport of clinical material for microbiological investigations.

Course Outcomes:

CO1: Knowledge of the natural history of infectious disease in order to deal with etiology, pathogenesis, laboratory diagnosis, treatment and control of infections in the community.

CO2: Competency to demonstrate the various methods of sterilisation practiced in the microbiology laboratory.

CO3: Competency to interpret the various antigen antibody reactions.

CO4: Competency to identify various hypersensitivity reactions.

CO5: Competency to diagnose Mycobacterium tuberculosis infection using laboratory techniques.

CO6: Competency to diagnose the syphilis using laboratory techniques.

CO7: Competency to diagnose MRSA infection using laboratory techniques.

CO8: Competency to diagnose Hepatitis B using laboratory techniques.

CO9: Competency to diagnose HIV using laboratory techniques.

CO10: Competency to diagnose intestinal parasitic infections using wet mount of stool.

Teaching Hours

Lecture	Practical	Innovative Sessions	Total
80	80	80	240

Schedule of Lectures

Topic	Hours
General microbiology (12 hours)	
1 Introduction to Microbiology	1
2 Morphology & physiology of bacteria	2
3 Culture media, identification of bacteria	1
4 Sterilization & disinfection	2
5 Bacterial genetics and drug resistance	3
6 Molecular methods in lab diagnosis	1
7 Antibacterial agents & antibiotic sensitivity tests	1
8 Infection	1
Immunology (17 hours)	
1 Introduction , classification of immunity cells involved in immunity	1
2 Antigen	1
3 Antibody	1
4 Antigen- Antibody reactions	2
5 Structure and functions of Immune system	2
6 Immune response	2
7 Complement in health & disease	1
8 H L A antigens in health & disease	1
9 Autoimmunity	1
10 Tumour & transplantation immunity	1
11 Immunodeficiency diseases	1
12 Immuno hematology	1
Systematic Bacteriology (30 hours)	
1 Staphylococci	1
2 Streptococci	1
3 Pneumococci	1
4 Neisseria	1
5 Coryne bacterium	1
6 Mycobacteria	1
7 Bacillus	1

8	Clostridia	2
9	Nocardia and Actinomycetes	1
10	Nonsporing anaerobes	1
11	Enterobacteriaceae	3
12	Hemophilus & Bordetella	1
13	Brucella	1
14	Yersinia , Pasteurella & Francisella	1
15	Pseudomonas	1
16	Vibrio and campylo bacter	2
17	Listeria and Legionella	1
18	Spirochaetes	3
19	Leptospira	1
20	Mycoplasma	1
21	Rickettsiae	1
22	Chlamydiae	1
23	Miscellaneous	1
	Virology (20 hours)	
1	General characteristics of viruses & cultivation	1
2	Virus host interactions, Replication of virus, Interferons	1
3	Diagnosis of viral infections , Bacteriophage	1
4	Poxviruses Adenoviruses & Herpesviruses	2
5	Picorna Viruses	1
6	Myxoviruses	3
7	Arboviruses	2
8	Hepatitis viruses	3
9	Slow Viruses	1
10	Miscellaneous Viruses	1
11	Human Immunodeficiency Virus	2
12	Rhabdoviruses	1
13	Retroviruses & Oncogenic Viruses	1
14	Henipavirus	1
	Mycology (5 hours)	
1	Introduction classification & Lab. Diagnosis	1
2	Superficial fungal infections	1
3	Sub cutaneous fungal infections	1
4	Deep mycotic infections	1
5	Opportunistic fungi	1
	Parasitology -19	
1	Introduction to parasitology	1
2	Entamoeba	1
3	Free living amoebae	1
4	Flagellates – Intestinal and Genital	1
5	Hemoflagellates - Leishmania	1
6	Hemoflagellates -Trypanosoma	1
7	Plasmodium & Babesia	2

8	Toxoplasma & Balantidium coli	1
9	Intestinal coccidian parasites & Microsporidia	1
10	Cestodes	2
11	Trematodes	2
12	Intestinal Nematodes I – Trichuris, Enterobius, Strongyloides	1
13	Intestinal Nematodes II – Ascaris and Trichinella	1
14	Intestinal Nematodes II – Hookworm and Larva Migrans	1
15	Tissue nematodes - Filarial Nematodes I	1
16	Filarial Nematodes II and Dracunculus	1

Applied Microbiology (4 hours)

1	Infection control practices	1
2	Healthcare associated infections	1
3	Bacteriological analysis of food, water, milk & air	1
4	Disposal of Hospital waste	1
5	Selection of Antimicrobials based on culture and sensitivity	1

Integrated learning (4 hours)

1 Horizontal integration (3rd semester)

Topic: Hypersensitivity reactions

2

Departments involved: Microbiology, Pathology and Pharmacology

2 Vertical integration(4th semester)

Topic: Tuberculosis

Departments involved: Anatomy, Microbiology, Pathology, Pharmacology, Medi- 2

cine, Surgery (30 minutes for Microbiology and Pathology, 15 minutes for other

Schedule of Practicals

1	Microscopy	1
2	Staining methods	1
3	Simple staining	1
4	Gram staining	4
5	Culture media and culture methods	1
6	Identification of bacteria	1
7	Sterilization & Disinfection	1
8	Ziehl-Neelsen staining	4
9	Lacto phenol cotton blue mount for fungi-demonstration	1
10	Parasitology – demonstration of ova/cyst in stool	1
11	Hanging drop preparation demonstration	1
12	Spotters- Structured exercises - Covering all sections	5
13	Antibiotic sensitivity test	1
14	Antigen Antibody reactions	1

Applied Microbiology/ Clinical Microbiology (Demonstration cum practical) 56hrs

1	Collection & despatch of specimens	1
2	Oropharyngeal infection	2
3	Wound infections	2
4	Respiratory tract infections	1
5	Meningitis-Pyogenic/fungal	1
6	Gastrointestinal infections	2
7	Urinary tract infections	1
8	Urethritis	1
9	Aseptic meningitis & encephalitis	2
10	Blood culture techniques	1
11	Equipments/ Instruments (Lab visit)	1
12	Interpretation of lab results	1
13	Pyrexia of Unknown Origin	1
14	Zoonotic infections	1
15	Sexually transmitted diseases	1
16	Tuberculosis	1
17	Vector borne diseases	2
18	Blood borne infections	2
19	Bone and joint infections	1
20	Infections of eye and ear	1
21	Congenital infections	1
22	Immuno prophylaxis & immunotherapy	1
	Revision -Seminar/Formative evaluation/Practical tests	30

Distribution of Marks for Internal Assessment and University Examination

University Examination					Internal Examination		
Theory I	Theory II	Practical	Viva voce	Total	Theory	Practical	Total
40	40	25	15	120	15	15	30

Internal Assessment

Internal assessment consists of internal assessment examinations and continuous evaluation during the course. Continuous evaluation during the course includes practical record book maintenance, performance in theory and practical tests, evaluation of student assignment etc. Three theory internal assessment exams & one practical internal assessment exam will be conducted. Practical internal assessment exam will be conducted after the third theory internal assessment as part of the third internal assessment.

The first & the second theory internal assessment examinations will be conducted in the afternoons of the last week of semesters III and IV as examination week and the third internal assessment (theory & practical) just before the University Examination.

The duration of the first and second internal assessment examinations will be of two hours each and the question paper pattern will be same as university examination. The third theory internal assessment examination will have 2 papers and will be conducted in the actual pattern of the University Examination. Of the consolidated theory internal assessment marks, 50% may be based on the last internal assessment examination and the rest 50% based on the first & the second internal assessment examinations and continuous evaluation during the course. Weightage for the continuous evaluation during the course should be 20% of the total marks in the subject.

University examination:

Theory:

There will be two papers – Paper I and Paper II Examination is to be conducted on two days. Duration of each Paper will be of two hours. Each Paper carries a total of 40 marks.

Paper I includes General Bacteriology, Systematic Bacteriology and Immunology.

Paper II includes Virology, Parasitology, Mycology, & Clinical

Practical:

Practical examination will be conducted in the laboratory. The objective of this examination is to assess the proficiency in the conduct of experiment, interpretation of data and logical conclusion. Structured evaluation will be done, 25 marks are to be allotted for practical examination. The exercises will be in the following pattern:

- I. Two staining techniques. Gram staining and Ziel Neelsen staining of clinical material. (5+5=10 marks)

(For each exercise above: Skill – 2 marks, Diagram – 1 mark, Interpretation – 2 marks)

- II. Clinical Case – A case scenario with 4 to 5 relevant exhibits (culture plates/ photographs/charts/serological test) are placed along with a series of questions. (5 marks)

III. 10 spotters-Structured exercises (Covering all topics as far as possible)
(10x1=10 marks)

e.g.- Gram stained smear of organisms, grown anaerobically on BA. Aerobic plate has no growth

What is the organism likely to be?

Mention one or more infections it can cause? What is the drug of choice?

Viva voce

Four examiners will individually examine and assess each candidate. Marks will be divided among the examiners.

Textbooks Recommended

Prescribed Books (Latest Edition):

1. Textbook of Microbiology – R. Ananthanarayanan & C.K. Jayaram Panicker
2. Essentials of Medical Microbiology- Apurba Sankar Sastry/Sandhya Bhat K
3. Textbook of Medical Parasitology – by C.K. Jayaram Panicker
4. Essentials of Medical Parasitology - Apurba Sankar Sastry/Sandhya Bhat K
5. Medical Microbiology - Jawetz, Melnick & Adelberg's

Reference Books

1. Basic Immunology : Functions and Disorders of the Immune System By Abdul K Abbas/ Andrew Lichtman/ Shiv Pillai
2. Textbook of Immunology by Roitt
3. Medical Microbiology & Immunology by Warren Levinson / Ernest Jawetz
4. Textbook of Parasitology by Chatterjee K.D
5. Medical Parasitology by RL Ichhpujani / Rajesh Bhatia
6. Koneman's Color Atlas and Textbook of Diagnostic Microbiology (Color Atlas & Textbook of Diagnostic Microbiology) Elmer. W. Koneman
7. Text Book of Medical Mycology by Jagadish Chander
8. Fields Virology(Knipe,Fields Virology)-2 Volume Set [Hardcover] by David M. Knipe/ Peter Howley
9. Mackie & McCartney – Practical Medical Microbiology by Collee/Fraser/Marmion/Simmons
10. Bailey & Scott's Diagnostic Microbiology by Forbes/ Sahm/Weissfeld

PHARMACOLOGY (U19MBB203)

Goal

To guide a medical graduate to study the various aspects of the pharmacology of drugs so as to gain competence in the safe and rational use of drugs for the promotive, curative and rehabilitative purposes.

Competencies:

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies.

1. To use essential medicines in the daily practice of the medical graduate.
2. To select drugs for common disease conditions based on objective criteria, individualise the selected drug for a particular patient and write a correct prescription.
3. To respond effectively to pharmaceutical promotion and the ability to use various independent sources of medicine information in the process of prescribing and providing treatment.
4. To use drugs, especially antimicrobials rationally.
5. To analyse prescribing in primary health facilities using WHO prescribing indicators and be able to use the same for self-analysis and improvement of own prescribing behaviour.
6. To communicate drug and non-drug information about common diseases with a simulated patient.
7. Report adverse drug reactions to the pharmacovigilance centre.
8. Diagnose and manage overdose.

The Broad Objectives

- To understand the concept of “Rational Therapy”
- To practice “Rational Use of Drugs” based on the knowledge gained from the study of pharmacology of drugs.
- To develop good prescribing habits and communication skills.
- To understand the essence of “Essential Drug Concept” and be competent to make/ modify the essential drug list of the institution.
- To uphold the principles of “Medical Ethics” in patient care, drug development and research.

Objectives in Detail:

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

Related to knowledge:

- Appreciate the relevance of studying the pharmacokinetics and pharmacodynamics of drugs.
- Understand the significance of alterations of pharmacokinetics and pharmacodynamics of drugs in the special groups like the paediatric, the geriatric, the pregnant and the lactating, the drug addict and the ethnic variant.
- Derive at the possible and probable indications, contra indications, interactions, and adverse effects of drugs based on the pharmacology of

individual drug or groups of drugs.

- Understand the importance of eliciting drug history as a routine practice.
- Familiarize with the process of rational prescribing and rational treatment for the individual and the social group
- Recognise the common signs and symptoms of poisoning due to over dosage of medicines, natural substances and chemicals and chart out the line of management.

Understand the deleterious effects of substance abuse and the principles of prevention and treatment.

- Understand the importance of the concept of essential drugs and to participate in the process of updating essential drug list of the institution.
- Learn the protocol to be followed during the development and clinical trial of drugs.

Related to skill:

- Cultivate good prescribing habit based on the 'WHO Guidelines to Good Prescribing'
- Develop communication skill.
- Prescribe drugs for common ailments.
- Learn to critically evaluate drug prescriptions and formulations.
- Familiarise with the nature of common formulations like powder, elixir, mixture, lotion ointment, paste etc. and learn the technique of compounding and dispensing in a small set up like a pharmacy.
- Observe/perform some of the experiments designed to study the drug effects and learn to interpret the data elicited.
- Participate in activities like adverse drug event monitoring, therapeutic serum plasma drug level monitoring etc.

Related to attitude:

- Learn to respect and uphold the principles of ethics in personal life, in patient care and also during development and research.

Training Method

- Theory classes- Emphasis is given to drugs included in the essential drug list.
- Practical exercises.
- Project work.
- Problem based learning and presentation.
- Subject seminars.
- Integrated teaching –Vertical and horizontal Integration with other departments.
- Group discussions/tutorials.
- Oral, quiz, periodical assessment.
- Continued medical education programmes.

Course Outcomes

CO1: Competency to use essential medicines in the daily practice of the medical graduate.

CO2: Competency to select drugs for common disease conditions based on objective criteria, individualise the selected drug for a particular patient and write a correct prescription.

CO3: Competency to respond effectively to pharmaceutical promotion and the ability to use various independent sources of medicine information in the process of prescribing and providing treatment.

CO4: Competency to use drugs, especially antimicrobials rationally.

CO5: Competency to analyse prescribing in primary health facilities using WHO prescribing indicators and be able to use the same for self-analysis and improvement of own prescribing behaviour.

CO6: Competency to communicate drug and non-drug information about common diseases with a simulated patient.

CO7: Competency to report adverse drug reactions to the pharmacovigilance centre.

CO8: Competency to diagnose and manage overdose.

Systems	Hours	Systems	Hours
General Pharmacology	12	Autonomic Nervous System	10
Autacoids and Related drugs	6	Respiratory System	3
Kidney	4	Cardiovascular Systems	10
Peripheral Nervous System	2	Central Nervous System	14
Antimicrobial Chemotherapy	12	Chemotherapy of Parasites	6
Chemotherapy of Neoplasm	4	Immunomodulators	3
Hormones & Antagonists	13	Blood & Blood formation	4
Gastrointestinal Function	3	Toxicology	2
Miscellaneous	2		

THEORY LECTURES:**Basic Principle:**

- The common diseases of the area to be identified
- Emphasis is to be given to drugs used more often for prophylaxis and treatment.
- The prototype representing the system /class and those included in the essential drug list alone to be discussed in depth. Frequently used preparations / formulations of that group/class may be compared with the prototype..
- The pharmacology required for understanding the basis of rational use in the clinical setting alone to be discussed.
- Principles of management of common diseases and poisonings are to be included in the discussion.
- Throughout the discussion, the importance of rational use of drugs to be stressed.

Common Format For Discussion of Theory Topics:

Definition, grouping/classification (preferably therapeutic classification), commonly used preparations, clinically relevant aspects of pharmacokinetics, mechanism of action, pharmacological actions, adverse effects, precautions, indications, contraindications and clinically significant interactions (topics arranged as per the divisions in the University examination

Section A (20 marks)

1. General Pharmacology

- Introduction: Definitions, Nomenclature, Essential drug concept, Rational drug use.
- Routes of drug administration.
- Pharmacokinetics; Absorption, Bioavailability, Distribution, Biotransformation and Excretion.
- Pharmacodynamics: Principles of drug action, Mechanisms of drug action, Action-effect sequence, The relationship between drug concentration and effect, Combined effect of drugs, Dosage and factors modifying drug action.
- Adverse effects of drugs

2. Autacoids & Related Drugs Antihistamines: H1 Blockers

- 5-Hydroxytryptamine & their antagonists: Preparations and clinical uses.
- Eicosanoids: Prostaglandins, Leukotrienes & Platelet-activating factors: preparations and clinical uses of major eicosanoids.
- Non opioid analgesics & non steroidal anti-inflammatory drugs.
- Principles of drug therapy of migraine.
- Drugs for gout.
- Drugs for rheumatoid arthritis

3. Autonomic Nervous System

- General considerations.
- Cholinergic drugs : Esters of choline, Natural alkaloids.
- Anticholinesterases
- Anticholinergic drugs: Anti muscarinic agents- Natural alkaloids, semisynthetic and synthetic compounds.
- Adrenergic drugs, catecholamines and non catecholamines.
- Adrenergic receptor blockers

4. Respiratory System:

- Drugs for cough
- Drugs for bronchial asthma
- Principles of management of bronchial asthma

Section B (20 marks)

5. Central Nervous System & Peripheral Nervous System:

- General anaesthetics.
- Skeletal muscle relaxants.
- Local anaesthetics.
- Alcohols: ethyl alcohol, methyl alcohol.
- Sedative- hypnotics: benzodiazepines and miscellaneous drugs.
- Opioid analgesics and antagonists.
- Drugs for anxiety disorders, affective disorders and psychoses.
- Anti seizure drugs.
- Drugs for degenerative disorders: Parkinsonism.
- CNS stimulants (psycho stimulants) and cognition enhancers
- (Nootropics) preparations and uses

6. Cardiovascular System, Drugs Affecting Coagulation and Lipid Lowering Agents:

- Drug therapy of heart failure.
- Drugs therapy of myocardial ischaemia.
- Drug therapy of hypertension.
- Antiarrhythmic agents: Brief discussion based on salient features of the class.
- Drugs affecting coagulation and thrombosis.
- Plasma expanders.
- Drug therapy of shock.
- Drug therapy of hyperlipidemia

7. Renal System

- Diuretics
- Vasopressin and other agents affecting the renal conservation of water.
- Drugs affecting rennin - angiotensin - aldosterone mechanism.

8. Blood Forming Agents

- Haematopoietic agents: Growth factors, iron, folic acid and vitamin B₁₂

Section A (20 marks)

Sl. No Topics

1. Gastrointestinal Tract

- Drug therapy of peptic ulcer.
- Drugs affecting gastrointestinal motility: Drugs for constipation, diarrhoea, emetics and anti emetics.
- Emetics and anti emetics

2. **Hormones**
- Hypothalamus and pituitary gland: Preparations and uses.
 - Thyroid and antithyroid drugs.
 - Pancreatic hormones and antidiabetic drugs.
 - Adrenocorticosteroids and their analogues.
 - Agents modifying bone mineral homeostasis: calcium, parathyroid hormone, calcitonin, vitamin D, bisphosphonates
3. **Reproductive System**
- Gonadal hormones and inhibitors.
 - Fertility and antifertility agents.
 - Oxytocics, abortifacients, and tocolytics.

Section B (20 marks)

4. **Antimicrobial Chemotherapy**
- General principles of antimicrobial action.
 - Sulphonamides and trimethoprim
 - β -Lactam antibiotics.
 - Aminoglycosides.
 - Tetracyclines & chloramphenicol.
 - Macrolides, Fluoroquinolones.
 - Miscellaneous: examples.
 - Antifungal drugs.
 - Antiviral drugs.
 - Antiseptics and disinfectants-examples.
 - Chemotherapy of urinary tract infection and urinary antiseptics.
 - Chemotherapy of tuberculosis.
 - Chemotherapy of leprosy.
 - Chemotherapy of sexually transmitted disorders.
5. **Chemotherapy of Parasites**
- Ectoparasites: scabies, pediculosis.
 - Protozoal: malaria, amoebiasis, giardiasis, trichomoniasis.
 - Helminthes: round worm, hook worm, thread worm, pin worm, whip worm, filarial worms, tape worm (Taenia solium & saginata)
6. **Chemotherapy of Neoplastic Diseases**
- General principles of Management.
 - Discussion based on individual groups
7. **Toxicology**
- General principles of treatment.
 - Heavy metal antagonists
8. **Immunomodulators**
- Immunosuppressants.
 - Immuno stimulants.
 - Gene therapy.
 - .

PHARMACOLOGY PRACTICAL EXERCISES:

- History of medicine & development of pharmacology as a separate discipline.
- Innovations, discoveries and inventions.
- Nature and sources of drugs.
- Chemical nature of drugs.
- Identification of the chemical nature of drugs.
- Dosage forms.
 - a. Oral
 - b. Parenteral.
 - c. Topical.
- Method of drawing the contents from ampoules and vials.
- Routes of drug administration.
- Weights and measures.
- Calculation of dosages.
- The Prescriptions
 - Common abbreviations and symbols used in prescriptions and chart orders.
 - Rational prescribing based on “WHO Guide to Good Prescribing” and “Good Clinical Practice”
 - Prescription audit –Incompatibility, criticism and rewriting of the prescription.
- Clinical problem solving exercises.
- Effect of drugs on blood pressure, heart rate and respiration on an anaesthetized dog (computer simulated exercise).
- Effect of drugs on rabbit’s eye.
- Effect of drugs on isolated frog heart.
- Effects of drugs on intestinal smooth muscle.
- Effects of drugs on skeletal muscle.
- Pharmacokinetic/ Pharmacodynamic charts.
- Bioavailability.
- Competitive antagonism.
- Non Competitive antagonism.
- Tachyphylaxis.
- An introduction to dispensing pharmacy.
- The powder: Oral rehydration salts (ORS).
- The Gargles & mouthwashes: Potassium permanganate solution.
- The Ointment: Whitefield’s ointment.
- Criticism of informed consent forms.
- Pharmacovigilance.
 - Problem I
 - Problem II.
- Fixed dose drug combinations
- Drug Interaction
- Effective doctor- patient communication.

SCHEME OF UNIVERSITY PRACTICAL EXAMINATION

Time – 3 hours

Max marks: 25

Practical I

Max marks -

Exercises	Number	12 Marks
Spotters	10	5
Prescription writing/Prescription audit	1	3
Problem solving exercise	1	2
Calculation of dosage/ADE Form filling/ Drug Interaction	1	2

Practical II (Max. marks: 13 marks)

Dispensing pharmacy	1	4
Experimental Pharmacology	1	4
Graph/chart / flowchart	1	2
Communication skill	1	3

Max marks -15

Viva voce

1. General Pharmacology, Autacoids and Related drugs, Blood forming Agents, Gastrointestinal Tract 3Marks
2. Autonomic Nervous System, Respiratory System, Cardiovascular System, Drugs Affecting Coagulation & Lipid Lowering Agents 4Marks
3. Hormones, Reproductive System, Central Nervous System, & Peripheral Nervous System 4Marks
4. Antimicrobial Chemotherapy, Chemotherapy of Parasites, Chemotherapy, Chemotherapy of Malignancy, Immunomodulators, Toxicology 4Marks

DISTRIBUTION OF TEACHING HOURS

Lecture	Practical	Innovative Sessions	Total
110	128	82	320

1. Essentials of Medical Pharmacology, K D Tripathi
2. Principles of Pharmacology by HL Sharma & KK Sharma
3. Pharmacology and Pharmacotherapeutics, R.S. Satoskar and S. D Bhandarkar
4. Pharmacology for Medical Graduates (3rd Edition) by Tara v Shanbhag, Smita Shenoy

Reference Books (Latest Edition)

1. Goodman and Gilman's The Pharmacological Basis of Therapeutics, Laurence L Brunton
2. Modern Pharmacology with Clinical Application, Charles R Craig
3. Basic and Clinical Pharmacology, Bertram G Katzung
4. Clinical Pharmacology, P. N. Bennet, M.J.Brown.

FORENSIC MEDICINE & TOXICOLOGY (U19MBB204)

Goal

The broad goal of teaching undergraduate students in Forensic Medicine & Toxicology is to produce a physician who is well informed about medicolegal responsibilities in the practice of medicine. S/he should be capable of making observations and inferring conclusions by logical deductions to set enquiries on the right track in criminal matters and connected medicolegal problems. S/he must acquire knowledge of law in relation to medical practice, medical negligence and respect for codes of medical ethics.

Competencies

The Indian Medical Graduate will get the knowledge and skills necessary to attain the following competencies.

Core Competencies:

- Conduct a medico-legal autopsy of an adult, prepare an autopsy report and give evidence in a court of law.
- Conduct a medico-legal autopsy of an infant, prepare an autopsy report and give evidence in a court of law.
- Identify the cases where medico-legal autopsy is to be performed by an expert and advise the law enforcement agencies in this regard.
- Collect, preserve and dispatch material objects and samples from the dead body as a part of autopsy examination.
- Identify the cases where police intimation is required and medico legal reports are to be prepared and handle such situations with necessary communication skills.
- Examine an injured individual, prepare a report and give evidence in a court of law.
- Examine an individual alleged to be intoxicated, prepare a report and give evidence in a court of law.
- Examine the victim in an alleged sexual assault case, prepare a report and give evidence in a court of law.
- Examine the accused in an alleged sexual assault case, prepare a report and give evidence in a court of law.
- Examine an individual for estimation of age, prepare a report and give evidence in a court of law.
- Identify and manage cases of child abuse.
- Identify the scenarios where material objects are to be collected, preserved and dispatched from a living person.
- Identify and manage common scenarios of acute and chronic poisoning and envenomation.
- Manage the medico-legal aspects of acute and chronic poisoning and envenomation.
- Practice the profession in accordance with principles of bioethics.
- Appropriately manage all patient-physician interactions which require consent with necessary communication skills and attitude.
- Possess the attitude to handle professional secrets in an ethical and legally compatible manner.
- Mould the practice so as to minimize and resolve legal conflicts arising in the doctor patient relationship.

Non-Core Competencies:

- Examine a set of bones, prepare a report and give evidence in a court of law.
- Identify and manage the medico-legal aspects of a scenario where a mentally ill individual is the accused in a crime.
- Do common bedside toxicological tests.
- Assess the behaviour of other physicians in their professional capacity with respect to ethical, medico-legal and social implications.

Objectives

Knowledge

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

- Identify the basic medicolegal aspects of hospital and general practice.
- Define the medicolegal responsibilities of a hospital or general practice.
- Appreciate the physician's responsibilities in criminal matters, and respect for the codes of medical ethics.
- Diagnose and manage common acute and chronic poisoning and identify medicolegal aspects.
- Describe the medicolegal aspects and findings of postmortem examination in case of death due to common unnatural conditions and poisonings.
- Detect occupational and environmental poisoning, prevention and epidemiology of common poisoning, and their legal aspects particularly pertaining to Workmen's Compensation Act.
- Describe the general principles of analytical toxicology.
-

Skills

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

- Make observations and logical inferences in order to initiate enquiries in criminal matters and medicolegal problems.
- Diagnose and treat common emergencies in poisoning and chronic toxicity.
- Make observations and interpret finding at postmortem examination.
- Observe the principles of medical ethics in the practice of this profession.

Integration

The department shall provide an integrated approach towards allied disciplines like Pathology, Radiology, Forensic Sciences, Hospital Administration, etc., to impart training regarding medicolegal responsibilities of physicians at all levels of health care. Integration with relevant disciplines will provide the scientific basis of clinical toxicology – e.g., medicine, pharmacology, etc.

Course Outcomes

CO1: Competency to Conduct a medico-legal autopsy of an adult, prepare an autopsy report and give evidence in a court of law.

CO2: Competency to conduct a medico-legal autopsy of an infant, prepare an autopsy report and give evidence in a court of law.

CO3: Competency to identify the cases where medico-legal autopsy is to be performed by an expert and advise the law enforcement agencies in this regard.

CO4: Competency to collect, preserve and dispatch material objects and samples from the dead body as a part of autopsy examination.

CO5: Competency to identify the cases where police intimation is required and medico legal re- ports are to be prepared and handle such situations with necessary communication skills.

CO6: Competency to examine an injured individual, prepare a report and give evidence in a court of law.

CO7: Competency to examine an individual alleged to be intoxicated, prepare a report and give evidence in a court oflaw.

CO8: Competency to examine the victim in an alleged sexual assault case, prepare a report and give evidence in a court of law.

CO9: Competency to examine the accused in an alleged sexual assault case, prepare a report and give evidence in a court of law.

CO10: Competency to examine an individual for estimation of age, prepare a report and give evidence in a court of law.

CO11: Competency to identify and manage cases of child abuse.

CO12: Competency to identify the scenarios where material objects are to be collected, preserved and dispatched from a living person.

CO13: Competency to identify the scenarios where material objects are to be collected, preserved and dispatched from a living person.

CO14: Competency to manage the medico-legal aspects of acute and chronic poisoning and en-venomation.

CO15: Competency to practice the profession in accordance with principles of bioethics.

CO16: Competency to appropriately manage all patient-physician interactions which require consent with necessary communication skills and attitude.

CO17: Attitude to handle professional secrets in an ethical and legally compatible manner.

CO18: Ability to mould the practice so as to minimize and resolve legal conflicts arising in the doctor patient relationship

Teaching hours:

* (Project Work, Seminars, Structured discussion, Integrated teaching, Formative evaluation, Revision)

Schedule of Lectures/Innovative Sessions:

Lectures	Practicals	Innovative sessions*	Total
34	20	50	104

Topic	Hours
Forensic Medicine	40 Hours
Introduction of Forensic Medicine	1 hour
Definition, synonyms, historical aspects, modern Forensic Medicine, sub-division etc.	
Courts and Legal Procedures	4 hours
Courts and their powers, Inquest, types of evidence, Dying declaration, Types of witnesses, Recording of medical evidence, Doctor as witness	
Ethical and Legal Aspects of Medical Practice	6 hours
MCI and SMC - Functions, Duties and privileges, Medical Ethics, Infamous conduct, Medical negligence, Consent in medical practice, Doctor and Consumer Protection Act, Euthanasia	

Personal Identity	3 hours
Factors for establishing identity, Determination of age and sex in the living and dead, Medicolegal importance of age, Forensic odontology, DNA profiling	
Forensic Thanatology	4 hours
Definition of death, moment of death, types of death - somatic and molecular, Brain- stem death & organ transplantation, Suspended animation, Sudden death, sudden infant death syndrome, Postmortem changes and estimation of time since death, Crime scene investigation	
Medicolegal Autopsy	2 hours
Objectives – procedures - negative autopsy, Examination of skeletal remains, Exhumation	
Asphyxial Deaths	3 hours
Pathophysiology, classification, cardinal features, Hanging - definition, types, mechanisms of death, postmortem appearances, medicolegal importance; Strangulation - definition, types, postmortem appearances, medicolegal importance; Suffocation - types, postmortem appearances, medicolegal importance; Drowning - definition, types, mechanisms of death, postmortem appearances, diatoms test, medicolegal importance	
Forensic Traumatology	8 hours
Classification of mechanical injuries, Blunt force injuries - abrasion, contusion, laceration, Sharp weapon injuries - incised and stab wound. Firearm injuries.	
Regional injuries - head, spine, thorax, abdomen and limbs. Injuries in road traffic accidents, Medicolegal aspects of injuries - hurt, grievous hurt, culpable homicide, classification of fatal injuries, etc. Injuries from physical agents - burns, electricity and lightning, Non-accidental trauma in children	
Human Sexual Function	3 hours
Medicolegal considerations of virginity, sex offences and paraphilias, pregnancy, delivery, Medical Termination of Pregnancy Act - provisions – criminal abortion, impotence, sterility, artificial insemination, sterilisation, surrogacy	
Infanticide	2 hours
Blood, Semen and Hair	1 hour
Identification of blood, semen and hair - collection and preservation, chemical tests for blood and semen, precipitin test, blood groups	
Forensic Psychiatry	3 hours
Symptoms of mental illness, classification, Mental Health Act, Restraint of insane, civil and criminal responsibilities, feigned insanity	
Toxicology	25 Hours

Occupational and Environmental Toxicology	4 hours
Non metallic irritants - phosphorus, halogens (chlorine)	
Metallic irritants - arsenic, lead, mercury, copper and iron	
Asphyxiants - CO, cyanide, H ₂ S	
Plant Poisons	2 hours
Abrus precatorius, Datura, Oleanders, Odallum, Castor, Strychnos	
nux vomica, Croton tiglium, Calotropis, Semecarpus	
anacardium	3 hours
Bites and Stings	
Snakes - identification, diagnosis and management of snake bite,	
scorpion sting, bee & wasp sting	3 hours
Alcohols	3 hours
Ethyl and methyl alcohol, ethylene glycol	
Pesticides	
Organophosphates, carbamates, organochlorines, pyrethroids, zinc	
phosphide, aluminium phosphide, paraquat	1 hour
Antipyretics and Analgesics	
Paracetamol, Aspirin	
Opium and Opiates	1 hour
Barbiturates and Benzodiazepines	1 hour
Food Poisoning	1 hour
Microbial, chemical,	
Mushrooms - clinical presentation and management	
Substance Abuse:	2 hours
NDPS Act.	
Synthetic & semi-synthetic narcotics, Heroin	
Description and medicolegal importance relating to alcohol,	
tobacco, cannabis, cocaine, opiates, hypnotics, amphetamines, and	
hallucinogens	

Integrated Teaching	9 Hours
a. With Emergency Medicine	2 hours
Identification of mechanical injuries, wound certification, ethical	
aspects of consent, examination of assault victim/s and accused,	
sexual assault victim examination, drunkenness examination	
b. With Poison Control Centre	6 hours
Toxicology - Clinical aspects	
Medicolegal issues involved in drug therapy, drug overdose, drug	
hyper- sensitivity, mistaken prescription/administration of	
drugs,	
Drug dependence	1 hour
c. With Analytical Toxicology Laboratory	
Toxicology - basic analytical aspects.	

Seminars/Symposia**5 Hours**

Euthanasia

1 hour

Plant poisons, chemicals and substance abuse

3 hours

Bites and stings

1 hour

Group Discussions	21 Hours
I. Ethical and legal aspects of medical practice	2 hours
II. Forensic thanatology	3 hours
III. Medicolegal autopsy	3hours
1. Objectives - Procedures- Negative autopsy	
2. Examination of skeletal remains.	
3. Exhumation	
IV. Asphyxial deaths 3	3 hours
V. Forensic traumatology	10 hours
VI. Clinical and medicolegal issues - poisoning	1 hour
VII. Recent trends in toxicology	1 hour

Schedule of Practicals

Specimens of poisons, venomous creatures, weapons, arms and ammuni- tion, etc.	6 hours
Bones, X-Rays and photographs	4 hours
Autopsy certificate, Wound certificate	4 hours
Certificate of drunkenness	2 hours
Examination of rape victim/accused	4
hours Viscera/material objects: collection, preservation/dispatch	2
hours Case of poisoning - problem solving exercise	4
hours	

Distribution of marks for Internal assessments and University examinations

University Examination				Internal Assessment		
Theory	Practical	Viva voce	Total	Theory	Practical	Total
40	30	10	80	10	10	20

Summative Assessment:

3 theory (40 marks each) and 3 practical internal examinations (30 marks each) may be held. Lowest marks secured for any internal assessment (theory) will not be considered for calculating the internal assessment average. At the end of the 5th semester, every student shall submit a record of 10 different medicolegal autopsies they have witnessed during the past 3 semesters. 10 marks allotted to the work record will be added to the marks of practical examinations and average will be taken as internal assessment.

At the end of the fifth semester of MBBS, one paper of University theory examination, one practical examination and viva voce must be conducted.

University Examination**Theory 40 marks**

One paper including the whole subject. The marks will be divided in the following manner. Ethics: 4

marks

Clinical Forensic Medicine: 8 marks

Forensic Pathology: 14 marks

Toxicology: 14 marks

Practicals 30 marks**Assessment of Practical Skills**

In the practical examination, any 4 of the following exercises may be chosen by the examiners for a particular day of examination:

- Age estimation and issuance of age certificate in the supplied proforma after perusing data/x-rays.
- Issuing wound certificate in the supplied proforma after analyzing set of data &/or photographs.
- Issuing drunkenness certificate in the supplied proforma after examination of a subject/data.
- Problem solving exercise based on medicolegal autopsy report.
- Problem solving exercise of a case of poisoning.
- Medicolegal reporting on victim/accused in sexual assault case in the supplied proforma after perusing data &/or photographs.
- Identifying the weapon; analysis of injury and drafting a statement to be given to police.
- Examination and discussion on two articles or poisons of medicolegal importance.

Each exercise is to be completed within 20 minutes, and each carries 6 marks.

Viva voce (Structured) 10 marks

All examiners will independently conduct viva voce for all candidates appearing on that day.

Work Record

Work record should be submitted on the day of practical examination for scrutiny by the

external examiners.

Textbooks Recommended

Prescribed Books

Forensic Medicine and Toxicology – PC
Ignatius Forensic Medicine for Medicos – B
Umadethan
Textbook of Forensic Medicine and Toxicology – VV
Pillay Modern Medical Toxicology – VV Pillay

Reference books

Taylor's Principles & Practice of Medical Jurisprudence - Keith
Simpson Knight's Forensic Pathology – Bernard Knight, Saukko
Principles and Practice of Forensic Medicine – B Umadethan
Comprehensive Medical Toxicology – VV Pillay

PHASE III

Semesters VI, VII, VIII and IX

Course of instruction of clinical subjects are continued in this Phase. After the second professional examination, students can enter the Phase III training . During the semesters VI and VII, the sub- jects Ophthalmology and Otorhinolaryngology are introduced. At the end of semester VII, Uni- versity examinations (Third professional part I) of the subjects Community Medicine, Ophthalmol- ogy and Otorhinolaryngology (ENT) are held. Students who have passed all the subjects of the second professional examination are alone allowed to appear for the third professional part I ex- amination. During semesters VIII and IX more attention is to given to the training in Medicine, Surgery, Obstetrics and Gynaecology (OBG) and Paediatrics. At the end of semester IX third professional (final) examination isheld.

Total hours of Lectures/Practical/Innovative sessions

Subjects	Lectures	Practical/ Clinical	Innovative Sessions	Total
Ophthalmology	76	240	64	380
Otorhinolaryngology	40	192	48	280
Orthopaedics	36	240	72	348
Pulmonology	8	48	16	72
Dermatology & STD	32	144	18	194
Psychiatry	8	140	16	164
Radiology	8	48	16	72
General Medicine	100	624	204	928
General surgery	100	624	204	928
Anaesthesiology	8	48	16	72
OBG	90	576	190	856
Paediatrics	44	240	88	372
Dentistry	4	48	8	60
Community Medicine	56	12 0		176

Duration of Clinical Posting

	Weeks	MCI Requirement
General Medicine*	30	26
General Surgery**	26	26
OBG	22	24
Paediatrics	10	10
Community Medicine	12	12
Orthopaedics***	10	10
Pulmonology	2	2
Dermatology	2	6
Psychiatry	4	2
Radiology****	2	2
ENT	8	8
Ophthalmology	8	10
Dentistry	2	2
Casualty	2	2

* This posting includes exposure to Laboratory Medicine & Infectious Diseases.

** Includes exposure to dressing and Anesthesia.

*** Includes exposure to Rehabilitation and Physiotherapy.

**** This posting includes training in Radiodiagnosis and Radiotherapy.

OPHTHALMOLOGY (U19MBB301)

Goal

The broad goal of teaching students in ophthalmology is to provide such knowledge and skills to the student that shall enable him/her to practice as a clinical and as a primary eye care physician and also to function effectively as a community health leader to assist in the implementation of National programme for the prevention of blindness and rehabilitation of the visually impaired.

Competencies

The Indian Medical Graduate will get the knowledge and skills necessary to attain the following competencies.

- Elicit a history pertinent to general health and ocular status.
- Diagnose and treat common problems affecting the eye.

Objectives

Knowledge

At the end of the course, the student shall have knowledge of:

- Common problems affecting the eye.
- Principles of management of major ophthalmic emergencies
- Main systemic diseases affecting the eye.
- Effects of local and systemic diseases on patient's vision and the necessary action required to minimise the sequelae of such diseases.
- Adverse drug reactions with special reference to ophthalmic manifestations.
- Magnitude of blindness in India and its main causes.
- National programme for control of blindness and its implementation at various levels.
- Eye care education for prevention of eye problems.
- Role of primary health centre in the organization of eye camps.
- Organisation of primary health care and the functioning of the ophthalmic assistant.
- Integration of the national programme for control of blindness with the other national health programmes
- Eye bank organization

Skills

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

- Assist in diagnostic procedures such as 1. visual acuity testing, 2. examination of eye, 3. subjective refraction correction of presbyopia, 4. pupillary reflex, 5. confrontation perimetry, 6. Tear Film staining with fluorescein, 7. Color Vision 8. Direct ophthalmoscopy and conjunctival smear examination and cover test, corneal sensations 9. Schiotz tonometry.

Integration

Semester	VI	VII	Total
Hours	24	32	56

The undergraduate training in ophthalmology will provide an integrated approach towards other disciplines especially Neuro sciences, Otorhinolaryngology, General Surgery and Medicine.

Schedule of Lectures

Topic	Hours
Basics Anatomy Physiology including Vit. A Deficiency Embryology	3 hours
Optics Elementary optics Refractive error Accommodation, presbyopia	3 hours
Conjunctiva Acute conjunctivitis Chronic conjunctivitis (Trachoma, spring catarrh) Degeneration & dry eye Assessment	3 hours
Cornea Introduction Microbial Keratitis • Bacterial • Fungal • Interstitial, Acanthamoeba Keratitis • Viral keratitis Corneal degeneration, Dystrophies	3 hours

Lens

9 hours

Anatomy /
Physiology
Etiopathogenesis
Senile cataract – stages,
symptoms Management
Complication
Congenital cataract
Assessment

Glaucoma

Introduction
Tonometry/ gonioscopy/
perimetry Classification :
POAG, PACG
Secondary glaucoma
Therapeutics in glaucoma
Congenital glaucoma
Assessment

Injuries of Eye

Introduction - classification/
concussion, perforation
Management
Chemical burns

Orbit

Introduction –anatomy of
orbit Orbital cellulitis
Exophthalmos (Thyroid)

Eyelid

Anatomy
Inflammation
Ptosis
Ectropion, Entropion
Assessment

Lacrimal Apparatus

Introduction (Anatomy)-
Evaluation of watering
Congenital NLD obstruction, Dacryocystitis
Assessment

Sclera & Episclera

Episcleritis,
sclerites
Styphaloma

Retina	4 hours
Introduction	
Diabetic retinopathy	
Vascular block & Hypertensive retinopathy	
ARMD/ RP	
RD/ Tumors	
Tumors – Retinoblastoma, malignant melanoma Assessment	
Retinal Surgeries including advanced methods	
Optic Nerve	3 hours
Introduction	
Pupillary reflexes – abnormalities Papilledema	
Optic neuritis	
Optic atrophy	
Strabismus	
Introduction/ EOM anatomy	5 hours
Classification	
Evaluation of squint Diplopia	
Treatment	
Assessment	
Miscellaneous	
Ocular emergencies	9 hours
Ocular manifestation of systemic diseases such as syphilis, Leprosy, TB, AIDS, Herpes Sarcoidosis	2 hour
Ocular therapeutics	1 hour
Eye banking	1 hour
Community Ophthalmology	3 hour
Newer techniques in Ophthalmology	1 hour
Ocular emergencies	1 hour
Instruments	10 hours
Revision classes by each consultant.	
Common topics to be covered for all medical subjects	
Communication skills including doctor-patient relationships. Intra- and inter- personal relationships.	
Caring for the critically sick and dying patient. Medical ethics.	
Basics in research methodology and statistics. Information retrieval.	
Use of medical library and database.	

OTORHINOLARYNGOLOGY (U19MBB302)

Goal

The broad goal of teaching undergraduate students in otorhinolaryngology is that the undergraduate students have adequate knowledge and skills for optimally dealing with common disorders and emergencies and principles of rehabilitation of the hearing impaired, and be familiar with the latest equipment and modern trends in ENT.

Competencies

The Indian Medical Graduate will get the knowledge and skills necessary to attain the following competencies.

- Identify differential diagnoses in the patient presenting in ENT OPD by taking a detailed history.
- Perform complete ear, nose, throat examination of the patient presenting in ENT OPD.
- Describe the pathophysiology of common ENT diseases and emergencies.
- Document and interpret the findings after a complete examination.
- Prescribe common investigative procedures, including imaging, and interpret the findings.
- Counsel the patient regarding need for various common surgeries in ENT.
- Perform procedures with assistance.
- Prescribe appropriate and rational medicines for common ENT conditions.
- Identify the cases that need referral.
- Know the management protocol for ENT emergencies.

Objectives

Knowledge

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

- Describe the basic pathophysiology of common ENT diseases and emergencies.
- Adopt the rational use of commonly used drugs, keeping in mind their adverse reactions.
- Suggest common investigative procedures and their interpretation.

Skills

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

- Learn use of head mirrors and common ENT OPD instruments.
- Detect and diagnose common ENT problems including the pre malignant, malignant and communicable disorders of the head and neck.
- Manage ENT problems at the first level of care and be able to refer whenever necessary.
- Assist, carry out minor surgical procedures like ear syringing, ear dressing and nasal packing.
- Assist in certain procedures such as tracheostomy, endoscopies and removal of foreign bodies.

Integration

The undergraduate training in ENT will provide an integrated approach towards other disciplines specially neurosciences, ophthalmology and general surgery.

Attitude

To demonstrate proficiency in examining and treating a patient with common ENT problems. To demonstrate the four ethical principles in management of common

Teaching Schedule

Lectures/Practicals/ Innovative Sessions

Semester	VI	VI I	Total
Hours	24	48	72

Clinical Posting

Semesters	VI	VII	Total
Weeks	4	4	8

Teaching Hours

Lectures	Practical/Clinical	Innovative sessions	Total
40	192	48	280

Schedule of Lectures

Total Hours

40

Nose

1. Anatomy of nose (including endoscopic anatomy)
2. Symptomatology and clinical examination of nose
3. Epistaxis
 - a. Blood supply of nose.
 - b. Causes.
 - c. Investigations
 - d. Management
4. Rhinitis
 - a. Physiology of nose and PNS.
 - b. Allergic Rhinitis.
 - c. Vasomotor Rhinitis.
 - d. Polypi of nose and PN
5. Sinonasal polyposis
6. Nasal Septum
 - a. Anatomy of nasal septum.
 - b. Types of DNS.
 - c. Management.
 - d. Complications such as haematoma, septal abscess and perforation.
 - e. Choanal Atresia & Management
7. Sinusitis
 - a. Anatomy of lateral wall of nose
 - b. Acute and chronic sinusitis.
 - c. Investigations and management.

8. Tumours of nose and paranasal sinuses
 - a. Benign angiofibroma - Inverted Papilloma
 - b. Malignant—Clinical features, Principles of management
9. Facio maxillary injuries
 - a. CSF Rhinorrhea
 - b. Le Forte's fractures
 - c. Tripod fractures
 - d. CSF Otorrhoea
10. Surgeries of nose and PNS
 - a. Septoplasty and SMR
 - b. FESS
 - c. Nasal bone fracture reduction
 - d. Caldwell Luc

Throat

11. Anatomy and physiology of pharynx, larynx, Tracheobronchial tree, Oesophagus
12. Symptomatology and clinical examination of throat
13. Tonsils and Adenoids
 - a. Anatomy of Waldeyer's Ring
 - b. Clinical features of tonsillitis and adenoids /Quincy
 - c. Investigations and Management
14. Neck Space Infections
 - a. Anatomy of neck spaces
 - b. Ludwig's angina
 - c. Retropharyngeal abscess
 - d. Parapharyngeal abscess
15. Hoarseness
 - a. Anatomy of larynx
 - b. Physiology of phonation
 - c. Differential diagnosis of hoarseness of voice
 - d. Inflammatory lesions of larynx
 - e. Obstructive lesions of larynx
 - f. Neurological lesions of larynx
16. Stridor
 - a. Causes in children
 - b. Causes in adults
 - c. Investigations and emergency management
 - d. Tracheostomy
17. Malignancies of larynx and hypopharynx
 - a. Etiology
 - b. Clinical features
 - c. Pathology
 - d. Investigations
 - e. Principles of management
18. Malignancies of Nasopharynx, Oropharynx and oral cavity, submucous fibrosis
 - a. Etiology
 - b. Clinical features
 - c. Pathology

- d. Investigations
 - e. Principles of management
- 19. Dysphagia-Causes, Investigations and Management
 - a. Anatomy of oropharynx and hypopharynx
 - b. Causes of dysphagia
 - c. Investigations and Management
- 20. Foreign bodies in aerodigestive tract
 - a. Air passage–Nose, Ear
 - b. Food passage
 - c. Direct Laryngoscopy
 - d. Bronchoscopy
 - e. Oesophagoscopy
- 21. Tracheostomy –Indications, procedure and complications
- Ear**
- 22. Anatomy of ear
 - a. External
 - b. Middle
 - c. Inner
- 23. Physiology of ear
 - a. Middle ear
 - b. Inner ear
- 24. Symptomatology and clinical examination of ear
- 25. Otitis externa and media (acute, secretory)
- 26. Chronic Suppurative Otitis Media (CSOM) (tubo-tympanic type)
- 27. Chronic Suppurative Otitis Media (CSOM) (attico-antral)
- 28. Complications of Otitis Media
- 29. Deafness
 - a. Congenital—Investigations and Management
 - b. Acquired —Conductive
 - c. Secretory otitis media
 - d. Otosclerosis
 - e. SNHL
 - f. Meniere's disease
 - g. Acoustic neuroma
 - h. Presbycusis
 - i. Ototoxicity
- 30. Audiometry I
 - a. Basic principles of audiometry
 - b. PTA
 - c. Tympanogram
- 31. Audiometry II
 - a. Hearing assessment in children
 - b. Hearing aids and Cochlear implant
- 32. Vertigo
 - a. Causes
 - b. Investigations and Management

33. Trans-sphenoidal Approach in Neurosurgery
 36 Keros Classification of Sphenoidal Recess
 Cochlear Implant
 37 Radiology in ENT
 38 Instruments in ENT
 39- Common case presentation (Seminar or Flipped
 42 classroom) OSCE discussion
 43

Schedule of Practicals

Four weeks each in the sixth and seventh semesters. The entire batch will be divided into groups of two/three (depending on the number of students) and posted to cubicles. One of these groups will attend the operation theatre by rotation.

8 to 9 am: Clinical methods and case presentation Class

9 to 11: Clinics

11 to 12 noon: Case or Topic presentation (Students should maintain a record book of minimum of ten cases – 2 marks will be awarded for this record book and added to the internal assessment practical marks)

Innovative teaching – Seminars / Group discussions

- Sensitise students to common ENT problems in the society. Students may be assigned projects in areas like early detection of deafness, rehabilitation of the hearing impaired, noise pollution and its prevention, tobacco and its deleterious effects in the ear, nose and throat, environmental pollution and allergies etc.
- Use of Internet to keep track of latest innovations and as a research tool.

Integrated teaching sessions - vertical and horizontal

Topic	Department
1. Anatomy of ear nose and throat	Anatomy
2. Physiology of hearing and balance, olfaction and phonation	Physiology

Course Outcomes

CO1: Competency to perform complete ear nose, throat examination.

CO2: Knowledge of the pathophysiology of common ENT diseases and emergencies.

CO3: Competency to document and interpret the findings after a complete examination.

CO4: Competency to prescribe common investigative procedures, including imaging, and interpret the findings.

CO5: Competency to counsel the patient regarding need for various common surgeries in ENT.

CO6: Competency to perform procedures with assistance.

CO7: Competency to prescribe appropriate and rational medicines for common ENT conditions.

CO8: Competency to identify the cases that need referral.

CO9: Knowledge of the management protocol for ENT emergencies.

University examination				Internal assessment		
Theory 40	Practical 30	Viva voce 10	Total 80	Theory 10	Practical 10	Total 20

Textbooks/ Reference Books

Recommended Prescribed Books:

1. Short Text Book of ENT - K.K. Ramalingam
2. Text book of Ear, Nose, Throat, Head and Neck Surgery- Clinical and Practical- P.Hazarika
3. Ear, Nose Throat Simplified - Hathiram and Grewal
4. Logan Turners Diseases of the Ear, Nose and Throat

Reference Book:

Scott- Brown's Otolaryngology – 6 volumes

GENERAL MEDICINE (U19MBB303)

Goal :

The broad goal of teaching under graduate students in Medicine is to have knowledge, skills and behavioural attributes to function effectively as the first contact physician.

Competencies

The Indian Medical Graduate will acquire the knowledge and skills necessary to attain the competencies to:

- Establish doctor-patient communication.
- Take an adequate history and interpret the same.
- Analyse symptoms and form differential diagnosis based on history.
- Conduct physical examination with the necessary clinical skills.
- Form provisional/differential diagnosis based on history and physical examination.
- Choose the appropriate basic Laboratory/Radiological investigation.
- Summarize/Conclude case based on all the above.
- Communicate diagnosis/disease information to patient/bystanders.
- Evaluate/Treat/Prevent common illness.
- Impart health education.
- Non communicable disease prevention/treatment.
- Familiarity with commonly used medications and treatment of common illness.
- Documentation.
- Communication/Relationship with seniors and colleagues.
- MLC - Documentation.
- Familiarise with basic medical procedure.

Objectives

Knowledge:

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

- Diagnose common clinical disorders with special reference to infectious diseases, nutritional disorders, tropical and environmental diseases.
- Propose diagnostic and investigative procedures and ability to interpret them;
- Outline various modes of management including drug therapeutics especially dosage, side effects, toxicity, interactions, indications and contra indications.
- Provide first level management of acute emergencies promptly and efficiently and decide the timing and level of referral, if required.
- Recognise common geriatric disorders and their management.

Skill

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

- Develop clinical skills (history taking, art of communication, detailed systematic clinical examination to diagnose various common medical disorders and emergencies;
- Take decision to refer a patient to secondary and /or tertiary level of health care after having instituted primary care when necessary

- Perform simple routine investigations like haemogram, stool, urine, sputum and biological fluid examinations;
- Assist the common bed side investigative procedures like pleural / peritoneal tap, lumbar puncture, bone marrow aspiration / biopsy and liver biopsy / aspiration

Attitude

- Heal whenever possible but always provide hope, health and happiness.
- Not to make investigation and treatment more difficult than the disease itself.
- Avoid over investigation and over treatment. Do not forget that most, common disorders are self curing.
- The patient is not a mere collection of symptoms / signs / disordered function /damaged organs / disturbed emotions – He is human, fearful / hopeful / seeking relief/health/ reassurance.
- To maintain human touch always integrating the traditional with the modern methods of healing.
- Maintain highest standard of ethical practice, character, modest and humble behavior.
- Maintain good relationship with professional colleagues. Avoid criticism of the measures taken by the colleagues. Medical practice is always a team work. There is no place for “EGO”.
- Treat the patient as a whole considering, social, economical and family background, and not the organ / system that are abnormal.

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Integration

With community medicine and physical medicine and rehabilitation to have the knowledge, and be able to manage important current national health programmes, also be able to view the patient in his / her total physical, social and economic milieu.

Integrate with other relevant academic inputs which provide scientific basis of clinical medicine e.g.:- Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology.

Teaching Schedule

Lectures/ Practical/Innovative Sessions

Semester	III	IV	V	VI	VII	VIII	IX	Total
Hours	24	24	16	48	32	96	64	304

Clinical Posting

Semester	III	V	VI	VIII	IX	Total
Weeks	8	2	4	8	4	26

Teaching Hours

Lecture	Practical/ Clinical	Innovative sessions	Total
100	624	204	928

Schedule of Lectures

Topic	Hours
Foundation of our art	1 hour
Nutrition, Exposure to Chemical and Physical Agents	11 hours
Obesity	1 hour
Vitamin deficiency and excess	2 hours
Fluid and electrolyte balance, acidosis, alkalosis	3 hours
Common poisonings	2 hours
Snake bite, insect stings	1 hour
Disturbance of temperature	1 hour
Drowning, electrical injury, radiation hazards	21 hours
Infections	1 hour
Enteric fever	1 hour
Cholera, gastroenteritis, food poisoning	1 hour
Influenza, other respiratory viral diseases	1 hour
Rabies	1 hour
Tetanus	1 hour
Herpes simplex, zoster, chicken pox	2 hours
Amoebiasis	2 hours
Helminthic infections and filariasis	1 hour
Malaria	1 hour
Leptospirosis	1 hour
Common fungal infections	2 hours
Common exanthem	2 hours
Tuberculosis	1 hour
Leprosy	1 hour
HIV, AIDS	1 hour
Syphilis	1 hour
Dengue fever	1 hour
Chikungunya	1 hour
Toxoplasmosis	
Kala Azar	
Hydatid Disease / Cysticercosis	
Rickettsial Infections- Scrub typhus	
Brucellosis/Melioidosis	
Rare infectious Diseases of the region	1 hour
Haematology	R
Red cell disorders (nutritional deficiency anemias to be emphasised)	e
Bleeding disorders, Disseminated Intravascular Coagulation, Platelet disorders	s
Leukemias, leukopenia	p
Lymphoma, myeloma	i
Respiratory System	

ratory physiology, respiratory function test	8 hours
Upper and lower respiratory tract	2 hours
infection Pneumonia	2 hours
Bronchiectasis, lung abscess	2 hours
Bronchial asthma, tropical	2 hours
eosinophilia COPD, cor	15 hour
pulmonale	1 hour
Respiratory failure	1 hour
Non cardiogenic pulmonary oedema / ARDS	2 hours

Course Outcomes

CO1: Learn Basic Anatomy and Physiological and biochemical changes in the body

CO2: Learn about microbes causing infection in humans and drugs use to treat these

CO3: Pathological changes during infection and the clinical examination of the patient with empathy and sympathy

CO4: Use of invasive and non invasive investigations required for the diagnosis

CO5: Streamline the thinking process, use investigations judiciously

Distribution of Marks for Internal Assessment and University Examinations

University Examination					Internal Assessment		
Theory I 60	Theory II 60	Practical 100	Viva Voce 20	Total 240	Theory 30	Practical 30	Total 60

University Examination - Scheme

Theory

Each theory paper of 60 marks will be of 3 hours duration.

Every question paper will have two sections carrying equal marks. Cancel the following items from Section A.

1. Match the following - 3 marks.
2. Diagram - 2 marks
3. Write briefly on - 5 Marks

The model questions can be as given

below Section A

1. MCQ - 10 Marks (20 Questions $\times$ $\frac{1}{2}$ marks each)
2. Short notes on - 10 Marks (5 Questions $\times$ 2 marks each)
3. Problem Oriented Essay questions- 10 Marks
(Total-30 Marks)

Section B - Same as Before

1. 10 Short structured question – 10 marks
2. 5 Short notes – 10 marks
3. 1 Problem oriented question – 10 marks

Division of Topics

Paper 1 – chest, dermatology, psychiatry, radiodiagnosis, basic sciences as applied medicine, genetics, immunology, rheumatology, tropical diseases, nutrition, poisoning, toxicology.

Paper 2 – CVS, GIT, nephrology, CNS, endocrinology, hematology.

Practicals

Long case 1 (including writing of case sheet) – 60

marks Short case 2 (system to be mentioned) – 20 x 2 –

40 marks **Clinical examination**

Clinical examination will be conducted in the hospital wards.

Clinical cases should include common diseases, the student is likely to come across in practice. Rare cases/obscure syndromes, long cases of neurology shall not be kept in the practical examination. Emphasis should be on candidate's capability in eliciting physical signs and their interpretation. Practical examination should be objective and should test skills and ability to interpret the results. OSCE (Objective Structured Clinical Evaluation) should be incorporated in the practical examination. VIVA includes evaluation of management approach in handling of emergencies. Candidate's skill in interpretation of common investigative data, X – Rays, Identification of specimens, ECG etc. is to be evaluated

Viva voce

Patient management problems, X- Ray, ECG, medicines, instruments, investigation charts.

Four examiners – topics to be divided and all examiners to examine each student. (4 x 5 = 20 marks)

Textbooks Recommended

Prescribed

Textbooks

1. Principles and Practice of Medicine – Davidson
2. Text Book of Medicine – Prof. Dr. K. V. Krishnadas
3. Text Book of Medicine – Kumar and Clerk
4. Clinical Examination in Medicine – Macleod
5. Clinical Examination in Medicine – Prof. K.V. Krishnadas
6. Clinical Methods - Hutchison

Reference Books

1. Text Book of Medicine API
2. Text Book of Medicine Harrison's
3. Text Book of Medicine Cecil Loeb
4. Text Book of Medicine Oxford

PSYCHIATRY AND BEHAVIOUR MEDICINE (U19MBB304)

Goal

The broad objective is to groom the medical student into a first contact physician with an awareness about and affinity for a holistic humanistic approach and a bio-psycho-social model of clinical medicine, besides an essential working knowledge about mind and its disorders.

Objectives

Knowledge:

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

- Identify the common mental illnesses.
- Aware of the management aspects of common mental illnesses.
- Be able to provide emergency and first level care in psychiatric disorders.
- Take appropriate referral decisions in psychiatric, neuropsychiatric and psychosomatic disorders.
- Provide an efficient follow-up for psychiatric patients in maintenance and prophylactic treatment.
- Develop sensitivity to the psychological factors influencing predisposition, onset, course, treatment and management of physical diseases.
- Identify psychiatric disorders like major depression, dysthymia, neurotic disorders and substance abuse disorders that present with physical symptoms and signs.

Skills:

At the end of the training the student should be able to:

- Develop communication skills to put the patient at ease and help in adjusting to illness and accepting treatment.
- Take a proper history and conduct a proper mental status examination and diagnose common psychiatric disorders.
- Impart first level management of psychiatric illnesses in emergencies.
- Make appropriate referral decisions in case of psychiatric disorders, neuropsychiatric disorders and psychosomatic disorders.
- Do follow-up of psychiatric patients in maintenance and prophylactic treatment.
- Able to develop good doctor patient relationship.
- Able to develop good interpersonal relationship and clinical team work with colleagues.

Attitude:

- Be available and willing to communicate with a patient in distress and suffering.
- Recognise the personality, personal anxieties and feelings of the patient and be able to respect the patient as a human being.
- Enable the patient to adjust to the pain, distress and disability of the illness and accept the treatment and its outcome with fortitude and optimism.

Integration:

- Integrate with Internal Medicine and specialities, Community Medicine and Physical Medicine to impart a holistic and longitudinal clinical approach.
- Integrate basic biological sciences with basic behaviour sciences like Psychology, Sociology, Medical Anthropology and Medical Ethics.

Clinical Posting

Semester	V	VI	Total
Weeks	2	2	4

Teaching Hours

Lecture	Practical/Clinical	Innovative sessions	Total
8	140	16	164

Schedule of Lectures

Topics	Hours
Science of the mind – psychology – sociology	1 hour
Emotions and their influence in health	1 hour
Influence of society and culture in health	1 hour
Importance of study of the mind for the practice of medicine	1 hour
Symptoms and signs of mental illnesses	2 hours
Diagnosis and nosology of mental disorders	1 hour
Organic psychiatric disorders	2 hours
Psychoses	2 hours
Neuroses	1 hour
Personality disorders	1 hour
Alcohol & other substances of abuse	2 hours
Childhood psychiatric disorders	1 hour
Psychiatric disorders of old age	1 hour
Treatment - approaches & principles in psychiatry	2 hours
Psychiatry in India	1 hour
Suicide and social psychiatry	1 hour
Mind, spirituality and medicine	1 hour

Innovative sessions: are mostly meant to cover communication, doctor patient relationship, patient role and doctor role and illness behaviour. For this 12 hrs are allocated in V semester and 12 hrs in VI semester. The innovative sessions will cover aspects of behaviour medicine, which is very vital for the physician. It includes communication in clinical settings, doctor-patient relationship, inter personal relationship and teamwork, breaking bad news, handling patient's complaints. These are better imparted as integrated group learning sessions and role play. 6 Session of 2 hrs in V Semester and 6 Session of 2 hrs in VI Semester are allocated for this.

Integrated teaching: 26 Hours

With Bio Chemistry : Neuro chemistry of the human behaviour 2

hours With Physiology/Anatomy : Limbic lobe functioning and human behaviour 2

hours With Pharmacology : Psychopharmacology-therapeutics aspects 4

hours With Community Medicine :

Epidemiology of mental disorders

National mental health
programme Child and women
mental health.

Psycho - social rehabilitation 4 hours

With Forensic Medicine : Mental Health Act'

87 Persons' with
disability Act Crime and
mental illness

Outline of psychiatric criminology 3 hours

With Internal Medicine

: Organic psychiatric disorders

Dementia, delirium, epileptic psychosis etc.

Course Outcomes

CO1: Ability to be the first contact physician for the mentally ill.

CO2: Awareness about and affinity for a holistic humanistic approach and a bio-psycho-social model of clinical medicine.

CO3: An essential working knowledge about mind and its disorders.

CO4: Competency to take appropriate referral decisions in psychiatric, neuropsychiatric and psychosomatic disorders.

CO5: Communication skills to put the patient at ease and help in adjusting illness and accepting treatment.

Assessment

Internal Assessment

Theory:

As there is no University examination in Psychiatry, the performance of the students are evaluated by the internal assessment examinations conducted by the department of Internal Medicine/Psychiatry. Short notes/short answer questions will be included in the 2 internal examinations conducted by department of Medicine. One hour theory examination will be conducted by the Psychiatry department during VI or VII Session and marks added to average marks in Medicine. (Theory)

Practical:

A brief clinical examination can be conducted by the department at the end of clinical posting consisting of a short case of psychiatric illness (30 minutes) and an interview /communication session (30 minutes) The marks can be added to Internal Medicine of Medicine department (practical).

University

Examination:

Theory:

Two short notes on psychiatry will be included in one of the theory papers in medicine.

Practical:

There will not be any practical/clinical examination in psychiatry

Textbooks Recommended

- | | |
|---|-------------------------|
| 1. Clinical Examination in Medicine | - Prof. K.V.Krishna Das |
| 2. Text Book of Medicine | - Prof. K.V.Krishna Das |
| 3. Clinical Psychiatry for undergraduates | - A.V.Rao & K.Kuruvilla |

Reference Books:

- | | |
|-----------------------------------|------------------------------------|
| 1. Psychological Medicine | - Curran & Patridge, Morgan & King |
| 2. Oxford Text Book of Psychiatry | |
| 3. Synopsis of Psychiatry | |

DERMATOLOGY AND SEXUALLY TRANSMITTED DISEASES (U19MBB305)

Goal

The aim of teaching the undergraduate student in Dermatology, Sexually Transmitted Diseases (STD) and Leprology is to impart such knowledge and skills that may enable him to diagnose and treat common ailments and to refer rare diseases or complications/unusual manifestations of common diseases, to the specialist.

Objectives

Knowledge:

To impart knowledge and skills to the students so that at the end of the postings they can..

- Diagnose and treat common ailments of skin
- Correlate skin lesions with possible underlying systemic conditions
- Comprehend the basics of topical therapy.
- Recognize emergency situations/rare cases so as to refer to a specialist for further evaluation.
- Diagnose sexually transmitted infections and leprosy and be aware of various National Programmes in leprosy and STDs
- Have a basic comprehension regarding the nuances of cosmetic dermatology and dermatological surgery.
- Have a basic comprehension of newer equipment and procedures related to modern dermatology- like UV therapy

Skills:

The student shall be able to..

- Interview the patient, elicit relevant and correct information and describe the history in chronological order.
- Conduct clinical exam, elicit & interpret physical findings and diagnose common disorders and emergencies.
- Perform simple, routine investigative and laboratory procedures required for making the bed-side diagnosis especially the examination of scrapings for fungus, preparation of slit smears and staining for AFB for leprosy patients and for STD cases.
- Manage common diseases, recognizing the need for referral for specialized care, in case of inappropriateness of therapeutic response.

Teaching Schedule

Lectures

Semester	VI	VII	Total
Hours	16	16	32

Clinical Posting

Semester	IV	V I	Total
Weeks	2	4	6

Teaching Hours

Lecture s	Practicals/Clini cal	Innovative sessions	Tota l
32	144	18	194

Schedule of lectures

Topic

14 hours

Basics of dermatology - including structure and functions of the skin and dermatological case taking.

Infections - bacterial, fungal, viral, and parasitic.

Eczemas.

Papulosquamous diseases - including psoriasis and lichen planus. Hair and Nail disorders.

Leprosy.

Urticaria and drug reactions. Bullous

dermatosis.

Nevi and cutaneous malignancies.

Connective tissue disorders and skin. Topical therapeutics.

STDs and HIV.

Cosmetic dermatology and dermatosurgery.

Procedures like UV Therapy & Newer types of laser procedures for dermatological indications.

Symposia, Seminars

14 hours

Course Outcomes

CO1: Competency to diagnose and manage common ailments of skin

CO2: Competency to correlate skin lesions with possible underlying systemic conditions.

CO3: Knowledge of the basics of topical therapy.

CO4: Ability to recognize emergency situations/rare cases so as to refer to a specialist for further evaluation.

CO5: Competency to diagnose sexually transmitted infections and leprosy and be aware of various National Programmes in leprosy and STDs

CO6: Knowledge of the nuances of cosmetic dermatology and dermatological surgery.

CO7: Knowledge of newer equipment and procedures related to modern dermatology-like UV therapy

CO8: Competency to interview the patient, elicit relevant and correct information and describe the history in chronological order.

CO9: Competency to perform simple, routine investigative and laboratory procedures required for making the bed-side diagnosis especially the examination of scrapings for fungus, preparation of slit smears and staining for AFB for leprosy patients and for STD cases.

RADIO-DIAGNOSIS & IMAGING (U19MBB306)

Goal

The broad goal of teaching undergraduate medical students in the field of Radio-diagnosis should be aimed at making the students realize the basic need of various radio-diagnostic tools in medical practice. They shall be aware of the techniques required to be undertaken in different situations for the diagnosis of various ailments as well as during prognostic estimations.

Objectives

Knowledge

The student shall be able to:

- Understand basics of x-ray production, its uses and hazards;
- Appreciate and diagnose changes in bones – like fractures, infections, tumours and meta- bolic bone diseases;
- Identify and diagnose various radiological changes in disease conditions of chest and me- diastinum, skeletal system, gastro intestinal tract, hepatobiliary system and genito urinary (G.U) system.
- Learn about various imaging techniques, including isotopes Computerised Tomography (C.T), Ultrasound, Magnetic Resonance Imaging (M.R.I) and D.S.A.

Skills

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

- Use basic protective techniques during various imaging procedures;
- Interpret common x-ray, radiodiagnostic techniques in various community situations;
- Advise appropriate diagnostic procedures in specialized circumstances to appropriate spe- cialists.

Teaching Schedule

Lecture/Practicals/Innovative Sessions

Semester	VI	Total
Hours	24hrs	24hrs

Clinical Posting

Semester	V	Total
Weeks	2 (One week each in Radiology & Radiation Oncology)	2

Teaching Hours

Lectures	Practicals/ Clinical	Innovative sessions	Total
8	48	16	72

*Includes teaching of Radiotherapy.

Schedule of Lectures

Topic

14 hours

1. Musculo Skeletal – Commonly performed skeletal radiography, various types of fractures/ locations. infections, tumours, metabolic bone disease, joint disease (Infections ,Immunological metabolic condition)

2. Chest – Normal chest, various lung parenchymal pathologies, congenital and acquired cardiac conditions, pneumothorax, pleural effusion, mediastinal masses.
3. GI System – Upper GI examination, lesions of oesophagus, stomach and duodenum – small bowel diseases, various colonic pathologies.
4. Hepatobiliary system – Ultrasound examination, contrast studies, CT, MRI.
5. Genitourinary system – Plain film, ultrasound examination, contrast studies, IVU, MCU, urethrogram and CT and emergencies.
6. Central nervous system – Radiological manifestations of infarcts, haemorrhage, tumours and inflammations in brain and spine and emergencies.
7. Interventional Radiology – Common IR procedures and their role in clinical practice.
8. Women's Imaging - Mammography, Imaging of the foetus and pregnant imaging of gynaecologic diseases and emergencies.
9. X-ray - its nature, production, hazards and basic safety protocols.

Course Outcome

CO1: Understanding of the basics of x-ray production, its uses and hazards.

CO2: Ability to appreciate and diagnose changes in bones – like fractures, infections, tumours and metabolic bone diseases.

CO3: Competency to identify and diagnose various radiological changes in disease conditions of chest and mediastinum, skeletal system, gastro intestinal tract, hepatobiliary system and genitourinary (G.U) system.

CO4: Competency to use basic protective techniques during various imaging procedures;

CO5: Competency to interpret common x-ray, radiodiagnostic techniques in various community situations.

CO6: Competency to advise appropriate diagnostic procedures in specialized circumstances to appropriate specialists.

CO7: Knowledge of various imaging techniques, including isotopes Computerised Tomography (C.T), Ultrasound, Magnetic Resonance Imaging (M.R.I) and D.S.A.

RADIATION THERAPY AND MEDICAL ONCOLOGY (U19MBB307)

Goal

The broad goal of teaching the undergraduate medical students in the field of Radiotherapy is to make the students understand the magnitude of the ever-increasing cancer problem in the country. The students must be made aware about steps required for the prevention and possible cure of this dreaded condition.

Objectives

Knowledge

The student shall be able to:

- To have a basic concept of Radiobiology
- Identify symptoms and signs of various cancers and their steps of investigations and management;
- Explain the effect of radiation therapy on human beings and the basic principles involved in it,
- Know about radio-active isotopes and their physical properties;
- Be aware of the advances made in radiotherapy in cancer management and knowledge of various radio therapeutic equipment while treating a patient;
- Identify various Chemotherapeutic agents used in cancer treatment.

Skills

At the completion of the training programme, the student shall be able to:

- Take a detailed clinical history of the case suspected of having a malignant disease;
- Assist various specialists in administration of anticancer drugs and in application and use of various radio therapeutic equipment, while treating a patient.

Course Outcomes

CO1: Basic knowledge of Radiobiology

CO2: Competency to identify symptoms and signs of various cancers and knowledge of the steps of investigations and management.

CO3: Knowledge of the effect of radiation therapy on human beings and the basic principles involved.

CO4: Knowledge of radio-active isotopes and their physical properties.

CO5: Awareness about the advances made in radiotherapy in cancer management and knowledge of various radio therapeutic equipment while treating a patient.

CO6: Knowledge of various Chemotherapeutic agents used in cancer treatment.

CO7: Competency to take a detailed clinical history of the case suspected of having a malignant disease;

CO8: Competency to assist various specialists in administration of anticancer drugs and in application and use of various radio therapeutic equipment, while treating a patient.

Schedule of Lectures

Topics

10 hours

Cancer epidemiology and possible etiological factors, screening for cancer
Principles of cancer chemotherapy – chemotherapeutic agents,
Targeted therapy
Hormone treatment in cancer
Radiation Oncology – radioactive sources – teletherapy – brachytherapy
Methods of radiotherapy – recent advances
Diagnosis and treatment of common malignancies
Oncological emergencies

Reference Books

1. Liebel & Philips Text book of Radiation Oncology
2. Perez & Brady Text book of Radiation Oncology
3. Text book of Oncology – Devitta
4. Manual of clinical oncology - Dennis. A. Casceita
5. Washington Manual of Oncology
6. Student- BMJ Journal
7. AJCC staging Manual (2012)
8. Radiobiology for the Radiologist (first seven chapters)- Eric J Hall

PULMONOLOGY (U19MBB308)

Goal

The aim of teaching the undergraduate in tuberculosis and chest diseases is to impart such knowledge and skills that may enable him/her to diagnose and manage common ailments affecting the chest with the special emphasis on management and prevention of tuberculosis and especially National Tuberculosis Control Programme.

Competencies

Core-Competencies

1. To prepare the clinical history of a patient with respiratory illness, by interacting with the patient, stressing on the points of presenting illness, past illness, personal history, occupational history etc.
2. To familiarize with the clinical examination of a patient with respiratory illness by methods of Inspection, palpation, percussion and auscultation.
3. To take history and examine a patient of pleural effusion systematically to arrive at a diagnosis and to suggest investigations and treatment.
4. To prepare history and examine a patient with pneumonic consolidation and to suggest investigations and treatment.
5. To take history and examine a patient with pneumothorax and to suggest investigation and treatment.
6. To Prepare history and examine a case of COPD and suggest investigations and management.
7. To take detailed history and to examine clinically a case of Bronchial asthma and plan investigations and treatment.
8. To prepare history and do clinical examination in a patient with Tuberculosis (pulmonary & extra pulmonary) and plan investigations and treatment with emphasis on Revised National TB control Program.

Non Core competencies.

1. Reading an X ray Chest and interpretation of X-rays for various common pulmonary diseases.
2. Viewing and interpreting Pulmonary function tests. (spirometry)
3. Viewing procedures like pleural aspiration, Intercostal drainage and bronchoscopy.

Objectives

Knowledge

At the end of the course of tuberculosis and chest diseases, the student shall be able to:

- Demonstrate sound knowledge of chest diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis;
- Demonstrate comprehensive knowledge of various modes of therapy used in treatment of respiratory diseases;
- Describe the mode of action of commonly used drugs, their doses, side-

- effects/toxicity, indications and contra-indications and interactions;
- Describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of management inclusive of National Tuberculosis Control Programme.

Skills

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

- Interview the patient, elicit relevant and correct information and describe the history in chronological order;
- Conduct clinical examination, elicit and interpret clinical findings and diagnose common respiratory disorders and emergencies.

Teaching Schedule

Lecture/Practical/Innovative Session:

Semester	VI	Total
Hours	24	24

Clinical Posting:

Semester	IV	Total
Weeks	2	2

Lectures	Practicals/ Clinical	Innovative sessions	Total
8	48	16	72

Course Outcomes

CO1: Competency to prepare the clinical history of a patient with respiratory illness, by interacting with the patient, stressing on the points of presenting illness, past illness, personal history, occupational history etc.

CO2: Familiarity with clinical examination of a patient with respiratory illness by methods of Inspection, palpation, percussion and auscultation.

CO3: Competency to take history, make diagnosis and suggest investigations and treatment in a patient with pleural effusion.

CO4: Competency to take history and examine a patient with pneumonic consolidation and to suggest investigations and treatment.

CO5: Competency to take history and examine a patient with pneumothorax and to suggest investigation and treatment.

CO6: Competency to take history and examine a case of COPD and suggest investigations and management.

CO7: Competency to take detailed history and to examine clinically a case of Bronchial asthma and plan investigations and treatment.

CO8: Competency to prepare history and do clinical examination in a patient with Tuberculosis (pulmonary & extra pulmonary) and plan investigations and treatment with emphasis on Revised National TB control Program.

GENERAL SURGERY (U19MBB309)

Goal

The broad goal of teaching undergraduate students in Surgery is to produce graduates capable of delivering efficient first contact surgical care.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Diagnose common surgical conditions both acute and chronic, in adult and children;
- Plan various laboratory tests for surgical conditions and interpret the results;
- Identify and manage patients of haemorrhagic, septicæmic and other types of shock;
- Be able to maintain patent air-way and resuscitate,
 - i. a critically injured patient;
 - ii. Patient with cardio-respiratory failure; and
 - iii. Drowning case;
- Monitor patients of head, chest, spinal and abdominal injuries, both in adult and children;
- Provide primary care for a patient of burns;
- Acquire principles of operative surgery, including pre-operative, operative and post operative care and monitoring;
- Treat open wounds including preventive measures against tetanus and gas gangrene;
- Diagnose neonatal and paediatric surgical emergencies and provide sound primary care before referring the patient to secondary/tertiary centres;
- Identify congenital anomalies and refer them for appropriate management.

Objectives

Knowledge

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

- Describe aetiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adult and children;
- Define sepsis, disinfection and sterilization and recommend judicious use of antibiotics;
- To impart theoretical knowledge on the diagnosis and management of common surgical problems in our country, both elective and emergency.
- To impart sound practical skills for the management of these problems.
- Describe common malignancies in the country and their management including prevention;
- Define indications and methods for fluid and electrolyte replacement therapy including blood transfusion;
- Enumerate different types of anaesthetic agents, their indications, mode of administration, contra indications and side effects
- To effect appropriate transformation in the attitude and behaviour of the learner, so that they can function effectively in society.

Skills

The student shall have observed/assisted/performed the following:

- Incision and drainage of abscess
- Debridement and suturing open wound
- Venesection

- Excision of simple cyst and tumours
- Biopsy of surface malignancy
- Catheterization and nasogastric intubation
- Circumcision
- Meatotomy
 - Vasectomy
 - Diagnostic proctoscopy
 - Hydrocele operation
 - Endotracheal intubation
 - Chest tube insertion

Integration

The undergraduate teaching in surgery shall be integrated at various stages with different pre and para and other clinical departments.

Teaching Schedule

Lectures/Practical/Innovative Sessions

Semester	III	IV	V	VI	VII	VIII	IX	Total
Hours	24	24	16	48	32	96	64	304

Clinical Posting *

Semester	III	V	VI	VIII	IX	Total
Hours	8	2	4	8	4	26

* This includes posting in anaesthesiology and Casualty

Teaching Hours – General Surgery

Lectures	Practical/Clinical	Innovative session	Total
100	624	204	928

The curriculum is primarily intended for the departments of General Surgery, G I Surgery, Urology, Paediatric surgery, vascular surgery, Plastic surgery, cardiovascular surgery, Radio diagnosis, Anaesthesiology and Facio-Maxillary surgery.

The training programme is divided into three stages.

1. Initial stage (semester III)
2. Intermediate stage (semesters IV to VII)
3. Concluding stage (semesters VIII & IX)

Initial Stage (Semester III)

The primary objective at this stage is to provide certain basic concepts in surgical knowledge along with clinical skills to elicit common physical findings.

Lectures/Integrated Teaching Topics

Introduction including basic concepts of doctor-patient relationship. History of surgery with emphasis on the contribution of Indian surgeons. Shock, hemorrhage and transfusion. Fluid and electrolyte disturbances. Surgical infections, AIDS and antisepsis. Surgical nutrition. Peripheral arterial disease, venous and lymphatic diseases. Concepts of organ transplantation. Tumors, cysts and basics of oncology. Wounds and wound healing.

First month – one to one and half hours per day – classes emphasizing basic clinical findings All

days for about 2 hours – ward posting and clinical discussion. Operation theatre by rotation to demonstrate basic surgical skills and common procedures – students may be asked to scrub up. Clerk ship – students posted to night duty in wards on their respective admission days of the units into which they are posted.

Self Learning Packages:

Problem – Based Learning

Under the guidance of one faculty member, common problems such as clinical breast examination, abdominal pain, leg ulcers etc. would be allotted to different batches of students. The focus would be on data collection from databases. At the end of their postings, the students will be asked to make a presentation of their findings. They will also

Ethical Aspects of Clinical Examination - Abdominal examination , Breast examination , Per Rectal Examination

be required to submit a detailed report of their study.

Evaluation Strategies:

The initial phase will be evaluated as follows: Log books – include record of patients studied by the learner along with day-to-day activities. MCQ examination on topics covered in theory. OSCEs, short case presentations and oral examinations.

Assessment of presentation of the problem-based learning focusing on communication skills.

Intermediate Stage (Semesters IV to VII)

The basic stress here is to provide concepts in trauma and emergency surgery and also certain surgical specialities such as pediatric surgery, anaesthesiology, dental and radio diagnosis.

Lecture/Integrated Teaching Topics

Thyroid and other endocrine diseases Breast diseases. ATLS and trauma management Concepts of minimally invasive including laparoscopic surgery.

Introduction to Natural Orifice Transluminal Endoscopic surgery (NOTES)

Anaesthesiology

Pain and management Concepts of local anaesthesia Regional anaesthesia General anaesthesia Critical care medicine.

Paediatric surgery

CHPS Hirschsprung's disease Anorectal malformations Tracheo-esophageal fistula. Diaphragmatic hernia Neonatal intestinal obstructions Meckel's diverticulum Urological problems in children Tumors in children

Evaluation

Log book maintained by the student. MCQ tests on the theory topics along with short answer questions. OSCEs Evaluation in each speciality/department.

Oral cavity, esophagus, stomach and duodenum Hepato-biliary surgery Pancreas and spleen Hernias including abdominal wall. Small and large intestines, rectum and anal canal. Day case surgery Auditing in surgery Upper urinary – kidney (congenital anomalies, infections, tumors, stones) Lower Urinary – bladder and ureter and urethra (congenital anomalies, infections, tumors, stones) Testis and scrotum and male external genitalia - male infertility

Neuro surgery:

Head injuries Spinal injuries Basics of diagnosis and investigation of intracranial lesions Common tumors affecting the CNS Intracranial hemorrhage.

Cardiovascular and Thoracic Surgery

Congenital heart disease Coronary artery diseases. Valvular lesions affecting the heart. Chest injuries and tumors of the chest wall.

Plastic surgery

Burns -management. Skin grafting and flaps. Oncoplastic procedures Cleft lip and cleft palate

Topic presentation by the students: 1 hour per week; two or three students select a topic.

Operative surgery

Demonstration of procedure in the operation theatre and video demonstrations.

Practical training

Clinical posting in the wards on all days Clerkship on admission days.

Course Outcomes:

CO1: Competency to diagnose common surgical conditions both acute and chronic, in adult and children.

CO2: Competency to plan various laboratory tests for surgical conditions and interpret the results. **CO3:** Ability to identify and manage patients of haemorrhagic, septicemic and other types of shock.

CO4: Ability to maintain patent air-way and resuscitate, i. a critically injured patient; ii. Patient with cardio-respiratory failure; and iii. Drowning case.

CO5: Competency to monitor patients of head, chest, spinal and abdominal injuries, both in adult and children.

CO6: Competency to provide primary care for a patient of burns;

CO7: Knowledge of principles of operative surgery, including pre-operative, operative and post operative care and monitoring;

CO9: Competency to treat open wounds including preventive measures against tetanus and gas gangrene.

CO10: Competency to diagnose neonatal and paediatric surgical emergencies and provide sound

primary care before referring the patient to secondary/tertiary centres.

Distribution of Marks for Internal Assessment and University Examinations:

University Examination				Internal Assessment			
Theory I	Theory II	Practical	Viva voce	Total	Theory	Practical	Total
60	60	100	20	240	30	30	60

University Examination - Scheme

Theory

Two papers– paper I -Section A -Gastrointestinal tract Section B-Orthopaedics Paper II - Sections A & B -General Surgery Except GIT Anaesthesiology, Surgical Anatomy And Recent advances. The questions will be objective type –short answer/short structure/structured essay.

Practical

One long case, three short cases of which two will be Orthopaedics case. Objective Structured Clinical Examination.

Viva voce

Four examiners-all examiners individually examine each student – topics to be divided X-rays/ instruments/specimens/operative surgery/surgical pathology -histopathology slides

Books Recommended

1. Short Practice of Surgery – Bailey and Love
2. Sabiston Textbook of Surgery
3. Operative Surgery -Das
4. Textbook of Operative Surgery – Farquharson.
5. Clinical Surgery – Das.
6. Clinical Methods – Hamilton Bailey
7. Pye's Surgical Handicraft.

ORTHOPAEDICS (U19MBB310)

Goal

The broad goal of teaching undergraduate medical students in the field of Orthopaedics is to make the students understand the basics of fractures and dislocations commonly encountered and the essential treatment needed for emergency management. The common inflammatory and neoplastic diseases occurring in the bones and joints should also be familiarized.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Detect sprains and deliver first aid measures for common fractures and sprains and manage uncomplicated fractures of clavicle, Colles's; fracture, phalanx fracture, undisplaced fractures, forearm, Jones's fracture.
- Diagnose and manage common bone infections.
- Advise aspects of rehabilitation for polio, cerebral palsy and amputation.

Objectives

Knowledge

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

- Explain the principles of recognition of bone injuries and dislocation;
- Apply suitable methods to detect and manage common infections of bones and joints;
- Identify congenital, skeletal anomalies and their referral for appropriate correction or rehabilitation;
- Recognize metabolic bone disease as seen in this country;
- Explain aetio genesis, manifestations, diagnosis of neoplasm affecting bones.

Skills

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

- Use techniques of splinting, plaster, immobilization etc.
- Identify the indications for amputations.

Application

Be able to perform certain orthopaedic skills, provide sound advice of skeletal and related conditions at primary or secondary health care level.

Integration

Integration with Anatomy, Surgery, Pathology, Radiology and Forensic Medicine to be done.

Teaching Schedule

Lectures/Practicals/Innovative Sessions

Semester	VI	VII	VIII	IX	Total
Hours	24	16	36	32	108

Clinical Postings*

Semester	IV	VI I	IX	Total
Weeks	4	4	2	10

* Includes Posting in Physical Medicine & Rehabilitation for 1 week

Teaching Hours

Lecture	Practical/ clinical	Innovative session	Total
36	240	72	348

Schedule of Lectures

Topic	Hours
Traumatology	17
1. Definition of a fracture and types of fracture and general principles of management	1
2. Complications of fracture – open fractures and pathological fracture, external fixation	1
3. Fracture clavicle, fracture neck of humerus and shoulder dislocation	1
4. Fracture humerus shaft and supra condylar fracture/condylar fracture	1
5. Elbow dislocation and forearm fracture	1
6. Monteggia fracture and gallezi fracture	1
7. Colle's fracture and fracture scaphoid	1
8. Tendon injuries and hand injuries	1
9. Fracture spine and traumatic paraplegia	1
10. Fracture pelvis and hip fracture – fracture neck of femur	1
11. Hip dislocation and fracture shaft of femur	1
12. Condylar fracture femur and tibia	1
13. Meniscus tear and fracture patella	1
14. Leg fracture	1
15. Ankle injuries – Pott's fracture	1
16. Fracture Calcaneum and fracture Talus	1
17. Growth Plate Injury	1
18. Supracondylar fracture humerus in children	1
Cold Orthopaedics	15
1. C.T.E.V. and flat Foot	1
2. C.D.H.	1
3. Torticollis, congenital pseudoarthrosis of Tibia and arthrogyrosis multiplex congenital	1
4. Osteomyelitis	1
5. Septic arthritis	1
6. Tuberculosis – spine, hip, knee, elbow, wrist and other sites	1
7. AVN Head Femur	1
8. Introduction to Ilizarov/arthroscopy/arthroplasty	2
9. Perthe's and SCFE	1
10. Rickets and osteomalacia	1
11. Rheumatoid arthritis and ankylosing spondylitis	1
12. IVDP and Kyphosis	1
13. Scoliosis and spondylolisthesis	1
14. Bone tumour, osteochondroma, simple bone cyst	1
15. ABC, enchondroma, GCT, Ewing's Tumour	1
16. Osteosarcoma, multiple myeloma, metastatic bone diseases and chondrosarcoma	2
17. Osteogenesis, imperfecta nerve injuries – radial/ulnar/median nerves Sciatic/brachial plexus, osteoarthritis of hip and knee.	2
Seminars/Symposia	
Symposium with clinical cases – Trauma	
1. CTEV2.	
2. C.D.H.	

3. T.B. Spine
4. T.B. Hip
5. Perthe's
6. Slipped capital femoral epiphysis
7. Back pain
8. Bone tumours (benign)
9. Bone tumours (malignant)
10. Cubitus Varus/Valgus
11. Genu Varus/Valgus

Schedule of Practicals/Clinical Posting

1. Nerve injuries
2. Osteomyelitis
3. Metabolic bone disease
4. Symposium on physical medicine and rehabilitation
5. Supracondylar fractures of humerus
6. Ankylosis
7. Compartmental syndrome and VIC
8. Fat embolism syndrome
9. Traction, splints, POP
10. Orthopedics Implant and Instruments

Course Outcomes

CO1: Competency to detect sprains and deliver first aid measures for common fractures and sprains and manage uncomplicated fractures of clavicle, Colles's; fracture, phalanx fracture, undisplaced fractures, forearm, Jones's fracture.

CO2: Competency to diagnose and manage common bone infections.

CO3: Competency to give advice aspects of rehabilitation for polio, cerebral palsy and amputation.

CO4: Orientation in basic principles of community based rehabilitation of people with disabilities.

Textbooks Recommended

1. Graham Apley – System of Orthopaedics
2. Fractures and Joint Injuries – Watson Jones
3. Orthopaedics – Samuel F Turek
4. Merer's Orthopaedic Surgery
5. Outline of Fractures – Adam's
6. Outline of Orthopaedic Surgery
7. Clinical Surgery – Das-Chapter on Orthopaedics
8. Crawford Adam's – Operative Techniques (Orthopaedics)

Reference Book

1. Campbell's Operative Orthopaedics

PHYSICAL MEDICINE AND REHABILITATION (U19MBB311)

Schedule of Lectures/Innovative Sessions

1. Introduction to Physical Medicine and Rehabilitation
2. Concepts of impairment, disability, handicap and the rehabilitation team.
3. Principles of physio therapy-various physical modalities and therapeutic exercises.
4. Principles of occupational therapy its application in rehabilitation medicine.
5. Principles of prosthetics and orthotics and rehabilitation aids-their application in rehabilitation medicine.
6. Broad principles of Neurological, Orthopaedic, Musculoskeletal, Paediatric, Cardiac and Pul- monary rehabilitation.
7. Principles of Pain management.
8. Basic principles of disability evaluation for certification purposes.
9. To get exposed to the potentials of socio-vocational rehabilitation of the disabled.
10. Persons with Disability Act 1995.
11. To get oriented to basic principles of community based rehabilitation of people with disabili- ties.

Textbook Recommended

1. Physical Medicine and Rehabilitation-Randall and Braddom

ANAESTHESIOLOGY (U19MBB312)

Objectives

The student should be able to:

- Identify the various types of surgical anaesthesia
- Identify and detect the common possible complications of anaesthesia and treat/prevent them if possible.
- Identify the basic components of critical care.
- The situations where the principles of critical care can be adapted to general management of the very sick patient even with limited resources.
- Identify the possible deleterious effects, especially long term adverse consequences, of critical care and methods of prevention, early detection and effective treatment.
- Diagnose cardiac and respiratory arrests effectively and institute treatment without delay.
- Identify the principles of prolonged life support.
- Point out those aspects of pathophysiology of pain that are of practical relevance to management of pain.
- Enumerate the major modalities of management of acute and chronic pains.
- Enumerate the components of the WHO 3 step analgesic ladder.
- Identify the barriers to effective pain management including opio phobia and fear of side effects of analgesics.
- Identify the means of overcoming the barriers.
- Define palliative care, supportive care and long term care.
- Identify the principles of symptom control.
- Identify the common social, emotional and spiritual problems of patients with life threatening diseases and their management.
- Describe the principles of management of the dying patient.

Schedule of Lectures

Lecture/Practical/Innovative Session

Semester	Hours	Total
VI	72	72

Teaching Hours

Lectures	Practicals	Innovative Sessions	Total
8	48	16	72

Module A: Clinical Anaesthesia: 3 hours

Lecture : Introduction to Anaesthesiology and clinical anaesthesia
Lecture : Types of anaesthesia

Lecture : Complications of anaesthesia, their prevention, early detection and management.

Module B: Critical care:2 hours

Lecture: What is critical care?

Group work followed by discussion: How can the principles of critical care can be adapted to general management of the very sick patient even with limited resources?
Group work followed by discussion: Possible deleterious effects, especially long term adverse consequences, of critical care and methods of prevention, early detection and effective treatment.

Module C: Resuscitation: 10 hours

Lecture: Principles of resuscitation and the emergency management of a patient with sudden loss of consciousness: basic life support; management of the upper airway.

Group discussion: Basic life support continued: Breathing and circulation. Practical work in three groups: Airway management, breathing and circulation.

Practical work in three groups: Airway management, breathing and circulation - continued
Group discussion: ACLS: Drugs

Group discussion: ACLS – continued

Group work followed by discussion: Resuscitation in trauma
Lecture: Introduction to shock

Group work followed by discussion: Management of hypovolemic shock
Evaluation, discussion and feedback.

Module D: Pain and Palliative care – 8

hours Lecture: Introduction to pain relief and palliative care
Lecture: Pathophysiology and assessment of pain

Role play followed by discussion: Assessment of pain (emphasizing on patient centered care)
Group discussion: The WHO analgesic ladder

Group work followed by discussion: Management of chronic pain (using hypothetical case histories)

Group work followed by discussion: Principles of management of symptoms of other than pain. Role play followed by discussion: Emotional problems and psychosocial

support in incurable illness

Group discussion: How can the principles of palliative care be integrated into routine medical practice?

1. Brain Death
2. Organ donation
3. End of life

New Innovative Methods

1. Ultrasound guided vascular access
2. Ultrasound guided regional nerveblock

Course Outcomes:

CO1: Knowledge of the various types of surgical anaesthesia

CO2: Knowledge of the common possible complications of anaesthesia and the skill to treat/ prevent them if possible.

CO3: Knowledge of the basic components of critical care.

CO4: Knowledge of the principles of prolonged life support.

CO5: Understanding of management of acute and chronic pains with understanding of the components of the WHO 3 step analgesic ladder.

CO6: Understanding of palliative care, supportive care and long term care.

CO7: Knowledge of the principles of management of the dying patient.

Assessment

There will be a pre test and post test for each module. The post test will be followed by evaluation of each session by the students.

OBSTETRICS & GYNAECOLOGY (INCLUDING FAMILY WELFARE PLANNING) – (U19MBB313)

Goal

The broad goal of teaching undergraduate students in Obstetrics and Gynaecology is that they shall acquire understanding of anatomy, physiology and patho physiology of the reproductive system and gain the ability to optimally manage common conditions affecting it.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Examine a pregnant woman; recognize high risk pregnancies and make appropriate referrals.
- Conduct a normal delivery, recognise complication and provide postnatal care.
- Resuscitate the newborn and recognise congenital anomalies.
- Advise a couple on the use of various available contraceptive devices and assist in insertion and removal of intra-uterine contraceptive devices.
- Perform pelvic examination, diagnose and manage common gynaecological problems including early detection of genital malignancies.
- Interpretation of data of investigations like biochemical, histopathological, radiological, ultrasound etc.

Objectives

Knowledge

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

- Outline the anatomy, physiology, and pathophysiology of the reproductive system and the common conditions affecting it.
- Detect normal pregnancy, labour, puerperium and manage the problems he/she is likely to encounter therein.
- List the leading causes of maternal and perinatal morbidity and mortality.
- Understand the principles of contraception and various techniques employed, methods of medical termination of pregnancy, sterilization and their complication.
- Identify the use, abuse and side effects of drugs in pregnancy, peri-menopausal and post-menopausal periods.
- Describe the national programme of maternal and child health and family welfare and their implementation at various levels.
- Identify common gynaecological diseases and describe principles of their management..
- State the indications, techniques and complications of surgeries like caesarian section, Abdominal hysterectomy, vaginal hysterectomy and other surgeries for prolapse, laparoscopic surgeries, manual vacuum aspiration syringe for Medical Termination of Pregnancy (MTP).

Skills

At the end of the course, the student shall be able to.

- Make a vaginal cytology smear, perform a postcoital test and wet vaginal smear examination for *Trichomonas vaginalis*, moniliasis and gram stain for gonorrhoea.

Attitude

The students should be considerate and compassionate to the patients. They should be able to mingle with the patients freely and should be able to go deep into their problems. They should not only study the physical ailments but also the mental problems which would have been the cause for many of the physical ailments. Should develop service mentality in students.

Integration

The student shall be able to integrate clinical skills with other discipline and bring about coordination of family welfare programmes for the national goal of population control.

General Guidelines for Training

1. Attendance of a maternity hospital or the maternity wards of a general hospital including (i) antenatal care (ii) the management of the puerperium and (iii) a minimum period of 5 months in –patient training including family welfare planning.
2. Of this period of clinical instruction, not less than one month shall be spent as a resident pupil in a maternity ward of a general hospital.
3. During this period, the student shall conduct at least 10 cases of labour under adequate super- vision and assist in 10 other cases.
4. A certificate showing the number of cases of labour attended by the student in the maternity hospital and/or patient homes respectively, shall be signed by a responsible medical officer in the staff of the hospital and shall state.
5. That the student has been present during the course of labour and personally conducted each case, making the necessary abdominal and other examination under the supervision of the cer- tifying officer describe his official position.
6. That satisfactory written histories of the cases conducted including wherever possible antena- tal and postnatal observations, were presented by the student and initialed by the supervising officer.

Lectures/Practical/Innovative Sessions

Semester	VI	VII	VIII	Total
Hours	48	32	120	200

Clinical Posting

Semesters	IV *	VI	VII	VIII	IX	Total
Weeks	8	4	4	4	4	22

* 8 Including 2 weeks Radiology

Teaching Hours

Lectures	Practicals/Clinicals	Innovative Sessions	Total
90	530	110	640

Schedule of Lectures

Topic	Hours
Obstetrics	49 hours
Applied anatomy:	
Pelvis, foetus in normal pregnancy, foetal circulation.	1
Physiology of pregnancy	
Maternal changes-anatomical, physiological and endocrinological	1
Diagnosis and differential diagnosis of pregnancy, antenatal care	1
Physiology of labour	
Stage of labour, mechanism of normal labour, conduct of normal labour	1
Physiology of puerperium	
Normal puerperium, care of puerperium	1
New born	
Care	1
Lactation	1
Pathology of pregnancy	
I trimester: hyperemesis, abortion, vesicular mole, Ectopic, antepartum	

haemorrhage, preterm labour, PROM	2
Hypertensive disorders of pregnancy	3
Medical diseases	9
Heart disease, anaemia, diabetes, UTI, hepatitis, TB-chest disease, infections, HIV	
Pathology of labour	9
Dystocia malpresentations +malposition, multiple pregnancy +hydramnios, dysfunctional labour dystocia due to abnormalities of maternal soft parts, foetal causes – tumours complicating pregnancy, contracted pelvis, CPD –obstructed labour.	
III stage complications	2
PPH, retained placenta, inversion of uterus, postpartum collapse injuries to parturient canal –rupture uterus, tears	2
Puerperium	
Puerperal infections, CVT, DVT	2
Special Cases	6
Post dated pregnancy, prematurity, IUGR, IUD, foetal surveillance, elderly primi , grand multipara, Rh negative ,post CS pregnancy, gynaecological disorders complicating pregnancy Maternal and perinatal mortality.	
Operative obstetrics	3
Caesarean section, episiotomy, destructive operation, manual removal of Placenta.	
Neonatology, congenital malformations	1
Drugs in pregnancy –oxytocin, obstetric analgesia	1
Induction of labour	1
USG in obstetrics.	1
Gynaecology & Reproductive Medicine	37
Applied anatomy	1
Development-developmental anomalies	2
Physiology	2
Menstrual disorders –A UB , amenorrhoea	3
Puberty – problems of	1
Menopause – Hormone replacement therapy (HRT)	2
Disease of vulva and vagina	2
PID	2
Endometriosis	1
Infertility	2
Contraception	3
Diseases of uterus	3
Diseases of cervix	2
Diseases of ovary	2
Hormones, hormone replacement therapy	2
Radiation chemotherapy, preventive gynaecology	3
Adolescent problems	1
Endoscopy (laparoscopy , hysteroscopy, culdoscopy)	1
Family Planning	4
MTP	
Sterilization	

Schedule of Practicals

Total Hours 530. Ward work - in the out patient department, operation theatre and labour room. Every day

8 – 9 am	- Symposium & Group discussion
9-10.30 am	- Case demonstration
10.30 am - 12.00 noon	- Clinical discussion

Two days per week is devoted for live operative surgery demonstration and discussion. Students have to maintain separate clinical record books and a minimum of twenty cases are to be recorded.

Clinical Posting in Obstetrics

Student will learn history taking, diagnosis and differential diagnosis of normal pregnancy, physical changes in pregnancy, presentation, position, lie etc., normal labour -stages and mechanism (demonstration of normal labour in the labour room), puerperium with stress on lactation, BFHI, common ailments of pregnancy like hyperemesis and UTI. Unit posting will include combined classes on Pathology of pregnancy, complications of pregnancy-APH, HTD, abnormal presentation, medical complications, PPRM, PTL, FGR, III stage complication and abnormal puerperium.

Clinical Posting in Gynaecology

Student will learn history taking, examination of a case, common symptoms, applied anatomy of genital organs, physiology of menstruation and ovulation, early complications of pregnancy, abortion, ectopic gestation and vesicular mole, fibroid, ovarian tumour, prolapse, endometriosis, malignancies of genital tract and abnormal uterine bleeding. Students will be exposed to operative procedures and diagnostic procedures like ultrasound and endoscopy.

Internment

Students will have to conduct at least 10 normal deliveries. They have to assist 10 normal and abnormal labour, apart from attending all emergencies. During this period there will be classes on palpation (Review), mechanism of labour, manikin demonstration, obstetric operations and emergencies. The students have to maintain a record of internment activities.

CardioTocoGram(CTG) monitoring and Partogram charting

Topics for Symposia and Seminars

Gynaecology

Physiology of menstruation, Abnormal vaginal discharge, Infertility, Contraception-I Contraception-II, MTP, Disorders of menstruation, Prolapse, Fibroid uterus Preinvasive & invasive lesions of cervix, Carcinoma endometrium, Ovarian tumour (benign), Malignant ovarian tumours, Adenomyosis + endometriosis, Endoscopy in gynaecology, P.I.D, Minor operations, Major operations, Hormones in gynaecology.

Obstetrics

Physiological changes during pregnancy diagnosis of pregnancy & differential diagnosis Antenatal Case, Physiology and stages of labour, Mechanism of labour, Puerperium hypertensive disorders of pregnancy, Heart disease & pregnancy, Diabetes and pregnancy, Fe deficiency anaemia, Rh incom- patibility, Antepartum haemorrhage, Abortion, Ectopic pregnancy, Multiple pregnancy III stage complication, USS in pregnancy, Fetal monitoring, Trophoblastic disease.

Topics for Project

Obstetrics

Impact of caesarian section in subsequent deliveries, Epidemiology & outcome of PIH Perinatal problem – term babies (a) High risk (b) Low risk, Perinatal outcome in preterm babies, 1st Trimester complication in pregnancy, Heart disease in pregnancy, IUGR in obstetrics, Gestational & overt diabetes in pregnancy, Bleeding diathesis complicating pregnancy, Foetal monitoring in labour, Antenatal fetal surveillance, Fetal malformation diagnosis & management prostaglandin in cervical ripening-effectiveness, Maternal morbidity in hypertensive pregnancy, Fetal outcome in PIH, Incidence & outcome in ectopic gestation, Antepartum haemorrhage evaluation.

Gynaecology

Incidence, clinical presentation & management of AUB, Evaluation of post menopausal bleeding, Etiology & management of infertility, Fibroid uterus in perimenopausal age group, Ovarian malignancy, PAP smear – effectiveness in screening epithelial neoplasia, Surgical management of fibroid uterus Endoscopy for pelvic factor in infertility, Uterine prolapse, Adolescent gynaecological problems.

Family Planning

Contraceptive methods – obstetrics temporary & permanent, Medical termination of pregnancy-1st Trimesters, C_uT as Intrauterine contraceptive, Medical method of early abortion, Techniques of 2nd trimester abortion.

Integrated Teaching Sessions (Vertical/Horizontal)

Topic	Departments
1. Lymphatic drainage of female genital tract Anatomy in relation to pelvic malignancy	
2. Embryology of genital tract and developmental Anatomy Anomalies with clinical relevance	
3. Mechanism of coagulation and its impact on Physiology Obstetric problems like PIH, abruptio placenta Amniotic fluid embolism	
4. Physiology of menstruation in relation to DUB Carbohydrate metabolism in normal and Biochemistry diabetes and its impact in pregnancy	Physiology gestational
5. Uterotonic drugs Hormones in gynecology Safety of drugs in pregnancy	Pharmacology
6. Imaging techniques in obstetrics & gynaecology	Perinatology
7. Cytopathology in genital tract malignancies	Pathology
8. Significant microbes in O&G	Microbiology
9. Social obstetrics	Community medicine
10. Medico legal aspects in O&G	Forensic Medicine
11. Liver disorders in pregnancy Other-Medical Disorders in pregnancy	Internal Medicine

Course Outcomes:

C01: Competency to examine a pregnant woman; recognize high risk pregnancies and make appropriate referrals.

C02: The ability to optimally manage common conditions affecting the female reproductive system.

C03: Competency to conduct a normal delivery, recognise complication and provide postnatal care.

C04: Competency to resuscitate the newborn and recognise congenital anomalies.

C05: Competency to advise a couple on the use of various available contraceptive devices and assist in insertion and removal of intra-uterine contraceptive devices.

C06: Competency to perform pelvic examination, diagnose and manage common gynaecological problems including early detection of genital malignancies.

C07: Competency to interpret results of investigations like biochemical, histopathological, radiological, ultrasound etc.

Distribution of Marks for Internal Assessment and University Examinations

University examination				Internal assessment			
Theory I	Theory II	Practical	Viva voce	Total	Theory	Practical	Total
40	40	50	30*	160	20	20	40

*Out of 30 marks, 10 marks is allotted for the record of delivery cases

Weekly evaluation of the candidates will be done by one of the faculty on every Saturday and grad- ing will be done as follows:

Textbooks Recommended - Prescribed Books

1. Text book of Obstetrics by Sheela Balakrishnan.
2. Clinical Obstetrics by Mudaliar
3. Holland and Brews – Manual of Obstetrics
4. Clinical Gynaecology by A Bhasker Rao & N N Roy Chowdary.
5. Text book of Gynaecology by Wilfred Shaw
6. Antenatal Clinics by Browne
7. Principles of Gynaecology by TNA Jeffcoat.
8. Handbook on Obstetrics, Gynaecology for Viva, by Dr. Radhamony

PAEDIATRICS AND NEONATOLOGY (U19MBB314)

Goal

The broad goal of teaching undergraduate students in pediatrics is to acquire adequate knowledge and appropriate skills for optimally dealing with major health problems of children to ensure their optimal growth and development.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Assess the growth and sexual maturity of a child including adolescent.
- Prescribe and administer immunization.
- Manage malnutrition
- Manage anaphylaxis.
- Manage a child with disability.
- Manage meningeal irritation.
- Manage seizure in a child.
- Diagnose and manage dehydration
- Manage aspiration.
- Perform Heimlich Maneuver.
- Keep the child in a knee chest position in a case with intense cyanosis.
- Give chest compression in case of bradycardia.
- Use Ryles tube in a child with gastric distention.
- Accompany as a member of the transport team.
- Communicate with the relatives with empathy and sympathy.
- Use computers and other digital tools in patient management.
- Do scientific studies.

Objectives

Knowledge

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

- Describe the normal growth and development during fetal life, neonatal period, childhood and adolescence and outline deviations thereof.
- Describe the common pediatric disorders and emergencies in terms of epidemiology, etiopathogenesis, clinical manifestations diagnosis rational therapy and rehabilitation.
- State age related requirements of calories, nutrients, fluids, drugs etc., in health and disease.
- Describe preventive strategies for common infectious disorders, malnutrition, genetic and- metabolic disorders, poisoning ,accidents and child abuse.
- Outline national programmes relating to child health including immunization programmes.

Skills

At the end of the course, the student shall be able to.

- Take a detailed pediatric history, conduct an appropriate physical examination of children including neonates, take anthropometric measurements, measure temperature orally and rectally, take BP measurement in all four limbs, make clinical diagnosis, conduct common bedside investigative procedures, operate a multi para monitor, use a pulse oximeter, interpret laboratory investigations' results, interpret

- paediatric early warning system (PEWS) chart and plan and institute therapy.
- Resuscitation of newborns at birth, use of AMBU bag, prepare ORS, perform tuberculin test, administer vaccines, perform venesection, provide nasogastric feeding, IV cannulation and intra osseous administration of fluids if IV cannula fails.
 - Conduct diagnostic procedures like, lumbar puncture, liver and renal biopsy, bone marrow aspiration and supra pubic aspiration, sub dural, pleural and ascitic tap.
 - Distinguish between normal newborn baby from those requiring special care and institute early care to all new born babies including preterm and low birth weight babies, provide guidance and counseling in breast feeding.
 - Provide ambulatory care to all sick children, identify indications for specialized / inpatient care/timely referral of those who require hospitalization.
 - Incision and drainage, dressing of burns, administration of oxygen and adrenaline injection.

Integration

The training in pediatrics should prepare the student to deliver preventive promotive, curative and rehabilitative services for care of children both in community and rehabilitative services for care of children both in community and hospital as a part of a team in an integrated form with other disciplines, e.g.. Anatomy, Physiology, Forensic Medicine, Community Medicine, Physical Medicine and Rehabilitation.

**Teaching Schedule
Lectures/Innovative
Sessions**

Semesters	VI	VII	VIII	IX	Total
Hours	24	16	60	32	132

Clinical Postings/Innovative Sessions

Semesters	VI	VIII	IX	Total
Weeks	4	4	2	10

Teaching Hours

Lecture	Practical /Clinical	Innovative Session *	Total
44	240	88	372

*Project work, seminars, structured discussion, integrated teaching, formative evaluation, revision

- CO1:** Competency to assess the growth and sexual maturity of a child including adolescent.
- CO2:** Competency to prescribe and administer immunization.
- CO3:** Competency to manage malnutrition.
- CO4:** Competency to manage anaphylaxis
- CO5:** Competency to manage a child with disability. **CO6:** Competency to manage meningeal irritaiton. **CO7:** Competency to manage seizure in a child.
- CO8:** Compentency to diagnose and manage dehydration.
- CO9:** Competency to manage aspiration and perform Heimlich Maneuver.
- CO10:** Competency to accompany as a member of the transport team.
- CO11:** Competency to communicate with the relatives with empathy and sympathy.
- CO12:** Competency to give chest compression in case of bradycardia.

Distribution of Marks for Internal Assessment & University Examinations

University Examination				Internal assessment		
Theory	Viva	Practical	Total	Theory	Practical	Total
40	10	30	80	10	10	20

Internal Assessment

Separate muster roll is kept for lecture and practical classes. The student is assessed through out the period of training under the following headings:

1. Clinical presentation- Grade: A-75%-Excellent, B-60% -Good, C-50%-Satisfactory, D-30%
-Unsatisfactory.

Concerned faculty member is responsible to record it and finally its mark will be added to internal assessment, along with each semester examination (10 marks added to clinical exam. of each se- mester during V & VIII) A record is kept by the Head of the department.

2. Clinical Records. Students are allotted to faculty members, and each student should write 10 cases during their posting and submit to the concerned faculty member. Cases should be written as follows:

5th Semester 6
8th Semester 3
9th Semester 1

Case record should include, history, clinical findings, diagnosis, differential diagnosis, follow up and a brief discussion of the disease process. 10 marks are awarded to the case record and is counted for the FINAL SESSIONAL EXAMINATION.

Clinical Examination: Candidate is evaluated at the end of each posting.

Recommended Textbooks

1. IAP Text book of Paediatrics A. Parthasarathy
2. Text book of Pediatrics O.P. Ghai
3. Care of the New born M. Singh

CLINICAL EPIDEMIOLOGY & RESEARCH METHODOLOGY
(U19MBB315)- Elective

Objectives of the Course

- To introduce the basic concepts in research methodology
- To enable students to interpret research findings
- To facilitate critical reading- identify good and bad research studies
- To enable them to conduct research projects
- To facilitate preparation of research proposals

TOPICS

	Topics	Hour s
1	Introduction to medical research	1
2	Study designs – observational studies, analytical studies	1
3	Fundamentals of clinical trials	1
4	Ethical principles in clinical research	1
5	Diagnostic test evaluation (interpretation of sensitivity, specificity, positive and negative predictive values)	1
6	Basics of statistics in research Hypothesis testing, P value, power, type I and II errors, confidence interval Sampling, validity, reliability, bias, confounding Measures of disease frequency Types of variables, data entry, presenting and summarizing data Analysis : dealing with continuous and categorical variables	3
7	Group exercise : writing research proposal	2
8	Group exercise : questionnaire designing	1
9	Group Exercise : Critical reading of research articles – application in evidence based medicine	2
	TOTAL	13

Course Outcomes:

CO1: Understanding of the basic concepts in research methodology.

CO2: Ability to interpret research findings.

CO3: Ability to critically read and identify good and bad research studies.

CO4: Ability to conduct research projects

CO5: Ability to prepare research proposals.

**Teaching Schedule
Semester VII****Time :1-2 pm****Textbooks for Reference**

1. Clinical Epidemiology: The Essentials by Robert Fletcher and Suzanne Fletcher. Lippincott Williams and Wilkins. 4th Edition. 2005.
2. User's Guide to the Medical Literature: A manual for evidence-based clinical practice edited by Gordon Guyatt, Drummond Rennie, Maureen Mead and Deborah Cook. McGraw Hill Medical. 2008. (web based).
3. Basic Epidemiology by R Bonita, R Beaglehole, T Kjellstrom WHO 2006
4. Medical statistics – Principles and methods by KR Sundaram S N Dwivedi & V Sreenivasan: BI Publications, New Delhi 2009.
5. Statistics for epidemiology by Nicholas P Jewell, Chapman & Hill (CRC), 2004.
6. Principles of Medical Statistics by Alvan R Feinstein CRC press, 2002.

TEACHING SCHEDULE

**Total Number of Teaching Hours in Different Semesters
(Includes Lectures, Practicals, Innovative Sessions & Clinical Postings)**

Subjects	I	II	III	IV	V	VI	VII	VIII	IX	Total
Anatomy	390	260	-	-	-	-	-	-	-	650
Physiology	264	232	-	-	-	-	-	-	-	496
Biochemistry	160	136	-	-	-	-	-	-	-	296
Pathology	-	-	96	144	64	-	-	-	-	304
Microbiology	-	-	96	96	48	-	-	-	-	240
Pharmacology	-	-	120	120	80	-	-	-	-	320
Forensic Medicine	-	-	24	48	32	-	-	-	-	104
Community Medicine	60	-	24	116	16	116	124	-	-	456
Ophthalmology	-	-	-	-	-	190	190	-	-	380
Otorhinolaryngology	-	-	-	-	-	120	160	-	-	280
General Medicine	-	-	216	24	64	144	32	288	160	928
Psychiatry	-	-	-	-	82	82	-	-	-	164
Dermatology & STD	-	-	-	48	-	112	16	-	-	194
Radiology	-	-	-	-	-	72	-	-	-	72
Pulmonology	-	-	-	-	-	72	-	-	-	72
General Surgery	-	-	216	24	64	144	32	288	160	928
Orthopaedics	-	-	-	96	-	24	112	36	80	348
Anaesthesiology	-	-	-	-	-	72	-	-	-	72
Obstetrics & Gynaecology	-	-	96	-	48	144	128	344	96	856
Paediatrics	-	-	-	-	-	120	16	156	80	372
Dentistry	--	-	-	-	-	60	-	-	-	60

**DISTRIBUTION OF LECTURES, PRACTICALS, INNOVATIVE SESSIONS &
CLINICAL POSTINGS**

Subjects	Lectures	Practical/Clinical/Innovative Sessions		Total
Anatomy	258	392		650
Physiology	160	320		480
Biochemistry	80	160		240
		Practical/Clinical	Innovative Sessions	
Pathology	100	100	104	304
Microbiology	80	80	80	240
Pharmacology	106	128	86	320
Forensic Medicine	34	20	50	104
Community Medicine	150	306		456
Ophthalmology	76	240	64	380
Otorhinolaryngology	40	192	48	280
General Medicine	100	624	204	928
Psychiatry	8	96	16	72
Dermatology & STD	32	144	18	194
Radiology	8	48	16	72
Pulmonology	8	48	16	72
General Surgery	100	624	204	928
Orthopaedics	36	240	72	348
Anaesthesiology	8	48	16	72
Obstetrics & Gynaecology	90	576	190	856
Paediatrics	44	240	88	372
Dentistry	4	48	8	60

A) GOAL

The broad goal of teaching undergraduates students Human Physiology is to provide the student 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.

OBJECTIVES**a) KNOWLEDGE**

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

1. Explain the normal functioning of all organ systems and their interactions for well co-ordinated total body function.
2. Assess the relative contribution of each organ system towards the maintenance of the milieu interior.
3. List the physiological principles underlying the 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 and 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.

2. HUMAN PHYSIOLOGY

SYLLABUS

1. GENERAL PHYSIOLOGY

1. **Homeostasis:** Basic concept, feedback mechanisms
2. Structure of cell membrane, transport across cell membrane
3. Membrane potentials

2. BLOOD

Composition & functions of blood.

Specific gravity, Packed cell volume, factors affecting & methods of determination. Plasma proteins – Types, concentration, functions & variations.

Erythrocyte – Morphology, functions & variations. Erythropoiesis & factors affecting erythropoiesis. ESR – Methods of estimation, factors affecting, variations & significance.

Haemoglobin – Normal concentration, method of determination & variation in concentration. Blood indices – MCV, MCH, MCHC – definition, normal values, variation.

Anaemia – Definition, classification, life span of RBC's destruction of RBC's, formation & fate of bile pigments, Jaundice – types.

Leucocytes: Classification, number, percentage, distribution morphology, properties, functions & variation. Role of lymphocytes in immunity, leucopoiesis life span & fate of leucocytes.

Thrombocytes – Morphology, number, variations, function & thrombopoiesis.

Haemostasis – Role of vasoconstriction, platelet plug formation in haemostasis, coagulation factors, intrinsic & extrinsic pathways of coagulation, clot retraction.

Tests of haemostatic function, platelet count, clotting time, bleeding time, prothrombin time – normal values, method & variations. Anticoagulants – mechanism of action. Bleeding disorders.

Blood groups: ABO & Rh system, method of determination, importance, indications & dangers of blood transfusion, blood substitutes.

Blood volume: Normal values, variations.

Body fluids: distribution of total body water, intracellular & extracellular compartments, major anions & cations in intra and extra cellular fluid.

Tissue fluids & lymph: Formation of tissue fluid, composition, circulation & functions of lymph. Oedema

– causes.

Functions of reticulo endothelial system.

3. MUSCLE AND NERVE

Classification of nerves, structure of skeletal muscle – Molecular mechanism of muscle contraction, neuromuscular transmission. Properties of skeletal muscle. Structure and properties of cardiac muscle & smooth muscle.

4. DIGESTIVE SYSTEM

Introduction to digestion: General structure of G.I. tract, Innervation.

Salivary glands: Structure of salivary glands, composition, regulation of secretion & functions of saliva **Stomach:** Composition and functions of gastric juice, mechanism and regulation of gastric secretion. **Exocrine Pancreas** – Structure, Composition of pancreatic juice, functions of each component, regulation of pancreatic secretion.

Liver: structure, composition of bile, functions of bile, regulation of secretion –

Gall bladder: structure, functions.

Small intestine – Composition, functions & regulation of secretion of intestinal juice.

Large intestine – Functions.

Motor functions of GIT: Mastication, deglutition, gastric filling & emptying, movement of small and large intestine, defecation.

5. EXCRETORY SYSTEM:

Structure & functions of kidney, functional unit of kidney & functions of different parts. Juxta glomerular apparatus, renal blood flow.

Formation of Urine: Glomerular filtration rate – definition, determination, normal values, factors influencing G.F.R. Tubular reabsorption – Reabsorption of sodium, glucose, water & other substances. Tubular secretion – secretion of urea, hydrogen and other substances.

Mechanism of concentration & dilution of urine. Role of kidney in the regulation of pH of the blood.

Micturition: anatomy & innervations of Urinary bladder, mechanism of micturition & abnormalities.

6. BODY TEMPERATURE & FUNCTIONS OF SKIN

7. ENDOCRINOLOGY

General endocrinology – Enumeration of endocrine glands & hormones – General functions of endocrine system, chemistry, mechanism of secretion, transport, metabolism, regulation of secretion of hormones. Hormones of anterior pituitary & their actions, hypothalamic regulation of anterior pituitary function.

Disorders of secretion of anterior pituitary hormones.

Posterior pituitary: Functions, regulation & disorders of secretion.

Thyroid: Histology, synthesis, secretion & transport of hormones, actions, of hormones, regulation of secretion & disorders, Thyroid function tests.

Adrenal cortex & Medulla – synthesis, secretion, action, metabolism, regulation of secretion of hormones & disorders.

Other hormones – Angiotensin, A.N.F.

8. REPRODUCTION

Sex differentiation, Physiological anatomy of male and female sex organs, Female reproductive system: Menstrual cycle, functions of ovary, actions of oestrogen & Progesterone, control of secretion of ovarian hormones, tests for ovulation, fertilization, implantation, maternal changes during pregnancy, pregnancy tests & parturition.

Lactation, composition of milk, factors controlling lactation, milk ejection, reflex, Male reproductive system: spermatogenesis, semen and contraception.

9. CARDIO VASCULAR SYSTEM

Functional anatomy and innervations of heart Properties of cardiac muscle Origin & propagation of cardiac impulse and heart block.

Electrocardiogram – Normal electrocardiogram. Two changes in ECG in myocardial infarction. Cardiac cycle – Phases, Pressure changes in atria, ventricles & aorta.

Volume changes in ventricles. Jugular venous pulse, arterial pulse

Heart sounds: Mention of murmurs.

Heart rate: Normal value, variation & regulation.

Cardiac output: Definition, normal values, one method of determination, variation, factors affecting heart rate and stroke volume.

Arterial blood pressure: Definition, normal values & variations, determinants, regulation & measurement of blood pressure.

Coronary circulation.

Cardio vascular homeostasis – Exercise & posture.

10. RESPIRATORY SYSTEM

Physiology of Respiration: External & internal respiration. Functional anatomy of respiratory passage & lungs.

Respiratory movements: Muscles of respiration, Mechanism of inflation & deflation of lungs. Intra pleural & intra pulmonary pressures & their changes during the phases of respiration.

Mechanics of breathing – surfactant, compliance & work of breathing.

Spirometry: Lung volumes & capacities definition, normal values, significance, factors affecting vital capacity, variations in vital capacity, FEV & its variations.

Pulmonary ventilation – alveolar ventilation & dead space – ventilation. Composition of inspired air, alveolar air and expired air.

Exchange of gases: Diffusing capacity, factors affecting it. Transport of Oxygen & carbon dioxide in the blood.

Regulation of respiration – neural & chemical. Hypoxia, cyanosis, dyspnoea, periodic breathing. Artificial respiration, pulmonary function tests.

11. CENTRAL NERVOUS SYSTEM

1. Organisation of central nervous system
2. Neuronal organization at spinal cord level
3. Synapse receptors, reflexes, sensations and tracts
4. Physiology of pain
5. Functions of cerebellum, thalamus, hypothalamus and cerebral cortex
6. Formation and functions of CSF
7. Autonomic nervous system

12. SPECIAL SENSES

Fundamental knowledge of vision, hearing, taste and smell.

PRACTICALS

The following list of practical is minimum and essential. All the practical have been categorized as procedures and demonstrations. The procedures are to be performed by the students during practical classes to acquire skills. All the procedures are to be included in the University practical examination. Those categorised as demonstrations are to be shown to the students during practical classes. However these demonstrations would not be included in the University examinations but question based on this would be given in the form of charts, graphs and calculations for interpretation by the students.

PROCEDURES

1. Enumeration of Red Blood Cells
2. Enumeration of White Blood Cells
3. Differential leucocyte counts
4. Determination of Haemoglobin
5. Determination of blood group
6. Determination of bleeding time and clotting time
7. Examination of pulse
8. Recording of blood pressure.

DEMONSTRATION:

1. Determination of packed cell volume and erythrocyte sedimentation rate
2. Determination of specific gravity of blood
3. Determination of erythrocyte fragility
4. Determination of vital capacity and timed vital capacity
5. Skeletal muscle experiments.
Study of laboratory appliances in experimental physiology. Frog's gastrocnemius sciatic preparation. Simple muscle curve, effects of two successive stimuli, effects of increasing strength of stimuli, effects of temperature, genesis of fatigue and tetanus. Effect of after load and free load on muscle contraction, calculation of work done.
6. **Electrocardiography:** Demonstration of recording of normal Electro cardiogram
7. Clinical examination of cardiovascular and respiratory system.

**UNIVERSITY PRACTICALS EXAM
– I BDS HUMAN PHYSIOLOGY
MARKS MAX.-50**

S. No.	Procedur es	Mark s	Tota l
1.	Major Practicals WBC Counting, Recording of BP	1x25	25
2.	Minor Practicals Blood Grouping BT, CT, Estimation of Hb	1x15	15
3.	Practical Viva		5
	Internal Assessment		5
			50

TEXT BOOKS

Guyton; Text book of Physiology, 9th edition.
 Ganong; Review of Medical Physiology, 19th edition
 Vander; Human physiology, 5th edition
 Choudhari; Concise Medical Physiology, 2nd edition
 Chatterjee; Human Physiology, 10th edition
 A.K. Jain; Human Physiology for BDS students, 1st edition

BOOKS FOR REFERENCE:

- i) Berne & Levy; Physiology, 2nd edition
- ii) West-Best & Taylor's, Physiological basis of Medical Practise, 11th edition

EXPERIMENTAL PHYSIOLOGY:

- i) Rannade; Practical Physiology, 4th edition
- ii) Ghai; a text book of practical physiology
- iii) Hutchison's; Clinical Methods, 20th edition

BIOCHEMISTRY

AIMS AND SCOPE OF THE COURSE IN BIOCHEMISTRY

The major aim is to provide a sound but crisp knowledge on the biochemical basis of the life processes relevant to the human system and to dental/medical practice. The contents should be organised to build on the already existing information available to the students in the pre-university stage and reorienting. A mere rehash should be avoided.

The chemistry portion should strive towards providing information on the functional groups, hydrophobic and hydrophilic moieties and weak valence forces that organise macromolecules. Details on structure need not be emphasised.

Discussion on metabolic processes should put emphasis on the overall change, interdependence and molecular turnover. While details of the steps may be given, the student should not be expected to memorise them. An introduction to biochemical genetics and molecular biology is a must but details should be avoided. The exposure to anti-vitamins, anti-metabolites and enzyme inhibitors at this stage, will provide a basis for the future study of medical subjects. An overview of metabolic regulation is to be taught by covering hormonal action, second messengers and regulation of enzyme activities. Medical aspects of biochemistry should avoid describing innumerable functional tests, most of which are not in vogue. Cataloguing genetic disorders under each head of metabolism is unnecessary. A few examples which correlate genotype change to functional changes should be adequate. At the end of the course the student would be able to acquire a useful core of information, which can be retained for a long time. Typical acid tests can be used to determine what is to be taught or what is to be learnt. A few examples are given below.

1. Need not know the structure of cholesterol. Should know why it cannot be carried free in plasma.
2. Mutarotation should not be taught. Student should know why amylase will not hydrolyse cellulose.
3. Need not know the details of alpha – helix and beta – pleats in proteins. Should know why haemoglobin is globular and keratin is fibrous.
4. Need not know mechanism of oxidative phosphorylation. Should know more than 90% of ATP is formed by this process.
5. Need not know details of the conversion of pepsinogen to pepsin. Should know hydrochloric acid cannot break a peptide bond at room temperature.
6. Need not remember the steps of glycogenesis. Should know that excess intake of carbohydrate will not increase glycogen level in liver or muscle.
7. Need not know about urea or creatinine clearance tests. Should know the basis of increase of urea and creatinine in blood in renal insufficiency.
8. Need not know the structure of insulin. Should know why insulin level in circulation is normal in most cases of maturity onset diabetes.
9. Need not know the structural details of ATP. Should know why about 10g of ATP in the body at any given time meets all the energy needs.
10. Need not know the mechanism of action of prolylhydroxylase. Should know why the gum bleeds in scurvy.
11. Need not know the structure of Vitamin K. Should know the basis of internal bleeding arising due to its deficiency.

12. Need not remember the structure of HMGCoA. Should know why it does not lead to increased cholesterol synthesis in starvation.

BIOCHEMISTRY AND

NUTRITION

SYLLABUS

1. CHEMISTRY OF BIOORGANIC MOLECULES

Carbohydrates: Definition, biological importance and classification. Monosaccharides – Isomerism, anomerism. Sugar derivatives, Disaccharides, Polysaccharides, Structures of starch and glycogen. **Lipids:** Definition, biological importance and classification. Fats and fatty acids. Introduction to compound lipids. Hydrophobic and hydrophilic groups.

Cholesterol. Bile salts. Micelle. Bimolecular leaflet.

Proteins: Biological importance.

Amino acids: Classification. Introduction to peptides.

Proteins: Simple and conjugated; globular and fibrous. Charge properties. Buffer action. Introduction to protein conformation. Denaturation.

Nucleic acids: Building units. Nucleotides. Outline structure of DNA and RNA.

High energy compounds: ATP, Phosphorylamidines, Thioesters, Enol phosphates.

2. MACRONUTRIENTS AND DIGESTION

Energy needs: Basal metabolic rate. Dietary carbohydrates, fibres. Dietary lipids, essential fatty acids. Nitrogen balance. Essential amino acids. Protein quality and requirement (methods for evaluation of protein quality to be excluded). Protein calorie malnutrition. Balanced diet.

Enzymatic hydrolysis of dietary carbohydrates. Mechanism of uptake of monosaccharides.

Digestion and absorption of triacylglycerols. Enzymatic hydrolysis of dietary proteins and uptake of amino acids.

3. MICRONUTRIENTS

Vitamins: Definition, classification, daily requirement, sources and deficiency symptoms. Brief account of water-soluble vitamins with biochemical functions. Vitamins A functions including visual process.

Vitamin D and its role in calcium metabolism. Vitamin E. Vitamin K and gamma carboxylation. Introduction to antivitamins and hypervitaminosis.

Minerals: Classification, daily requirement.

Calcium and phosphate: sources, uptake, excretion, function. Serum calcium regulation.

Iron: sources, uptake and transport.

Heme and nonheme iron functions; deficiency.

Iodine: Brief introduction to thyroxine synthesis. General functions of thyroxine.

Fluoride: function, deficiency and excess. Indications of role of other minerals.

4. ENERGY METABOLISM

Overview: Outlines of glycolysis, pyruvate oxidation and citric acid cycle. Beta oxidation of fatty acids. Electron transport chain and oxidative phosphorylation. Ketone body formation and utilisation.

Introduction to glycogenesis, glycogenolysis, fatty acid synthesis, lipogenesis and lipolysis. Gluconeogenesis. Lactate metabolism. Protein utilisation for energy. Glucogenic and ketogenic amino acids. Integration of metabolism.

5. SPECIAL ASPECTS OF METABOLISMS

Importance of pentose phosphate pathway. Formation of glucuronic acid. Outlines of cholesterol synthesis and breakdown. Ammonia metabolism. Urea formation. Phosphocreatine formation.

Transmethylation. Amines. Introduction to other functions of amino acids including one carbon transfer. Detoxication: Typical reactions. Examples of toxic compounds. Oxygen toxicity.

6. BIOCHEMICAL GENETICS AND PROTEIN SYNTHESIS

Introduction to nucleotides; formation and degradation. DNA as genetic material.

Introduction to replication and transcription. Forms and functions of RNA. Genetic code and mutation. Outline of translation process. Antimetabolites and antibiotics interfering in replication, transcription and translation. Introduction to cancer, viruses and oncogenes.

7. ENZYME AND METABOLIC REGULATION

Enzymes: Definition, classification, specificity and active site. Cofactors. Effect of pH, temperature and substrate concentration. Introduction to enzyme inhibitors, proenzymes and isoenzymes. Introduction to allosteric regulation, covalent modification and regulation by induction/repression.

Overview of hormones. Introduction to second messengers, cyclic AMP, calcium ion, inositol triphosphate. Mechanism of action of steroid hormones, epinephrine, glucagon and insulin in brief. Acid base regulation. Electrolyte balance.

8. STRUCTURAL COMPONENTS AND BLOOD PROTEINS

Connective tissue: Collagen and elastin. Glycosaminoglycans. Bone structure. Structure of membranes. Membrane associated processes in brief. Exocytosis and endocytosis. Introduction to cytoskeleton.

Myofibril and muscle contraction in brief.

Haemoglobin: functions. Introduction to heme synthesis and degradation.

Plasma proteins: classification and separation. Functions of albumin. A brief account of immunoglobulins. Plasma lipoproteins: Formation, function and turnover.

9. MEDICAL BIOCHEMISTRY

Regulation of blood glucose. Diabetes mellitus and related disorders. Evaluation of glycemic status. **Hyperthyroidism and hypothyroidism:** Biochemical evaluation.

Hyperlipoproteinemias and atherosclerosis, Approaches to treatment.

Jaundice: Classification and evaluation.

Liver function tests: Plasma protein pattern, serum enzymes levels. Brief introduction to kidney function tests and gastric function tests. Acid base imbalance.

Electrolyte imbalance: evaluation. Gout. Examples of genetic disorders including lysosomal storage disorders, glycogen storage disorders, glucose 6- phosphate dehydrogenase deficiency, hemoglobinopathies, inborn errors of amino acid metabolism and muscular dystrophy (one or two examples with biochemical basis will be adequate). Serum enzymes in diagnosis.

PRACTICALS: Contact hours 50

1.	Qualitative analysis of carbohydrates	4
2.	Colour reactions of proteins and amino acids	4
3.	Identification of nonprotein nitrogen substance	4
4.	Normal constituents of urine	4

5.	Abnormal constituents of urine	4
6.	Analysis of saliva including amylase	2
7.	Analysis of milk Quantitative estimations	2
8.	Titration acidity and ammonia in urine	2
9.	Free and total acidity in gastric juice	2
10.	Blood glucose estimation	2
11.	Serum total protein estimation	2
12.	Urine creatinine estimation Demonstration	2
13.	Paper electrophoresis charts/clinical data evaluation	2
14.	Glucose tolerance test profiles	2
15.	Serum lipid profiles	1
16.	Profiles of hypothyroidism and hyperthyroidism	1
17.	Profiles of hyper and hypoparathyroidism	1
18.	Profiles of liver function	1
19.	Urea, uric acid creatinine profile in kidney disorders	1
20.	Blood gas profile in acidosis / alkalosis	1

UNIVERSITY PRACTICALS EXAM – I
BDS BIOCHEMISTRY
MARKS MAX.-50

S. No.	Procedures	Marks	Total
1.	Qualitative Analysis	1x20	20
2.	Quantitative Estimation	1x20	20
3.	Spotters	5x1	5
	Internal Assessment		5
			50

RECOMMENDED BOOKS:

1. Concise text book of Biochemistry (3rd edition) 2001, T.N. Pattabiraman
2. Nutritional Biochemistry 1995, S. Ramakrishnan and S.V. Rao
3. Lecture notes in Biochemistry 1984, J.K. Kandlish

REFERENCE BOOKS:

1. Text book of Biochemistry with clinical correlations 1997, T.N. Devlin
2. Harper's Biochemistry, 1996., R.K. Murray et.al
3. Basic and applied Dental Biochemistry, 1979, R.A.D. Williams & J.C. Elliot

OBJECTIVES:

- A. Knowledge and understanding
- B. Skills and
- C. Attitudes

A) Knowledge and understanding:

The graduate should acquire the following knowledge during the period of training.

- i. Diagnose and treat simple restorative work for teeth.
- ii. Gain knowledge about aesthetic restorative material and to translate the same to patients needs.
- iii. Gain the knowledge about endodontic treatment on the basis of scientific foundation.
- iv. Carry out simple endodontic treatment.
- v. Carry out simple luxation of tooth and its treatment and to provide emergency endodontic treatment.

SKILLS:

He/she should attain the following skills necessary for practice of dentistry

- i. Use medium and high speed hand – pieces to carry out restorative work.
- ii. Use and be familiar with endodontic instruments and materials needed for carrying out simple endodontic treatment.
- iii. Translate patients aesthetic needs along with function.

ATTITUDES:

- i. Maintain a high standard of professional ethics and conduct and apply these in all aspects of professional life.
- ii. Willingness to participate in CDE programme to update knowledge and professional skill from time to time
- iii. Help and participate in the implementation of the national oral health policy.
- iv. He/she should be able to motivate the patient for proper dental treatment at the same time proper maintenance of oral hygiene should be emphasised which will help maintain the restorative work and prevent future damage.

CONSERVATIVE DENTISTRY AND ENDODONTICS SYLLABUS

INTRODUCTION:

Definition aims objectives of Conservative Dentistry scope and future of Conservative Dentistry.

1. Nomenclature Of Dentition:
Tooth numbering systems A. D. A. Zsigmondy Palmer and F. D. I. Systems.
2. Principles Of Cavity Preparation:

Steps and nomenclature of cavity preparation classification of cavities, nomenclature of floors and angles of cavities.

3. Dental Caries:
Aetiology, classification clinical features, morphological features, microscopic features, clinical diagnosis and sequel of dental caries.
4. Treatment Planning For Operative Dentistry:
Detailed clinical examination, radiographic examination, tooth vitality tests, diagnosis and treatment planning, preparation of the case sheet.
5. Gnathological Concepts of Restoration:
Physiology of occlusion, normal occlusion, ideal occlusion, mandibular movements and occlusal analysis. Occlusal rehabilitation and restoration.
6. Armamentarium for Cavity Preparation:
General classification of operative instruments, hand cutting instruments design formula and sharpening of instruments. Rotary cutting instruments dental bur, mechanism of cutting, evaluation of hand piece and speed current concepts of rotary cutting procedures. Sterilisation and maintenance of instruments. Basic instrument tray set up.
7. Control of Operating Field:
Light source sterilisation field of operation control of moisture, rubber dam in detail, cotton rolls and anti sialogagues.
8. Amalgam Restoration:
Indication contraindication, physical and mechanical properties, clinical behaviour, Cavity preparation for Class I, II, V and III. Step wise procedure for cavity preparation and restoration failure of amalgam restoration.
9. Pulp Protection:
Liners, varnishes and bases, Zinc phosphate, zinc polycarboxylate, zinc oxide eugenol and glass ionomer cements.
10. Anterior Restorations:
Selection of cases, selection of material, step wise procedures for using restorations, silicate (theory only) glass ionomers, composites, including sand witch restorations and bevels of the same with a note on status of the dentine bonding agents.
11. Direct Filling Gold Restorations:
Types of direct filling gold indications and limitations of cohesive gold. Annealing of gold foil cavity preparation and condensation of gold foils.
12. Preventive Measures in Restorative Practice:
Plaque Control, Pit and fissure sealants dietary measures restorative procedures and periodontal health. Contact and contour of teeth and restorations matrices tooth separation and wedges.
13. Temporisation or Interim Restoration.
14. Pin Amalgam Restoration Indication and Contra Indication:
Advantages disadvantages of each types of pin methods of placement use of auto matrix. Failure of pin amalgam restoration.
15. Management of Deep Carious Lesions: Indirect And Direct Pulp Capping.
16. Non Carious Destruction of Tooth Structures Diagnosis and Clinical Management
17. Hyper Sensitive Dentine and its Management.

18. Cast Restorations Indications, contra indications, advantages and disadvantages and materials used for same Class II and Class I cavity preparation for inlays fabrication of wax pattern spurring inverting and casting procedures & casting defects.
19. Die Materials And Preparation Of Dies.
20. Gingival Tissue Management For Cast Restoration And Impression Procedures
21. Recent Cavity Modification Amalgam Restoration.
22. Differences between Amalgam and Inlay Cavity preparation with note on all the types of Bevels used for Cast Restoration.
23. Control of Pain During Operative Procedures.
24. Treatment Planning for Operative Dentistry Detailed Clinical and Radiographic Examination
25. Vitality Tests, Diagnosis and Treatment Planning and Preparation of Case Sheet.
26. Applied Dental Materials.
 1. Biological Considerations.

Evaluation, clinical application and adverse effects on the following materials, Dental cements, Zinc oxide eugenol cements zinc phosphate cements, polycarboxylates glass ionomer cements, silicate cement calcium hydroxides varnishes.
 2. Dental amalgam, technical considerations mercury toxicity mercury hygiene.
 3. Composite, Dentine bonding agents, chemical and light curing composites
 4. Rubber base Imp. Materials
 5. Noble & non – noble metal alloys
 6. Investment and die materials
 7. Inlay casting waxes
 8. Dental porcelain
 9. Aesthetic Dentistry

Undergraduate students should have an understanding of the philosophy and scientific knowledge of esthetic dentistry.

 1. Introduction and scope of esthetic dentistry.
 2. Anatomy and Physiology of smile.
 3. Role of colour in esthetic dentistry.
 4. Simple procedures [roundening of central incisors to enhance esthetic appearance]
 5. Bleaching of teeth.
 6. Veneers with various materials.
 7. Preventive and interceptive esthetics.
 8. Ceramics.
 9. Simple gingival contouring to enhance appearance.
27. Endodontics: introduction, definition, scope and future of endodontics
28. Clinical diagnostic methods
29. Emergency endodontic procedures
30. Pulpal diseases causes, types and treatment
31. Periapical diseases: acute periapical abscess, acute periodontal abscess phoenix abscess, chronic alveolar abscess granuloma cysts condensing osteitis, external resorption.
32. Vital pulp therapy: indirect and direct pulp capping, pulpotomy, different types and medicaments used.
33. Apexogenesis and apexification or problems of open apex.
34. Rationale of endodontic treatment case selection indication and contraindications for root canal treatments.

35. Principles of root canal treatment, mouth preparation, root canal instruments, hand instruments, power driven instruments, standardization, colour – coding principle of using endodontic instruments. Sterilisation of root canal instruments and materials rubber dam application.
36. Anatomy of the pulp cavity: root canals apical foramen. Anomalies of pulp cavities access cavity preparation of anterior and premolar teeth.
37. Preparation of root canal space, Determination of working length, cleaning and shaping of root canals, irrigating solution, chemical aids to instrumentation.
38. Disinfection of root canal space intracanal medicaments, poly antibiotic paste gross mans paste, mummifying agents. Outline of root canal treatment, bacteriological examinations, culture methods.
39. Problems during cleaning and shaping of root canal spaces. Perforation and its management. Broken instruments and its management, management of single and double curved root canals.
40. Methods of cleaning and shaping like step-back crown down and conventional methods.
41. Obturation of the root canal system. Requirements of an ideal root canal filling material obturation methods using gutta percha healing after endodontic treatment. Failures in endodontics.
42. Root canal sealers Ideal properties classification. Manipulation of root canal sealers.
43. Post endodontic restoration fabrication and components of post core preparation.
44. Smear layer and its importance in endodontics and conservative treatment.
45. Discoloured teeth and its management, bleaching agents, vital and non vital bleaching methods.
46. Traumatized teeth classification of fractured teeth, management of fractured tooth and root, Luxated teeth and its management.
47. Endodontic surgeries indication and contraindications, pre operative preparation. Pre medication surgical instruments and techniques apicectomy, retrograde filling, post operative sequelae trephination hemisection, radisectomy techniques of tooth reimplantaion (both intentional and accidental) endodontic implants.
48. Root resorption.
49. Emergency endodontic procedures.
50. Lasers in conservative endodontics (introduction only) practice management
51. Professional association Dentist Act 1948 and its amendment 1993.
52. Duties towards the govt. Like payments of professional tax, income tax.
53. Financial management of practice
54. Dental material and basic equipment management.
55. Ethics

PRACTICAL:

Exercise:

Student has to perform any one of the following procedure

1. Class II amalgam restoration
2. Class I amalgam restoration with buccal or palatal extension
3. Class I composite restoration
4. Anterior RCT

Mark distribution for Exercise 1 & 2

- | | | |
|-----------------------------------|---|----------|
| 1. Case selection and diagnosis | - | 10 marks |
| 2. Cavity preparation | - | 35 marks |
| 3. Base and matrix band placement | - | 20 marks |
| 4. Restoration and finishing | - | 25 marks |

Total 90

Mark distribution for Exercise 3

- | | | |
|---------------------------------|---|----------|
| 1. Case selection and diagnosis | - | 10 marks |
| 2. Cavity preparation | - | 35 marks |
| 3. Acid Etching and bonding | - | 20 marks |
| 4. Restoration and finishing | - | 25 marks |

Total 90

Mark distribution for Exercise 4

- | | | |
|---------------------------------|---|----------|
| 1. Case selection and diagnosis | - | 10 marks |
| 2. Access cavity preparation | - | 35 marks |
| 3. Working length determination | - | 20 marks |
| 4. Master cone | - | 25 marks |

Total 90

- Competent to diagnose all carious lesions
- Competent to perform Class I and Class II cavities and their restoration with amalgam
- Restore class V and Class III cavities with glass ionomer cement
- Able to diagnose and appropriately treat pulpally involved teeth (pulp capping procedures)
- Able to perform RCT for anterior teeth
- Competent to carry out small composite restorations
- Understand the principles of aesthetic dental procedures

INTRODUCTION

Dental Anatomy including Embryology and Oral Histology – a composite of basic Dental Sciences & their clinical applications.

SKILLS

The student should acquire basic skills in:

1. Carving of crowns of permanent teeth in wax.
2. Microscopic study of oral tissues.
3. Identification of deciduous & Permanent teeth.
4. Age estimation by patterns of teeth eruption from plaster casts of different age groups.

OBJECTIVES

After a course on Dental Anatomy including Embryology and Oral Histology,

1. The student is expected to appreciate the normal development, morphology, structure & functions of oral tissues & variations in different pathological/non-pathological states.
2. The students should understand the histological basis of various dental treatment procedures and physiologic ageing process in the dental tissues.
3. The students must know the basic knowledge of various research methodologies.

SYLLABUS

I. TOOTH MORPHOLOGY

1. Introduction to tooth morphology:

- Human dentition, types of teeth, & functions, Palmer's & Binomial notation systems, tooth surfaces, their junctions – line angles & point angles, definition of terms used in dental morphology, geometric concepts in tooth morphology, contact areas & embrasures – Clinical significance

2. Morphology of permanent teeth:

- Description of individual teeth, along with their endodontic anatomy & including a note on their chronology of development, differences between similar class of teeth & identification of individual teeth.
- Variations & Anomalies commonly seen in individual teeth.

3. Morphology of Deciduous teeth:

- Generalised differences between Deciduous & Permanent teeth.
- Description of individual deciduous teeth, including their chronology of development, endodontic anatomy, differences between similar class of teeth & identification of individual teeth.

4. Occlusion:

- Definition, factors influencing occlusion – basal bone, arch, individual teeth, external & internal forces & sequence of eruption.
- Inclination of individual teeth – compensatory curves.
- Centric relation & Centric occlusion – protrusive, retrusive & lateral occlusion.
- Clinical significance of normal occlusion.
- Introduction to & Classification of Malocclusion.

II. ORAL EMBRYOLOGY

1. Brief review of development of face, jaws, lip, palate & tongue, with applied aspects.

2. Development of teeth:

- Epithelial mesenchymal interaction, detailed study of different stages of development of crown, root & supporting tissues of tooth & detailed study of formation of calcified tissues.
- Applied aspects of disorders in development of teeth.

3. Eruption of deciduous & Permanent teeth:

- Mechanisms in tooth eruption, different theories & histology of eruption, formation of dentogingival junction, role of gubernacular cord in eruption of permanent teeth.
- Clinical or Applied aspects of disorders of eruption.

4. Shedding of teeth:

- Factors & mechanisms of shedding of deciduous teeth.
- Complications of shedding.

III. ORAL HISTOLOGY

- ### **1. Detailed microscopic study of Enamel, Dentine, Cementum & Pulp tissue. Age changes & Applied aspects (Clinical and forensic significance) of histological considerations – Fluoride applications, transparent dentine, dentine hypersensitivity, reaction of pulp tissue to varying insults to exposed dentine; Pulp calcifications & Hypercementosis.**

2. Detailed microscopic study of Periodontal ligament & alveolar bone, age changes, histological changes in periodontal ligament & bone in normal & orthodontic tooth movement, applied aspects of alveolar bone resorption.
3. Detailed microscopic study of Oral Mucosa, variation in structure in relation to functional requirements, mechanisms of keratinisation, clinical parts of gingiva, Dentogingival & Mucocutaneous junctions & Lingual papillae. Age changes & clinical considerations.
4. **Salivary Glands:**
 - Detailed microscopic study of acini & ductal system.
 - Age changes & clinical considerations.
5. **TM Joint:**
 - Review of basic anatomical aspects & microscopic study & clinical considerations.
6. **Maxillary Sinus:**
 - Microscopic study, anatomical variations, functions & clinical relevance of maxillary sinus in dental practice.
7. **Processing of Hard & soft tissues for microscopic study:**
 - Ground sections, decalcified sections & routine staining procedures.
8. Basic histochemical staining patterns of oral tissues.

IV. ORAL PHYSIOLOGY

1. **Saliva:**
 - Composition of saliva – variations, formation of saliva & mechanisms of secretion, salivary reflexes, brief review of secretomotor pathway, functions, role of saliva in dental caries & applied aspects of hyper & hypo salivation.
2. **Mastication:**
 - Masticatory force & its measurement – need for mastication, peculiarities of masticatory muscles, masticatory cycle, masticatory reflexes & neural control of mastication.
3. **Deglutition:**
 - Review of the steps in deglutition, swallowing in infants, neural control of deglutition & dysphagia.
4. **Calcium, phosphorous & fluoride metabolism:**
 - Source, requirements, absorption, distribution, functions & excretion, clinical considerations, hypo & hypercalcemia & hyper & hypo phosphatemia & fluorosis.
5. **Theories of Mineralisation:**
 - Definition, mechanisms, theories & their drawbacks.
 - Applied aspects of physiology of mineralization, pathological considerations – calculus formation.
6. **Physiology of Taste:**
 - Innervation of taste buds & taste pathway, physiologic basis of taste sensation, age changes & applied aspects – taste disorders.
7. **Physiology of Speech:**
 - Review of basic anatomy of larynx & vocal cords.
 - Voice production, resonators, production of vowels & different consonants – Role of palate, teeth & tongue.
 - Effects of dental prosthesis & appliances on speech & basic speech disorders.

**UNIVERSITY PRACTICALS EXAM – I BDS
DENTAL ANATOMY, EMBRYOLOGY AND ORAL
HISTOLOGY MARKS MAX.–100**

S. No.	Procedures	Marks	Total
1.	Slides	6x5	30
2.	Spotters	4x5	20
3.	Carving	1x40	40
	Internal Assessment		10
			100

RECOMMENDED TEXT BOOKS

1. Orban's Oral Histology & Embryology – S.N. Bhaskar
2. Oral Development & Histology – James & Avery
3. Wheeler's Dental Anatomy, Physiology & Occlusion – Major. M. Ash
4. Dental Anatomy – its relevance to dentistry – Woelfel & Scheid
5. Applied Physiology of the mouth – Lavelle
6. Physiology & Biochemistry of the mouth – Jenkins

The science of Dental Material has undergone tremendous changes over the years. Continued research has led to new material systems and changing concepts in the dental field. Interlinked with various specialised branches of chemistry. Practically all engineering applied sciences and biological characteristics, the science of dental material emerged as a basic sciences in itself with its own values and principles.

INTRODUCTI

ON AIMS:

Aim of the course is to present basic chemical and physical properties of Dental materials as they are related to its manipulation to give a sound educational background so that the practice of the dentistry emerged from art to empirical status of science as more information through further research becomes available. It is also the aim of the course of Dental materials to provide with certain criteria of selection and which will enable to discriminate between facts and propaganda with regards to claims of manufactures.

OBJECTIVES:

To understand the evolution and development of science of dental materials

To explain purpose of course in dental materials to personnel concerned with the profession of dentistry. Knowledge of physical and chemical properties. Knowledge of biomechanical requirements of particular restorative procedure. An intelligent compromise of the conflicting as well as co-ordinating factors into the desired earnest. Laying down standards or specifications of various materials to guide to manufacturers as well as to help professionals.

Search for newer and better materials which may answer our requirements with greater satisfaction. To understand and evaluate the claims made by manufacturers of dental materials.

NEED FOR THE COURSE:

The profession has to rise from an art to a science; the need for the dentist to possess adequate knowledge of materials to exercises his best through knowledge of properties of different types of materials. The growing concern of health hazards due to mercury toxicity, inhalation of certain vapour or dust materials, irritations and allergic reaction to skin due to contact of materials. Materials causing irritation of oral tissues, pH of restorative materials causing inflammation and necrosis of pulp which is a cause for the dentist to possess wider knowledge of physical, chemical and biological properties of materials being used. For the protection for the patient and his own protection certain criteria of selection are provided that will enable the dentist to discriminate between facts and propaganda, which will make a material biologically acceptable.

SCOPE:

DENTAL MATERIALS SYLLABUS

The dental materials are employed in mechanical procedures including restorative dentistry such as Prosthodontics, endodontics, periodontal, orthodontics and restorative materials.

There is scarcely a dental procedure that does not make use of dental materials in one form or another and therefore the application of dental material is not limited to any one branch of dentistry. Branches such as minor surgery and periodontics require less use of materials but the physical and chemical characters of materials are important in these fields.

The toxic and tissue reaction of dental materials and their durability in the oral cavity where the temperature is between 32 & 37 degree centigrade, and the ingestion of hot or cold food ranges from 0- 70 degree centigrade. The acid and alkalinity of fluids show pH varies from 4 to 8.5. The load on 1 sq. mm of tooth or restorative materials can reach to a level as high as many kilograms. Thus the biological properties of dental materials cannot be separated from their physical and chemical properties.

2) STRUCTURE OF MATTER AND PRINCIPLES OF ADHESION.

Change of state, inter atomic primary bonds, inter atomic secondary bonds, inter atomic bond distance and bonding energy, thermal energy, crystalline structure, non crystalline structures, diffusion, adhesion and bonding and adhesion to tooth structures.

3) IMPORTANT PHYSICAL PROPERTIES APPLICABLE TO DENTAL MATERIALS

Physical properties are based on laws of mechanics, acoustics, optics, thermodynamics, electricity, magnetism, radiation, atomic structure or nuclear phenomena. Hue, value, chroma and translucency physical properties based on laws of optics, dealing with phenomena of light, vision and sight. Thermal conductivity & coefficient of thermal expansion are physical properties based on laws of thermodynamics. Stress, strain, proportional limit, elastic limit yield strength, modulus of elasticity, flexibility, resilience, impact, impact strength, permanent deformation, strength, flexure strength fatigue, static fatigue, toughness, brittleness, ductility & malleability, hardness, abrasion resistance, relaxation, rheology, Thixotropic, creep, static creep, dynamic creep, flow, colour, three dimensional colour – hue, values, chroma, Munsell system, metamersim, fluorescence, physical properties of tooth, stress during mastication

4) BIOLOGICAL CONSIDERATIONS IN USE OF DENTAL MATERIALS

Materials used are with the knowledge of appreciation of certain biological considerations for use in oral cavity. Requirement of materials with biological compatibility. Classification of materials from perspective of biological compatibility. eg. Contact with soft tissues, affecting vitality of pulp, used for root canal fillings, affecting hard tissues of teeth, laboratory materials that could accidentally be inhaled or ingested during handling. Hazards associated with materials: pH effecting pulp, polymers causing chemical irritation, mercury toxicity, etc. Microleakage, Thermal changes, Galvanism, toxic effect of materials. Biological evaluation for systemic toxicity, skin irritation, mutagenicity and carcinogenicity. Disinfection of dental materials for infection control.

5) GYPSUM & GYPSUM PRODUCTS

Gypsum – its origin, chemical formula, Products manufactured from gypsum Dental plaster, Dental stone, Die stone, high strength, high expansion stone.

Application and manufacturing procedure of each, macroscopic and microscopic structure of each. Supplied as and Commercial names.

Chemistry of setting, setting reaction, theories of setting, gauging water, Microscopic structure of set material.

Setting time: working time and setting time, Measurement of setting time and factors controlling setting time.

Setting expansion, Hygroscopic setting expansion – factors affecting each Strength: wet strength, dry strength, factors affecting strength, tensile strength Slurry – need and use.

Care of cast.

ADA classification of gypsum products

Description of impression plaster and dental investment

Manipulation including recent methods or advanced methods. Disinfection: infection control, liquids, sprays, radiation Method of use of disinfectants

Storage of material – shelf life

6) IMPRESSION MATERIALS USED IN DENTISTRY

Impression plaster, Impression compound, Zinc oxide eugenol impression paste & bite registration paste incl., non eugenol paste, Hydrocolloids, reversible and irreversible, Elastomeric impression materials.

Polysulphide, Condensation silicones, Addition silicones, Polyether, Visible light cure polyether urethane dimethacrylate, Historical background & development of each impression material, Definition of impression, Purpose of making impression, Ideal properties required and application of material, Classification as per ADA specification, general & individual impression material.

Application and their uses in different disciplines, Marketed as and their commercial names, Mode of supply & mode of application bulk/wash impression. Composition, chemistry of setting, Control of setting time, Type of impression trays required, Adhesion to tray, manipulation, instruments & equipments required. Techniques of impression, storage of impression, (Compatibility with cast and die material). Any recent advancements in material and mixing devices. Study of properties: Working time, setting time, flow, accuracy, strength, flexibility, tear strength, dimensional stability, compatibility with cast & die materials incl., electroplating Biological properties: tissue reaction, Shelf life & storage of material, Infection control – disinfection, Advantages & disadvantages of each material.

7) SYNTHETIC RESINS USED IN DENTISTRY

Historical background and development of material, Denture base materials and their classification and requirement

Classification of resins

Dental resins – requirements of dental resins, applications, polymerisation, polymerisation mechanism stages in addition polymerisation, inhibition of polymerisation, co-polymerisation, molecular weight, crosslinking, plasticisers, Physical properties of polymers, polymer structures types of resins.

ACRYLIC RESINS:

Mode of polymerisation: Heat activated, Chemically activated, Light activated, Mode of supply, application, composition, polymerisation reaction of each. Technical considerations: Methods of manipulation for each type of resin. Physical properties of denture base resin. Miscellaneous resins & techniques: Repair resins, Relining and rebasing. Short term and long-term soft-liners, temporary crown

and bridge resins, Resin impression trays, Tray materials, Resin teeth, materials in maxillofacial prosthesis, Denture cleansers, Infection control in detail, Biological properties and allergic reactions.

RESTORATIVE RESINS:

Historical background, Resin based restorative materials, Unfilled & filled, Composite restorative materials, Mode of supply, Composition, Polymerisation mechanisms: Chemically activated, Light activated, Dual cure: Degree of conversion, Polymerisation shrinkage Classification of Composites: Application, composition and properties of each Composites of posterior teeth, Prosthodontics resins for veneering. Biocompatibility – microleakage, pulpal reaction, pulpal protection Manipulation of composites: Techniques of insertion of Chemically activated, light activated, dual cure Polymerisation, Finishing and polishing of restoration, Repair of composites Direct bonding Bonding: Need for bonding, Acid – etch technique, Enamel bonding, Dentin bonding agents. Mode of bonding, Bond strength, Sandwich technique its indication and procedure. Extended application for composites: Resins for restoring eroded teeth, Pit and fissure sealing, Resin inlay system – Indirect & direct, Core build up, Orthodontic applications.

8) METAL AND ALLOYS:

Structure and behaviour of metals, Solidification of metals, mechanism of crystallisation amorphous & crystalline. Classification of alloys, Solid solutions, Constitutes or equilibrium phase diagrams: Electric alloys, Physical properties, Peritectic alloys, Solid state reaction other binary systems: Metallography & Heat treatment. Tarnish and corrosion, Definition: causes of corrosion, protection against corrosion. Corrosion of dental restorations, clinical significance of galvanic current. Dental Amalgam.

History:

Definition of dental amalgam, application, Alloy classification, manufacture of alloy powder composition – available as.

Amalgamation: setting reaction & resulting structure, properties, Microleakage Dimensional stability, Strength, Creep, Clinical performance

Manipulation: Selection of alloy, proportioning, mechanism of trituration, condensation, carving & finishing. Effect of dimensional changes, Marginal deterioration. Repair of amalgam, mercury toxicity, mercury hygiene.

DIRECT FILLING GOLD:

Properties of pure gold, mode of adhesion of gold for restoration forms of direct filling gold for using as restorative material

Classification: Gold Foil, Electrolytic precipitate, powdered gold.

Manipulation: Removal of surface impurities and compaction of direct filling gold. Physical properties of compacted gold, Clinical performance.

DENTAL CASTING ALLOYS:

Historical background, desirable properties of casting alloys.

Alternatives to cast metal technology: direct filling gold, amalgam, mercury free condensable intermetallic compound – an alternative to metal casting process. CAD-CAM process for metal & ceramic inlays – without need for impression of teeth or casting procedure, pure titanium, most bio compatible metal which are difficult to cast can be made into crowns with the aid of CAD-CAM technology. Another method of making copings – by copy milling (without casting)

Classification of casting alloys: By function & description.

Recent classification, High noble (HN), Noble (N) and predominantly base metal (PB) Alloys for crown & bridge, metal ceramic & removable partial denture. Composition, function, constituents and application, each alloy both noble and base metal. Properties of alloys: Melting range, mechanical properties, hardness, elongation, modulus of elasticity, tarnish and corrosion.

Casting shrinkage and compensation of casting shrinkage. Biocompatibility – Handling hazards & precautions of base metal alloys, casting investments used. Heat treatment: Softening & hardening heat treatment. Recycling of metals. Titanium alloys & their application, properties & advantages. Technical considerations In casting. Heat source, furnaces.

9) DENTAL WAXES INCLUDING INLAY CASTING WAX

Introduction and importance of waxes. Sources of natural waxes and their chemical nature. Classification of Waxes:

Properties: melting range, thermal expansion, mechanical properties, flow & residual stresses, ductility. Dental Wax: Inlay wax: Mode of supply: Classification & composition, Ideal requirements: Properties of inlay wax: Flow, thermal properties Wax distortion & its causes.

Manipulation of inlay wax: Instruments & equipment required, including electrically heated instruments metal tips and thermostatically controlled wax baths.

Other waxes: Applications, mode of supply & properties.

Casting Wax, Base plate wax, Processing wax, Boxing wax, Utility wax, Sticky wax, Impression wax for corrective impressions, Bite registration wax.

10) DENTAL CASTING INVESTMENTS

Definition, requirements, classification

Gypsum bonded – classification. Phosphate bonded, Silica bonded

Mode of Supply: Composition, application, setting mechanism, setting time & factors controlling it. Expansions: Setting expansion, Hygroscopic Setting expansion, & thermal expansion: factors affecting Properties: Strength, porosity, and fineness & storage. Technical considerations: For Casting procedure, Preparation of die, Wax pattern, spruing, investing control of shrinkage compensation, wax burnout, and heating the invested ring, casting. Casting machines, source of heat for melting the alloy. Defects in casting.

11) SOLDERING, BRAZING AND WELDING

Need of joining dental appliances, Terms & Definition

Solders: Definition, ideal requirement, types of solders – Soft & hard and their fusion temperature, application. Mode of supply of solders, Composition and selection, Properties.

Tarnish & corrosion resistance mechanical properties, microstructure of soldered joint.

Fluxes & Anti fluxes: Definition, Function, Types, commonly used fluxes & their selection

Technique of Soldering & Brazing: free hand soldering and investment, steps and procedure.

Welding: Definition, application, requirements, procedure, weld decay – causes and how to avoid it. Laser welding.

WROUGHT BASE METAL ALLOYS

Applications and different alloys used mainly for orthodontics purpose

1. Stainless steel
2. Cobalt chromium nickel
3. Nickel titanium
4. Beta titanium

Properties required for orthodontic wires, working range, springiness, stiffness, resilience, Formability, ductility, ease of joining, corrosion resistance, stability in oral environment, bio compatibility

Stainless steels: Description, type, composition & properties of each type. Sensitisation & stabilisation, Mechanical properties – strength, tensile, yield strength, KHN. Braided & twisted wires their need, Solders for stainless steel, Fluxes, Welding

1. Wrought cobalt chromium nickel alloys, composition, allocation, properties, heat treatment, physical properties Nickel – Titanium alloys, shape, memory & super elastic
2. Titanium alloys, application, composition, properties, welding, Corrosion resistance

12) DENTAL CEMENTS

Definition & Ideal requirements:

Cements: Silicate, Glass ionomer, metal modified glass ionomer, resin modified glass ionomer, zinc oxide eugenol, modified zinc oxide eugenol, zinc phosphate, zinc silico phosphate, zinc poly carboxylate, Cavity liners and cement bases, Varnishes Calcium hydroxide, Gutta percha

Application, classification (general and individual), setting mechanism, mode of supply, Properties, factors affecting setting, special emphasis on critical procedures of manipulation and protection of cement, mode of adhesion, biomechanism of caries inhibition.

Agents for pulpal protection. Modifications and recent advances, Principles of cementation. Special emphasis on cavity liners and cement bases and luting agents.

13) DENTAL CERAMICS

Historical background & General applications

Dental ceramics: definition, classification, application, mode of supply, manufacturing procedure, methods of strengthening. Properties of fused ceramic: Strength and factors affecting, modulus of elasticity, surface hardness, wear resistance, thermal properties, specific gravity, chemical stability, esthetic properties, biocompatibility, technical considerations.

Metal Ceramics (PFM): Alloys – Types and composition of alloys. Ceramic – Type and Composition. Metal Ceramic Bond – Nature of bond. Bonding using electro deposition, foil copings, bonded platinum foil, swaged gold alloy foil coping. Technical considerations for porcelain and porcelain fused metal restorations. Recent advances – all porcelain restorations, Manganese core, injection moulded, castable ceramics, glass infiltrated alumina core ceramic (In ceram), ceramic veneers, inlays and onlays, and CAD – CAM ceramic. Chemical attack of ceramic by fluoride. Porcelain furnaces.

14) ABRASION & POLISHING AGENTS

Definition of abrasion and polishing. Need of abrasion and polishing. Types of abrasives: Finishing, polishing & cleaning. Types of abrasives: Diamond, Emery, aluminium oxides garnet, pumice, Kieselgurh, Tripoli, rouge, tin oxide, chalk, chromic oxide, sand carbides, diamond, zirconium silicate, Zinc oxide

ABRASIVE ACTION:

Desirable characteristics of an abrasive, Rate of abrasion, Size of particle, pressure and speed. Grading of abrasive & polishing agents. Binder, Polishing materials & procedures used. Technical consideration – Material and procedure used for abrasion and polishing, Electrolytic polishing and burnishing.

15) DIE AND COUNTER DIE MATERIALS INCLUDING ELECTROFORMING AND ELECTROPLISHING.

Types – Gypsum products, Electroforming, Epoxy resin, Amalgam.

16) DENTAL IMPLANTS: Evolution of dental implants, types and materials.

17) MECHANICS OF CUTTING: Burs and points.

At the end of the course the student should have the knowledge about the composition, properties, manipulative techniques and their various commercial names. The student should also acquire skills to select and use the materials appropriately for laboratory and clinical use.

**UNIVERSITY PRACTICALS EXAM
– II BDS DENTAL MATERIALS
MARKS MAX. – 100**

S. No.	Procedures	Marks	Total
1.	Spotters	15x2	30
2.	Endodontics	30	30
3.	Prosthodontics	30	30
	Internal Assessment		10
			100

RECOMMENDED BOOKS:

1. Phillips Science of Dental Materials – 10th edn. – Kenneth J. Anusavice
2. Restorative Dental Materials – 10 edn. Robert G. Craig
3. Notes on Dental Materials – E.C. Combe

GOAL:

The broad goal of teaching undergraduate students in pharmacology is to inculcate rational and scientific basis of therapeutics keeping in view of dental curriculum and profession.

OBJECTIVES:

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

- i. Describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs in general and in dentistry in particular.
- ii. List the indications, contraindications; interactions, and adverse reactions of commonly used drugs with reason.
- iii. Tailor the use of appropriate drugs in disease with consideration to its cost, efficacy, safety for individual and mass therapy needs.
- iv. Indicate special care in prescribing common and essential drugs in special medical situations such as pregnancy, lactation, old age, renal, hepatic damage and immune compromised patients.
- v. Integrate the rational drug therapy in clinical pharmacology.
- vi. Indicate the principles underlying the concepts of "Essential drugs".

SKILLS:

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

- 1) Prescribe drugs for common dental and medical ailments.
- 2) Appreciate adverse reactions and drug interactions of commonly used drugs.
- 3) Observe experiments designed for study of effects of drugs.
- 4) Critically evaluate drug formulations and be able to interpret the clinical pharmacology of marketed preparations commonly used in dentistry.
- 5) **INTEGRATION:** Practical knowledge of use of drugs in clinical practice will be acquired through integrated teaching with clinical departments.

LECTURE:

GENERAL AND DENTAL PHARMACOLOGY AND THERAPEUTICS SYLLABUS

I. GENERAL PHARMACOLOGY:

1. General principles of pharmacology; sources and nature of drugs dosage forms; prescription writing; pharmacokinetics (absorption, distribution, metabolism and excretion of drugs), mode of action of drugs, combined effects of drugs, receptor mechanism of drug action, factors modifying drug response, adverse drug reactions; drug interactions, implications of General Principles in clinical dentistry.
2. CNS drugs; General anaesthetics, hypnotics, analgesics psychotropic drugs, anti-epileptics, muscle relaxants, local anaesthetics, Implications of these drugs in clinical dentistry.
3. Autonomic drugs; sympathomimetics, antiadrenergic drugs
parasympathomimetics and parasympatholytics, Implications of Autonomic drugs in clinical dentistry.
4. Cardiovascular drugs; Cardiac stimulants; antihypertensive drugs, vasopressor agents, treatment of shock, Antianginal agents and diuretics, Implications of these drugs in clinical dentistry.
5. Autocoids:
Histamine, antihistamines, prostaglandins, leukotrienes and bronchodilators, Implications of Autocoids in clinical dentistry.
6. Drugs acting on blood: coagulants and anticoagulants, hematinics, Implications of these drugs in clinical dentistry.
7. G.I.T. Drugs, Purgatives, anti-diarrhoeal, antacids, anti-emetics, Implications of these drugs in clinical dentistry.
8. Endocrines: Emphasis on treatment of diabetes and glucocorticoids, thyroid and anti-thyroid agents, drugs affecting calcium balance and anabolic steroids, Implications of these drugs in clinical dentistry.
9. **Chemotherapy: Antimicrobial agents (against bacteria, anaerobic infections, fungi, virus and broad spectrum). Infection management in dentistry. Pharmacotherapy of Tuberculosis, leprosy and chemotherapy of malignancy in general. Implications of Chemotherapy in clinical dentistry.**
10. Vitamins: Water soluble vitamins, Vit. D, Vit. K. and Vit. E. Implications of Vitamins in clinical dentistry.
11. Pharmacotherapy of emergencies in dental office and emergency drugs tray
Implications of Pharmacotherapy in clinical dentistry.
12. Chelating agents – BAL, EDTA and desferrioxamine,

II. DENTAL PHARMACOLOGY

1. Anti-septics, astringents, obtundents, mummifying agents, bleaching agents, styptics, disclosing agents, dentifrices, mouth washes, caries and fluorides.
2. **Pharmacotherapy of common oral conditions in dentistry. Practicals and Demonstrations:**
To familiarise the student with the methodology: prescription writing and dispensing.
Rationale of drug combinations of marketed drugs.

**UNIVERSITY PRACTICALS EXAM – II BDS
GENERAL AND DENTAL PHARMACOLOGY AND
THERAPEUTICS MARKS MAX. –100**

S. No.	Procedures	Marks	Total
1.	Prescription writing	20	20
2.	Preparation	50	50
3.	Charts – Practical Based	20	20
	Internal Assessment		10
			100

LIST OF BOOKS RECOMMENDED FOR READING AND REFERENCE

1. R.S. Satoskar, Kale Bhandarkar's Pharmacology and Pharmacotherapeutics, 10th Edition, Bombay Popular Prakashan 1991.
2. Bertam G. Katzung, Basic and Clinical pharmacology 6th ed. Appleton & Lange 1997.
3. Lauerence D.R. Clinical Pharmacology 8th ed. Churchill Livingston 1997.
4. Satoskar R.S. & Bhandarkar S.D., Pharmacology and Pharmacotherapeutics part I & part ii, 13th Popular Prakashan Bombay 1993.
5. Tripathi K.D., Essentials of Medical Pharmacology 4th ed. Jaypee Brothers 1999.

GUIDELINES:

Special emphasis should be given throughout on the importance of various diseases as applicable to dentistry.

1. Special precautions/ contraindications of anaesthesia and various dental procedures in different systemic diseases.
2. Oral manifestations of systemic diseases.
3. Medical emergencies in dental practice.

A dental student should be taught in such a manner that he/she is able to record the arterial pulse, blood pressure and be capable of suspecting by sight and superficial examination of the body – diseases of the heart, lungs, kidneys, blood etc. He should be capable of handling medical emergencies encountered in dental practice.

GENERAL MEDICINE

THEORY SYLLABUS

CORE TOPICS (Must Know)

1. Aims of medicine Definitions of signs, symptoms, diagnosis, differential diagnosis treatment & prognosis.

2. Infections.
fever,

AIDS, herpes simplex, herpes zoster, syphilis diphtheria.

3. G.I.T.

Stomatitis, gingival hyperplasia, dysphagia, acid peptic disease, jaundice, acute and chronic hepatitis, cirrhosis

s
of liver ascites.

4. CVS

Acute rheumatic fever rheumatic valvular heart disease, hypertension, ischemic heart disease, infective endocarditis, common arrhythmias, congenital heart disease, congestive cardiac failure.

5. RS

COLLATERAL TOPICS (Desirable to Know)

Infectious mononucleosis Enteric

mumps, Measles, rubella, malaria.

Diarrhoea

Dysentery

Amoebiasis

Malabsorption

Lung Abscess

Pneumonia, COPD, Pulmonary TB, Bronchial asthma

Pleural effusion

Pneumothorax

X

Bronchiectasis

S

6. Haematology

Anaemias, bleeding & clotting disorders, leukemias, lymphomas, agranulocytosis, splenomegaly, oral manifestations of haematologic disorders, generalised lymphadenopathy.

Lung cancers.

7. Renal System

Acute nephritis

Nephrotic

syndrome

Renal failure

8. Nutrition

Avitaminosis

Balanced diet

PEM

Avitaminosis

9. CNS

Facial palsy, facial pain including trigeminal neuralgia, epilepsy, headache including migraine.

- Meningitis

- Examination of comatose patient

- Examination of cranial nerves.

10. Endocrines

Diabetes Mellitus Acromegaly, Hypothyroidism,

Addison's disease, Cushing's

syndrome

Hyperthyroidism, Thyrotoxicosis, Calcium metabolism and parathyroids.

11. Critical care

Syncope, cardiac arrest, CPR, shock

Acute LVF

ARDS

CLINICAL TRAINING:

The student must be able to take history, do general physical examination (including build, nourishment, pulse, BP, respiration, clubbing, cyanosis, jaundice, lymphadenopathy, oral cavity) and be able to examine CVS, RS and abdomen and facial nerve.

UNIVERSITY PRACTICALS EXAM

– III BDS GENERAL MEDICINE

MARKS MAX. – 100

S. No.	Procedures	Marks	Total
1.	Long Case (1)	45	45
2.	Short Case (1)	30	30
3.	X Rays, Drugs, Instruments	15	15
	Internal Assessment		10

AIMS:

To acquaint the student with various diseases, which may require surgical expertise and to train the student to analyse the history and be able to do a thorough physical examination of the patient. The diseases as related to head and neck region are to be given due importance, at the same time other relevant surgical have a good theoretical knowledge of various ailments, and be practically trained to differentiate benign and malignant diseases and be able to decide which patient requires further evaluation.

**GENERAL
SURGERY
SYLLABUS****1. HISTORY OF SURGERY:**

The development of surgery as a speciality over the years, will give the students and opportunity to know the contributions made by various scientists, teachers and investigators. It will also enable the student to understand the relations of various specialities in the practice of modern surgery.

2. GENERAL PRINCIPLES OF SURGERY:

Introduction to various aspects of surgical principles as related to orodental diseases. Classification of diseases in general. This will help the student to understand the various diseases, and their relevance to routine dental practice.

3. WOUNDS:

Their classification, healing, repair, treatment, medico-legal aspects of accidental wounds and complications of wounds.

4. INFLAMMATION:

Of soft and hard tissues. Causes in inflammation, varieties, treatment and sequelae.

5. INFECTIONS:

Acute and chronic abscess skin infections, cellulitis, carbuncle, and Perysepelas. Specific infections such as tetanus, gangrene, syphilis, gonorrhoea, tuberculosis, Actinomycosis, Vincents angina, cancrum oris. Pyaemia, toxemia and septicaemia.

6. TRANSMISSABLE VIRAL INFECTIONS:

HIV and Hepatitis B with special reference to their prevention and precautions to be taken in treating patients in a carrier state.

7. SHOCK AND HAEMORRHAGE:

Classification, causes, clinical features and management of various types of shock. Syncope, Circulatory collapse. Haemorrhage – different types, causes, clinical features and management. Blood group, blood transfusion, precautions and complications of blood and their products.

Hemophilias, their transmission, clinical features and management especially in relation to minor dental procedures.

8. TUMOURS, ULCERS, CYSTS, SINUS AND FISTULAE:

Classification, clinical examination and treatment principles in various types of benign and malignant tumours, ulcers, cysts, sinus and fistulae.

9. DISEASES OF LYMPHATIC SYSTEM:

Especially those occurring in head and neck region. Special emphasis on identifying diseases such as tubercular infection, lymphomas, leukaemias, metastatic lymph node diseases.

10. DISEASES OF THE ORAL CAVITY:

Infective and malignant diseases of the oral cavity and oropharynx including salivary glands with special emphasis on preventive aspects of premalignant and malignant diseases of the oral cavity.

11. DISEASES OF LARYNX, NASOPHARYNX:

Infections and tumours affecting these sites. Indications, procedure and complications of tracheostomy.

12. NERVOUS SYSTEM:

Surgical problems associated with nervous system with special reference to the principles of peripheral nerve injuries, their regeneration and principles of treatment. Detailed description of affections of facial nerve and its management. Trigeminal neuralgia, its presentation and treatment.

13. FRACTURES:

General principles of fractures, clinical presentation and treatment with additional reference to newer method of fracture treatment. Special emphasis on fracture healing and rehabilitation.

14. PRINCIPLES OF OPERATIVE SURGERY:

Principles as applicable to minor surgical procedures including detailed description of asepsis, antiseptics, sterilisation, principles of anaesthesia and principles of tissue replacement.

Knowledge of sutures, drains, diathermy, cryosurgery and use of Laser in surgery.

15. ANOMALIES OF DEVELOPMENT OF FACE:

Surgical anatomy and development of face. Cleft lip and cleft palate – principles of management.

16. DISEASES OF THYROID AND PARATHYROID:

Surgical anatomy, pathogenesis, clinical features and management of dysfunction of thyroid and parathyroid glands. Malignant diseases of the thyroid – classification, clinical features and management.

17. SWELLINGS OF THE JAW:

Differential diagnosis and management of different types of swellings of the jaw.

18. BIOPSY:

Different types of biopsies routinely used in surgical practice.

Skills to be developed by the end of teaching is to examine a routine swelling, ulcer and other related diseases and to perform minor surgical procedures such as draining an abscess, taking a biopsy etc.

**UNIVERSITY PRACTICALS EXAM
– III BDS GENERAL SURGERY
MARKS MAX. – 100**

S. No.	Procedures	Marks	Total
1.	Long Case (1)	40	40
2.	Short Case (1)	30	30
3.	Instruments	10	10
4.	Viva		10
	Internal Assessment		10
			100

AIMS:

- (1) To train the students to diagnose the common disorders of Orofacial region by clinical examination and with the help of such investigations as may be required and medical management of oro-facial disorders with drugs and physical agents.
- (2) To train the students about the importance, role, use and techniques of radiographs/digital radiograph and other imaging methods in diagnosis.
- (3) The principles of the clinical and radiographic aspects of Forensic Odontology. The syllabus in ORAL MEDICINE & RADIOLOGY is divided into two main parts.
 - (I) Diagnosis, Diagnostic methods and Oral Medicine (II) Oral Radiology. Again the part ONE is subdivided into three sections. (A) Diagnostic methods (B) Diagnosis and differential diagnosis (C) Oral Medicine & Therapeutics.

COURSE CONTENT

- (1) Emphasis should be laid on oral manifestations of systemic diseases and ill-effects of oral sepsis on general health.
- (2) To avoid confusion regarding which lesion and to what extent the student should learn and know, this elaborate syllabus is prepared. As certain lesions come under more than one group, there is repetition.

Part – I ORAL MEDICINE AND DIAGNOSTIC AIDS SYLLABUS

SECTION (A) – DIAGNOSTIC METHODS.

- (1) Definition and importance of Diagnosis and various types of diagnosis
- (2) Method of clinical examinations.
 - (a) General Physical examination by inspection.
 - (b) Oro-facial region by inspection, palpation and other means
- (c) To train the students about the importance, role, use of saliva and techniques of diagnosis of saliva as part of oral disease
- (d) Examination of lesions like swellings, ulcers, erosions, sinus, fistula, growths, pigmented lesions, white and red patches
- (e) Examination of lymph nodes
- (f) Forensic examination – Procedures for post-mortem dental examination; maintaining dental records and their use in dental practice and post-mortem identification; jurisprudence and ethics.
- (3) Investigations
 - (a) Biopsy and exfoliative cytology
 - (b) Haematological, Microbiological and other tests and investigations necessary for diagnosis and prognosis

SECTION (B) – DIAGNOSIS, DIFFERENTIAL DIAGNOSIS

While learning the following chapters, emphasis shall be given only on diagnostic aspects including differential diagnosis

- (1) Teeth: Developmental abnormalities, causes of destruction of teeth and their sequelae and discolouration of teeth
- (2) Diseases of bone and Osteodystrophies: Development disorders: Anomalies, Exostosis and tori, infantile cortical hyperostosis, osteogenesis imperfecta, Marfan's syndrome, osteopetrosis. Inflammation – Injury, infection and spread of infection, fascial space infections, osteoradionecrosis. Metabolic disorders – Histiocytosis
Endocrine – Acromegaly and hyperparathyroidism
Miscellaneous – Paget's disease, Mono and polyostotic fibrous dysplasia, Cherubism.
- (3) Temporomandibular joint: Developmental abnormalities of the condyle. Rheumatoid arthritis, Osteoarthritis, Sub-luxation and luxation.
- (4) Common cysts and Tumors:
Cysts of soft tissue: Mucocele and Ranula
Cysts of bone: Odontogenic and nonodontogenic.

TUMORS:

Soft Tissue:

Epithelial: Papilloma, Carcinoma, Melanoma

Connective tissue: Fibroma, Lipoma,

Fibrosarcoma Vascular: Haemangioma,

Lymphangioma

Nerve Tissue: Neurofibroma, Traumatic Neuroma, Neurofibromatosis

Salivary Glands: Pleomorphic adenoma, Adenocarcinoma, Warthin's Tumor, Adenoid cystic carcinoma.

Hard Tissue:

Non Odontogenic: Osteoma, Osteosarcoma, Osteoclastoma, Chondroma,

Chondrosarcoma, Central giant cell tumor, and Central haemangioma

Odontogenic: Enameloma, Ameloblastoma, Calcifying Epithelial Odontogenic tumor,

Adenomatoid Odontogenic tumor, Periapical cemental dysplasia and odontomas

(5) Periodontal diseases: Gingival hyperplasia, gingivitis, periodontitis, pyogenic granuloma

(6) Granulomatous diseases: Tuberculosis, Sarcoidosis, Midline lethal granuloma, Crohn's Disease and Histiocytosis X

(7) Miscellaneous Disorders: Burkitt lymphoma, Sturge – Weber syndrome, CREST syndrome, Rendu-Osler-Weber disease

SECTION (C): ORAL MEDICINE AND THERAPEUTICS.

The following chapters shall be studied in detail including the aetiology, pathogenesis, clinical features, investigations, differential diagnosis, management and prevention

(1) Infections of oral and paraoral structures:

Bacterial: Streptococcal, tuberculosis, syphilis, Vincent's, leprosy, actinomycosis, diphtheria and tetanus

Fungal: Candida albicans

Virus: Herpes simplex, Herpes zoster, Ramsay Hunt syndrome, measles, herpangina, mumps, infectious mononucleosis, AIDS and hepatitis-B

(2) Important common mucosal lesions:

White lesions: Chemical burns, leukoedema, leukoplakia, Fordyce spots, stomatitis nicotina, leukoplakia, white sponge nevus, candidiasis, lichen planus, discoid lupus erythematosus

Vesiculo-bullous lesions: Herpes simplex, herpes zoster, herpangina, bullous lichen planus, pemphigus, cicatricial pemphigoid erythema multiforme.

Ulcers: Acute and chronic ulcers

Pigmented lesions: Exogenous and endogenous

Red lesions: Erythroplakia, stomatitis venenata and medicamentosa, erosive lesions and denture sore mouth.

(3) Cervico-facial lymphadenopathy

(4) Facial pain:

- i. Organic pain: Pain arising from the diseases of orofacial tissues like teeth, pulp, gingival and periodontal tissue, mucosa, tongue, muscles, blood vessels, lymph tissue, bone, paranasal sinus, salivary glands etc.,
- ii. Pain arising due to C.N.S. diseases.
- (a) Pain due to intracranial and extracranial involvement of cranial nerves. (Multiple sclerosis, cerebrovascular diseases, trojter's syndrome etc.)
- (b) Neuralgic pain due to unknown causes: Trigeminal neuralgia, glossopharyngeal neuralgia, sphenopalatine ganglion neuralgia, periodic migrainous neuralgia and atypical facial pain

(5) Altered sensations: Cacogeusia, halitosis

(6) Tongue in local and systemic disorders: (Aglossia, ankyloglossia, bifid tongue, fissured tongue, scrotal tongue, macroglossia, microglossia, geographic tongue, median rhomboid glossitis, depapillation of tongue, hairy tongue, atrophic tongue, reactive lymphoid hyperplasia, glossodynia, glossopyrosis, ulcers, white and red patches etc.)

(7) Oral manifestations of:

- (i) Metabolic disorders:
 - (a) Porphyria
 - (b) Haemochromatosis
 - (c) Histiocytosis X diseases
- (ii) Endocrine disorders:
 - (a) Pituitary: Gigantism, acromegaly, hypopituitarism
 - (b) Adrenal cortex: Addison's disease
(Hypofunction) Cushing's syndrome
(Hyperfunction)
 - (c) Parathyroid glands: Hyperparathyroidism.
 - (d) Thyroid gland: Hypothyroidism) Cretinism, myxoedema
 - (e) Pancreas: Diabetes
- (iii) Nutritional deficiency: Vitamins; riboflavin, nicotinic acid, folic acid Vitamin B12, Vitamin C (Scurvy)
- (iv) Blood disorders:
 - (a) Red blood cell diseases
Deficiency anemias: (Iron deficiency, Plummer – Vinson syndrome, pernicious anaemia) Haemolytic anaemias: (Thalassemia, sickle cell anaemia, erythroblastosis foetalis) Aplastic anaemia
Polycythemia
 - (b) White Blood cell diseases
Neutropenia, cyclic neutropenia, agranulocytosis, infectious mononucleosis and leukemias
 - (c) Haemorrhagic disorders:
Thrombocytopenia, purpura, haemophilia, Christmas disease and Von Willebrand's disease

(8) Disease of salivary glands:

- (i) Development disturbances: Aplasia, atresia and aberration
 - (ii) Functional disturbances: Xerostomia , ptyalism
 - (iii) Inflammatory conditions: Nonspecific sialadenitis, mumps, sarcoidosis heerdfort's syndrome (Uveoparotid fever), Necrotising sialometaplasia
 - (iv) Cysts and tumors: Mucocele, ranula, pleomorphic adenoma, mucoepidermoid carcinoma
 - (v) Miscellaneous: Sialolithiasis, Sjogren's syndrome, mikuliez's disease and sialosis
- (9) Dermatological diseases with oral manifestations:
- (a) Ectodermal dysplasia (b) Hyperkerotosis palmarplantaris with periodontoopathy (c) Scleroderma
 - (d) Lichen planus including ginspan's syndrome (e) Lupus erythematosus (f) Pemphigus (g) Erythema multiforme (h) Psoriasis
- (10) Immunological diseases with oral manifestations
- (a) Leukemia (b) Lymphomas (c) Multiple myeloma (d) AIDS clinical manifestations, opportunistic infections, neoplasms (e) Thrombocytopenia (f) Lupus erythematosus (g) Scleroderma (h) dermatomyositis (i) Submucous fibrosis (j) Rheumatoid arthritis (k) Recurrent oral ulcerations including behcet's syndrome and reiter's syndrome
- (11) Allergy: Local allergic reactions, anaphylaxis, serum sickness (local and systemic allergic manifestations to food drugs and chemicals)
- (12) Foci of oral infection and their ill effects on general health
- (13) Management of dental problems in medically compromised persons:
- (i) Physiological changes: Puberty, pregnancy and menopause
 - (ii) The patients suffering with cardiac, respiratory, liver, kidney and bleeding disorders, hypertension, diabetes and AIDS. Post-irradiated patients.
- (14) Precancerous lesions and conditions
- (15) Nerve and muscle diseases:
- (i) Nerves: (a) Neuropraxia (b) Neurotmesis (c) Neuritis (d) Facial nerve paralysis including Bell's palsy, Heerfordt's syndrome, Melkerson Rosenthal syndrome and Ramsay Hunt syndrome (e) Neuroma (f) Neurofibromatosis (g) Frey syndrome
 - (ii) Muscles: (a) Myositis ossificans (b) Myofascial pain dysfunction syndrome (c) Trismus
- (16) Forensic odontology:
- a) Medicolegal aspects of orofacial injuries
 - b) Identification of bite marks
 - c) Determination of age and sex
 - d) Identification of cadavers by dental appliances, Restorations and tissue remnants
- (17) Therapeutics: General therapeutic measures – drugs commonly used in oral medicine viz., antibiotics, chemotherapeutic agents, anti-inflammatory and analgesic drugs, astringents, mouth washes, styptics, demulcents, local surface anaesthetic, sialogogues, antisialogogues and drugs used in the treatment of malignancy

Part – II BEHAVIOURAL SCIENCES AND ETHICS.

Part – III ORAL RADIOLOGY

- (1) Scope of the subject and history of origin
- (2) Physics of radiation: (a) Nature and types of radiations (b) Source of radiations (c) Production of X- rays (d) Properties of X-rays (e) Compton effect (f) Photoelectric effect (g) Radiation measuring units
- (3) Biological effects of radiation
- (4) Radiation safety and protection measures
- (5) Principles of image production

(6) Radiographic techniques:

- i. Intra-Oral: (a) Periapical radiographs (Bisecting and parallel techniques) (b) Bite wing radiographs
(c) Occlusal radiographs
- ii. Extra-Oral: (a) Lateral projections of skull and jaw bones and paranasal sinuses (c) Cephalograms
(d) Orthopantomograph (e) Projections of temporomandibular joint and condyle of mandible (f) Projections for Zygomatic arches
- iii. Specialised techniques: (a) Sialography (b) Xeroradiography (c) Tomography

(7) Factors in production of good radiographs:

- (a) K.V.P. and M.A. of X-ray machine (b) Filters (c) Collimations (d) Intensifying screens (e) Grids (f) X-ray films (g) Exposure time (h) Techniques (i) Dark room (j) Developer and fixer solutions (k) Film processing

(8) Radiographic normal anatomical landmarks

(9) Faculty radiographs and artefacts in radiographs

(10) Interpretation of radiographs in various abnormalities of teeth, bones and other orofacial tissues

(11) Principles of radiotherapy of oro-facial malignancies and complications of radiotherapy

(12) Contrast radiography and basic knowledge of radio-active isotopes

(13) Radiography in Forensic Odontology – Radiographic age estimation and post-mortem radiographic methods

PRACTICALS / CLINICALS:

1. Student is trained to arrive at proper diagnosis by following a scientific and systematic procedure of history taking and examination of the orofacial region. Training is also imparted in management wherever possible. Training also shall be imparted on saliva diagnostic procedures. Training also shall be imparted in various radiographic procedures and interpretation of radiographs.
2. In view of the above each student shall maintain a record of work done, which shall be evaluated for marks at the time of university examination
3. The following is the minimum of prescribed work for recording
 - (a) Recording of detailed case histories of interesting cases..... 10
 - (b) Intra-oral radiographs (Periapical, bitewing, occlusal)..... 25
 - (c) Saliva diagnostic check as routine procedure

**UNIVERSITY PRACTICALS EXAM
– IV BDS ORAL MEDICINE AND
RADIOLOGY MARKS MAX. – 100**

S. No.	Procedures	Marks	Total
1.	Clinical diagnosis	15x2	30
2.	Clinical Viva	10x2	20
3.	Radiographic Technique	7x2	14
4.	Radiographic Interpretation	8x2	16
5.	Final Diagnosis	5x2	10
	Internal Assessment		10
			100

- Able to identify precancerous and cancerous lesions of the oral cavity and refer to the concerned speciality for their management
- Should have an adequate knowledge about common laboratory investigations and interpretation of their results.
- Should have adequate knowledge about medical complications that can arise while treating systemically compromised patients and take prior precautions/consent from the concerned medical specialist.
- Have adequate knowledge about radiation health hazards, radiation safety and protection.
- Competent to take intra – oral radiographs and interpret the radiographic findings
- Gain adequate knowledge of various extra – oral radiographic procedures, TMJ radiography and sialography.
- Be aware of the importance of intra – and extra – oral radiographs in forensic identification and age estimation
- Should be familiar with jurisprudence, ethics and understand the significance of dental records with respect to law.

BOOKS RECOMMENDED:**a) Oral Diagnosis, Oral Medicine & Oral Pathology**

1. Burkit – Oral Medicine – J.B. Lippincott Company
2. Coleman – Principles of Oral Diagnosis – Mosby Year Book
3. Jones – Oral Manifestations of Systemic Diseases – W.B. Saunders company
4. Mitchell – Oral Diagnosis & Oral Medicine
5. Kerr – Oral Diagnosis
6. Miller – Oral Diagnosis & Treatment
7. Hutchinson – clinical Methods
8. Oral Pathology – Shafers
9. Sonis. S.T., Fazio. R.C. and Fang.L – Principles and practice of Oral Medicine

b) Oral Radiology

1. White & Goaz – Oral Radiology – Mosby year Book
2. Weahrman – Dental Radiology – C.V. Mosby Company
3. Stafne – Oral Roentgenographic Diagnosis – W.B.Saunders Co.,

c) Forensic Odontology

1. Derek H. Clark – Practical Forensic Odontology – Butterworth-Heinemann (1992)
2. C Michael Bowers, Gary Bell – Manual of Forensic Odontology – Forensic Pr (1995)

OBJECTIVES:

At the end of the Oral Pathology & Oral Microbiology course, the student should be able to comprehend

—

1. The different types of pathological processes that involve the oral cavity.
2. The manifestations of common diseases, their diagnosis & correlation with clinical pathological processes.
3. The oral manifestations of systemic diseases to help in correlating with systemic physical signs & laboratory findings.
4. The underlying biological principles governing treatment of oral diseases.
5. The principles of certain basic aspects of Forensic Odontology.

SKILLS:

1. Microscopic study of common lesions affecting oral tissues through microscopic slides & projection slides.
2. Study of the disease process by surgical specimens.
3. Study of teeth anomalies / polymorphisms through tooth specimens & plaster casts.
4. Microscopic study of plaque pathogens.
5. Study of haematological preparations (blood films) of anaemias & leukemias.
6. Basic exercises in Forensic Odontology such as histological methods of age estimation and appearance of teeth in injuries.

ORAL PATHOLOGY & ORAL MICROBIOLOGY SYLLABUS

1. INTRODUCTION:

- A bird's eye view of the different pathological processes involving the oral cavity & oral cavity involvement in systemic diseases to be brought out. Interrelationship between General Medicine & General Surgery & Oral pathology is to be emphasised.
- 2. Developmental disturbances of teeth, jaws and soft tissues of oral & paraoral region:**
- Introduction to developmental disturbances – Hereditary, Familial mutation, Hormonal etc. Causes to be highlighted.
 - Developmental disturbances of teeth – Aetiopathogenesis, clinical features, radiological features & histopathological features as appropriate:-
The size, shape, number, structure & eruption of teeth & clinical significance of the anomalies to be emphasised.
 - Forensic Odontology.
 - Developmental disturbances of jaws – size & shape of the jaws.
 - Developmental disturbances of oral & paraoral soft tissues – lip & palate – clefts, tongue, gingival, mouth, salivary glands & face.
- 3. Dental Caries:**
- Aetiopathogenesis, microbiology, clinical features, diagnosis, histopathology, immunology, prevention of dental caries & its sequelae.

4. Pulp & Periapical Pathology & Osteomyelitis.
 - Aetiopathogenesis & interrelationship, clinical features, microbiology, histopathology & radiological features (as appropriate) of pulp & periapical lesions & osteomyelitis.
 - Sequelae of periapical abscess – summary of space infections, systemic complications & significance.
5. Periodontal Diseases:
 - Aetiopathogenesis, microbiology, clinical features, histopathology & radiological features (as appropriate) of gingivitis, gingival enlargements & periodontitis. Basic immunological mechanisms of periodontal disease to be highlighted.
6. Microbial infections of oral soft tissues:
 - Microbiology, defence mechanisms including immunological aspects, oral manifestations, histopathology and laboratory diagnosis of common bacterial, viral & fungal infections namely: Bacterial: Tuberculosis, Syphilis, ANUG & its complications – Cancrum Oris.
Viral: Herpes Simplex, Varicella zoster, Measles, Mumps & HIV infection. Fungal: Candidal infection. Aphthous Ulcers.
7. Common non-inflammatory diseases involving the jaws:
 - Aetiopathogenesis, clinical features, radiological & laboratory values in diagnosis of: Fibrous dysplasia, Cherubism, Osteogenesis Imperfecta, Paget's disease, Cleidocranial dysplasia, Rickets, Achondroplasia, Marfan's syndrome & Down's syndrome.
8. Diseases of TM Joint:
 - Ankylosis, summary of different types of arthritis & other developmental malformations, traumatic injuries & myofascial pain dysfunction syndrome.
9. Cysts of the Oral & Paraoral region:
 - Classification, etiopathogenesis, clinical features, histopathology, laboratory & radiological features (as appropriate) of Odontogenic cysts, Non-Odontogenic cysts, Pseudocysts of jaws & soft tissue cysts of oral & paraoral region.
10. Tumours of the Oral Cavity:
 - Classification of Odontogenic, Non-Odontogenic & Salivary Gland Tumours
Aetiopathogenesis, clinical features, histopathology, radiological features & laboratory diagnosis (as appropriate) of the following common tumours:-
 - a) Odontogenic – all lesions.
 - b) Non-odontogenic
 - Benign Epithelial – Papilloma, Keratoacanthoma & Naevi.
 - Benign Mesenchymal – Fibroma, Aggressive fibrous lesions, Lipoma, Haemangioma, Lymphangioma, Neurofibroma, Schwannoma, Chondroma, Osteoma & Tori.
 - Malignant Epithelial – Basal Cell Carcinoma, Verrucous Carcinoma, Squamous Cell carcinoma & Malignant Melanoma.
 - Malignant Mesenchymal – Fibrosarcoma, Osteosarcoma, Giant cell tumour, Chondrosarcoma, Angiosarcoma, Kaposi's sarcoma, Lymphomas, Ewing's sarcoma & Other Reticuloendothelial tumours.
 - c) Salivary Gland
 - Benign Epithelial neoplasms – Pleomorphic Adenoma, Warthin's tumour, & Oncocytoma.

- Malignant Epithelial neoplasms – Adenoid Cystic Carcinoma,
Mucoepidermoid Carcinoma,
Acinic Cell Carcinoma & Adenocarcinomas.

d) Tumours of Disputed Origin – Congenital Epulis & Granular Cell Myoblastoma.

e) Metastatic tumours – Tumors metastasising to & from oral cavity & the routes of metastasis.

11. Traumatic, Reactive & Regressive lesions of Oral Cavity:

- Pyogenic & Giant cell granuloma, exostoses Fibrous Hyperplasia, Traumatic Ulcer & Traumatic Neuroma.
- Attrition, Abrasion, Erosion, Bruxism, Hypercementosis, Dentinal changes, Pulp calcifications & Resorption of teeth.
- Radiation effects of oral cavity, summary of Physical & Chemical injuries including allergic reactions of the oral cavity.
- Healing of Oral wounds & complications – Dry socket.

12. Non neoplastic Salivary Gland Diseases:

- Sialolithiasis, Sialosis, Sialadenitis, Xerostomia & Ptyalism.

13. Systemic Diseases involving Oral cavity:

- Brief review & oral manifestations, diagnosis & significance of common Blood, Nutritional, Hormonal & Metabolic diseases of Oral cavity.

14. Mucocutaneous Lesions:

- Aetiopathogenesis, clinical features & histopathology of the following common lesions. Lichen Planus, Lupus Erythematosus, Pemphigus & Pemphigoid lesions, Erythema Multiforme, Psoriasis, Scleroderma, Ectodermal Dysplasia, Epidermolysis bullosa & White sponge nevus.

15. Diseases of the Nerves:

- Facial neuralgias – Trigeminal & Glossopharyngeal. VII nerve paralysis, Causalgia.
- Psychogenic facial pain & Burning mouth syndrome.

16. Pigmentation of Oral & Paraoral region & Discolouration of teeth:

- Causes & clinical manifestations.

17. Diseases of Maxillary Sinus:

- Traumatic injuries to sinus, Sinusitis, Cysts & Tumours involving antrum.

18. a) ORAL PRECANCER – CANCER: Epidemiology, aetiology, clinical and histopathological features, TNM classification. Recent advances in diagnosis, management and prevention.

b) Biopsy: Types of biopsy, value of biopsy, cytology, histo chemistry & frozen sections in diagnosis of oral diseases.

19. Principles of Basic Forensic Odontology (Pre-clinical Forensic Odontology):

- Introduction, definition, aims & scope.
- Sex and ethnic (racial) differences in tooth morphology and histological age estimation
- Determination of sex & blood groups from buccal mucosa / saliva.
- Dental DNA methods
- Bite marks, rugae patterns & lip prints.
- Dental importance of poisons and corrosives.
- Overview of forensic medicine and toxicology
- Personal identification.
- Basis for dental identification.
- Dental identification procedures.
- Comparative dental identification.

- Oral autopsy.
- Obtaining dental records.
- Comparing post and antemortem dental data.
- Writing a report and drawing conclusions.
- Identification in disasters.
- Dental section.
- Post-mortem unit
- Antemortem unit
- Comparison and identification unit
- Dental profiling
- Identifying ethnic origin from teeth
- Sex differentiation
- Sex differences in tooth size
- Dental age estimation
- Crime investigation
- The dentist as an expert witness

**UNIVERSITY PRACTICALS EXAM
– III BDS ORAL PATHOLOGY AND
MICROBIOLOGY
MARKS MAX. – 100**

S. No.	Procedures	Marks	Total
1.	Slides – 10	10x5	50
2.	Spotters – 4	4x5	20
3.	Clinical Pathology 2 Cases	2x10	20
	Internal Assessment		10
			100

RECOMMENDED BOOKS

- | | |
|--|-------------------------------------|
| 1. A Text Book of Oral Pathology | - Shafer, Hine & Levy. |
| 2. Oral Pathology – Clinical Pathologic correlations | - Regezi & Sciubba. |
| 3. Oral Pathology | - Soames & Southam. |
| 4. Oral Pathology in the Tropics | - Prabhu, Wilson, Johnson & Daftary |

COURSE OBJECTIVE

Undergraduate programme in Orthodontics is designed to enable the qualifying dental surgeon to diagnose, analyse and treat common orthodontic problems by preventive, interceptive and corrective orthodontic procedures. The following basic instructional procedures will be adapted to achieve the above objectives.

1. Introduction, Definition, Historical Background, Aims and Objectives of Orthodontics and Need for Orthodontic care.
2. Growth and Development: In General
 - a. Definition
 - b. Growth spurts and Differential growth
 - c. Factors influencing growth and Development
 - d. Methods of measuring growth
 - e. Growth theories (Genetic, Sicher's, Scott's, Moss's, Petrovics, Multifactorial)
 - f. Genetic and epigenetic factors in growth
 - g. Cephalocaudal gradient in growth.
3. Morphologic Development Of Craniofacial Structures
 - a. Methods of bone growth
 - b. Prenatal growth of craniofacial structures
 - c. Postnatal growth and development of: cranial base, maxilla, mandible, dental arches and occlusion.
4. Functional Development of Dental Arches and Occlusion
 - a. Factors influencing functional development of dental arches and occlusion.
 - b. Forces of occlusion
 - c. Wolfe's law of transformation of bone
 - d. Trajectories of forces
5. Clinical Application of Growth and Development
6. Malocclusion – In General
 - a. Concept of normal occlusion
 - b. Definition of malocclusion
 - c. Description of different types of dental, skeletal and functional malocclusion.
7. Classification of Malocclusion
Principle, description, advantages and disadvantages of classification of malocclusion by Angle, Simon, Lischer and Ackerman and Proffitt.
8. Normal and Abnormal Function of Stomatognathic System
9. Aetiology Of Malocclusion
 - a. Definition, importance, classification, local and general aetiological factors.
 - b. Etiology of following different types of malocclusion:
 - 1) Midline diastema
 - 2) Spacing

- 3) Crowding
 - 4) Cross-Bite: Anterior/Posterior
 - 5) Class III Malocclusion
 - 6) Class II Malocclusion
 - 7) Deep Bite
 - 8) Open bite
10. Diagnosis And Diagnostic Aids
 - a. Definition, Importance and classification of diagnostic aids
 - b. Importance of case history and clinical examination in orthodontics
 - c. Study Models: - Importance and uses –Preparation and preservation of study models
 - d. Importance of intraoral X-rays in orthodontics
 - e. Panoramic radiographs: - Principles, Advantages, disadvantages and uses
 - f. Cephalometrics: Its advantages, disadvantages
 1. Definition
 2. Description and use of cephalostat
 3. Description and uses of anatomical landmarks lines and angles used in cephalometric analysis
 4. Analysis Steiner's, Down's, Tweed's, Ricket's – E- line
 - g. Electromyography and its use in orthodontics
 - h. Wrist X-rays and its importance in orthodontics
 11. General Principles In Orthodontic Treatment Planning Of Dental And Skeletal Malocclusions
 12. Anchorage in Orthodontics – Definition, Classification, Types and Stability Of Anchorage
 13. Biomechanical Principles In Orthodontic Tooth Movement
 - a. Different types of tooth movements
 - b. Tissue response to orthodontic force application
 - c. Age factor in orthodontic tooth movement
 14. Preventive Orthodontics
 - a. Definition
 - b. Different procedures undertaken in preventive orthodontics and their limitations.
 15. Interceptive Orthodontics
 - a. Definition
 - b. Different procedures undertaken in interceptive orthodontics
 - c. Serial extractions: Definition, indications, contra-indication, technique, advantages and disadvantages.
 - d. Role of muscle exercises as an interceptive procedure
 16. **Corrective Orthodontics**
 - a. Definition, factors to be considered during treatment planning.
 - b. Model analysis: Pont's Ashley Howe's, Bolton, Careys, Moyer's Mixed Dentition Analysis
 - c. Methods of gaining space in the arch:- Indications, relative merits and demerits of proximal stripping, arch expansion and extractions
 - d. Extractions in Orthodontics – indications and selection of teeth for extraction.
 17. Orthodontic Appliances: General
 - a. Requisites for orthodontic appliances
 - b. Classification, indications of Removable and Functional Appliances
 - c. Methods of force application

d. Materials used in construction of various orthodontic appliances – use of stainless steel, technical considerations in curing of acrylic, Principles of welding and soldering, fluxes and antiluxes.

e. Preliminary knowledge of acid etching and direct bonding.

18. Ethics

REMOVABLE ORTHODONTIC APPLIANCES

- 1) Components of removable appliances
- 2) Different types of clasps and their use
- 3) Different types of labial bows and their use
- 5) Expansion appliances in orthodontics;
 - i) Principles
 - ii) Indications for arch expansion
 - iii) Description of expansion appliances and different types of expansion devices and their uses.
 - iv) Rapid maxillary expansion

FIXED ORTHODONTIC APPLIANCES

1. Definition, Indications & Contraindications
2. Component parts and their uses
3. Basic principles of different techniques; Edgewise, Begg straight wire.

EXTRAORAL APPLIANCES

1. Headgears
2. Chincup
3. Reverse pull headgears

MYOFUNCTIONAL APPLIANCES

1. Definition and principles
2. Muscle exercises and their uses in orthodontics
3. Functional appliances:
 - i) Activator, Oral screens, Frankels function regulator, bionator twin blocks, lip bumper
 - ii) Inclined planes – upper and lower
18. Orthodontic Management Of Cleft Lip And Palate
19. Principles Of Surgical Orthodontics Brief knowledge of correction of:
 - a. Mandibular Prognathism and Retrognathism
 - b. Maxillary Prognathism and Retrognathism
 - c. Anterior open bite and deep bite
 - d. Cross bite
20. Principle, Differential Diagnosis & Methods of Treatment of:
 1. Midline diastema
 2. Cross bite
 3. Open bite
 4. Deep bite
 5. Spacing
 6. Crowding

- 7. Class II – Division 1, Division 2
- 8. Class III Malocclusion – True and Psuedo Class III
- 21. Retention and Relapse
Definition, Need for retention, Causes of relapse, Methods of retention, Different types of retention devices, Duration of retention, Theories of retention.

**CLINICALS AND PRACTICALS IN
ORTHODONTICS PRACTICAL TRAINING
DURING II YEARS B.D.S.**

- I. Basic wire bending exercises Gauge 22 or 0.7mm
 - 1. Straightening of wires (4 Nos.)
 - 2. Bending of a equilateral triangle
 - 3. Bending of a rectangle
 - 4. Bending of a square
 - 5. Bending of a circle
 - 6. Bending of U.V.
- II. Construction of Clasps (Both sides upper/lower) Gauge 22 or 0.7mm
 - 1. $\frac{3}{4}$ Clasp (C-Clasp)
 - 2. Full Clasp (Jackson's Crib)
 - 3. Adam's Clasp
 - 4. Triangular Clasp
- III. Construction of Springs (on upper both sides) Gauge 24 or 0.5mm
 - 1. Finger Spring
 - 2. Single Cantelever Spring
 - 3. Double Cantelever Spring (Z-Spring)
 - 4. T-Springs on premolars
- IV. Construction of Canine retractors Gauge 23 or 0.6mm
 - 1. U – Loop canine retractor
(Both sides on upper & lower)
 - 2. Helical canine retractor
(Both sides on upper & lower)
 - 3. Buccal canine retractor:
 - Self supported buccal canine retractor With
 - a) Sleeve – 5mm wire or 24 gauge
 - b) Sleeve – 19 gauge needle on any one side.
 - 4. Palatal canine retractor on upper both sides Gauge 23 or 0.6mm
- V. Labial Bow
Gauge 22 or 0.7mm
One on both upper and lower

CLINICAL TRAINING DURING III YEAR B.D.S.

NO. EXERCISE

01. Making upper Alginate impression
02. Making lower Alginate impression
03. Study Model preparation
04. Model Analysis
 - a. Pont's Analysis
 - b. Ashley Howe's Analysis
 - c. Carey's Analysis
 - d. Bolton's Analysis
 - e. Moyer's Mixed Dentition Analysis

CLINICAL TRAINING DURING FINAL YEAR B.D.S.

NO. EXERCISE

01. Case History taking
02. Case discussion
03. Discussion on the given topic
04. Cephalometric tracings
 - a. Down's Analysis
 - b. Steiner's Analysis
 - c. Tweed's Analysis

PRACTICAL TRAINING DURING FINAL YEAR B.D.S.

1. Adam's Clasp on Anterior teeth Gauge 0.7mm
2. Modified Adam's Clasp on upper arch Gauge 0.7mm
3. High Labial bow with Apron spring on upper arch
(Gauge of Labial bow – 0.9mm, Apron spring – 0.3mm)
4. Coffin spring on upper arch Gauge 1mm
Appliance Construction in Acrylic
 1. Upper & Lowe Hawley's Appliance
 2. Upper Hawley's with Anterior bite plane
 3. Upper Habit breaking Appliance
 4. Upper Hawley's with Posterior bite plane with 'Z' Spring
5. Construction of Activator
6. Lower inclined plane/Catalan's Appliance
7. Upper Expansion plate with Expansion Screw

**UNIVERSITY PRACTICALS EXAM – IV
BDS ORTHODONTICS & DENTAL
ORTHOPAEDICS MARKS MAX. – 100**

S. No.	Procedures	Marks	Total
1.	Diagnosis, Treatment Planning and Presentation of a Patient, presenting with an Orthodontics problem, with basic clinical records of OPG, Cephalometric Radiographs and Clinical Models	40	40
2.	Wire Bending Demonstration of 3 components from Removable Appliances	30	30
3.	Spotters	10	10
4.	Viva Voce	10	10
	Internal Assessment		10
			100

- Understand about normal growth and development of facial skeleton and dentition.
- Pinpoint aberrations in growth process both dental and skeletal and plan necessary treatment.
- Diagnose the various categories of malocclusion
- Able to motivate and explain to the patient (and parent or guardian) about the necessity of treatment.
- Plan and execute preventive orthodontics (space maintainers or space regainers)
- Plan and execute interceptive orthodontics (habit breaking appliances)
- Manage treatment of simple malocclusion such as anterior spacing using removable appliances.
- Handle delivery and activation of removable orthodontics appliances.
- Diagnose and appropriately refer patients with complex malocclusion to the specialist

The behavioral sciences including sociology and psychology shall be included in the 1 year of the course. A store should be made on national oral health policing frequently by the public health dentistry. The students must be exposed to CPR. Compiles. Must be involved in comprehensive oral health care or holistic approach and treat patient as a whole.

RECOMMENDED AND REFERENCE BOOKS

- | | |
|---|--------------------|
| 1. CONTEMPORARY ORTHODONTICS | WILLIAM R. PROFFIT |
| 2. ORTHODONTICS FOR DENTAL STUDENTS | WHITE and GARDINER |
| 3. HANDBOOK OF ORTHODONTICS | MOYERS |
| 4. ORTHODONTICS – PRINCIPLES AND PRACTICE | GRABER |
| 5. DESIGN, CONSTRUCTION AND USE OF REMOVABLE ORTHODONTIC APPLIANCES | C. PHILIP ADAMS |

AIMS:

To produce a graduate who is competent in performing extraction of teeth under both local and general anaesthesia, prevent and manage related complications, acquire a reasonable knowledge and understanding of the various diseases, injuries, infections occurring in the Oral & Maxillofacial region and offer solutions to such of those common conditions and has an exposure into the in-patient management of maxillofacial problems.

OBJECTIVES:**a) Knowledge & Understanding:**

At the end of the course and clinical training the graduate is expected to-

1. Apply the knowledge gained in the related medical subjects like pathology, microbiology and general medicine in the management of patients with oral surgical problems.
2. Diagnose, manage and treat (understand the principles of treatment of) patients with oral surgical problems.
3. Gain Knowledge of a range of surgical treatments.
4. Be able to decide the requirement of a patient to have oral surgical specialist opinion or treatment.
5. Understand the principles of in-patient management.
6. Understand the management of major oral surgical procedures and principles involved in patient management.
7. Know the ethical issues and have communication ability.

b) Skills:

1. A graduate should have acquired the skill to examine any patient with an oral surgical problem in an orderly manner, be able to understand requisition of various clinical and laboratory investigations and is capable of formulating differential diagnosis.
2. Should be competent in the extraction of teeth under both local and general anaesthesia.
3. Should be able to carry out certain minor oral surgical procedures under L.A. like frenectomy, alveolar procedures & biopsy etc.
4. Ability to assess, prevent and manage various complications during and after surgery.
5. Able to provide primary care and manage medical emergencies in the dental office.
6. Understand the management of major oral surgical problems and principles involved in inpatient management.

ORAL & MAXILLOFACIAL SURGERY SYLLABUS

1. Introduction, definition, scope, aims and objectives.
2. Diagnosis in oral surgery:
 - A. History taking
 - B. Clinical examination
 - C. Investigations.

3. Principles of infection control and cross-infection control with particular reference to HIV/AIDS and Hepatitis.

4. Principles of Oral Surgery-

a) Asepsis: Definition, measures to prevent introduction of infection during surgery.

1. Preparation of the patient
2. Measures to be taken by operator
3. Sterilisation of instruments – various methods of sterilisation etc.
4. Surgery set up.

b) Painless Surgery:

1. Pre-anaesthetic considerations Pre-medication: purpose, drugs used
2. Anaesthetic considerations –
 - a) Local b) Local with IV sedations
3. Use of general anaesthetic

c) Access:

Intra-oral: Mucoperiosteal flaps, principles, commonly used intra oral incisions. Bone Removal: Methods of bone removal.

Use of Burs: Advantages & precautions

Bone cutting instruments: Principles of using chisel & osteotome.

Extra-oral: Skin incisions – principles, various extra-oral incision to expose facial skeleton.

- a) Submandibular
- b) Pre auricular
- c) Incision to expose maxilla & orbit
- d) Bicoronal incision

d) Control of haemorrhage during surgery Normal Haemostasis

Local measures available to control bleeding Hypotensive anaesthesia etc.

e) Drainage & Debridement

Purpose of drainage in surgical wounds Types of drains used

Debridement: purpose, soft tissue & bone debridement.

f) Closure of wounds

Suturing: Principles, suture material, classification, body response to various materials etc.

g) Post operative care

Post operative instructions

Physiology of cold and heat

Control of pain – analgesics

Control of infection –
antibiotics

Control of swelling – anti-inflammatory drugs

Long term post operative follow up –
significance.

5. Exodontia: General

considerations Ideal

Extraction.

Indications for extraction of teeth

Extractions in medically compromised patients. Methods of extraction –

- (a) Forceps or intra-alveolar or closed method. Principles, types of movement, force etc.
- (b) Trans-alveolar, surgical or open method, Indications, surgical procedure.

Dental elevators: uses, classification, principles in the use of elevators, commonly used elevators.

Complications of Exodontia –

Complications during exodontias

Common to both maxilla and

mandible. Post-operative

complications –

Prevention and management of complications.

6. Impacted teeth:

Incidence, definition, aetiology.

- (a) Impacted mandibular third molar.

Classification, reasons for removal,

Assessment – both clinical &

radiological Surgical procedures for

removal. Complications during and

after removal, Prevention and

management.

- (b) Maxillary third molar,

Indications for removal,

classification, Surgical procedure

for removal.

- (c) Impacted maxillary canine

Reasons for canine

impaction,

Localisation, indications for removal,

Methods of management, labial and palatal

approach, Surgical exposure, transplantation,

removal etc.

7. Pre-prosthetic Surgery:

Definition, classification of procedures

- (a) Corrective procedures:

Alveoloplasty, Reduction of

maxillary tuberosities,

Frenectomies and removal of tori.

- (b) Ridge extension or Sulcus extension

procedures Indications and various surgical

procedures

- (c) Ridge augmentation and reconstruction.

Indications, use of bone grafts,

Hydroxyapatite Implants – concept of

osseointegration Knowledge of various

types of implants and Surgical procedure

to place implants.

8. Diseases of the maxillary sinus

Surgical anatomy of the

sinus. Sinusitis both acute

and chronic

Surgical approach of sinus – Caldwell-Luc
procedure Removal of root from the sinus.

Oro-antral fistula – aetiology, clinical features and various surgical methods for closure.

9. Disorders of T.M. Joint

Applied surgical anatomy of the joint.

Dislocation – Types, aetiology, clinical features and management. Ankylosis – Definition, aetiology, clinical features and management

Myo-facial pain dysfunction syndrome, aetiology, clinical features, management- Non surgical and surgical.

Internal derangement of the joint. Arthritis of T.M. Joint.

10. Infections of the Oral cavity

Introduction, factors responsible for infection, course of odontogenic infections, spread of odontogenic infections through various facial spaces. Dento-alveolar abscess – aetiology, clinical features and management. Osteomyelitis of the jaws – definition, aetiology, predisposing factors, classification, clinical features and management.

Ludwigs angina – definition, aetiology, clinical features, management and complications.

11. Benign cystic lesions of the jaws –

Definition, classification, pathogenesis.

Diagnosis – Clinical features, radiological, aspiration biopsy, use of contrast media and histopathology.

Management – types of surgical procedures, Rationale of the techniques, indications, procedures, complications etc.

12. Tumours of the Oral

cavity – General considerations

Non odontogenetic benign tumours occurring in oral cavity – fibroma, papilloma, lipoma, ossifying fibroma myxoma etc.

Ameloblastoma – Clinical features, radiological appearance and methods of management. Carcinoma of the oral cavity –

Biopsy – types

TNM

classification.

Outline of management of squamous

Cell carcinoma: surgery, radiation and chemotherapy

Role of dental surgeons in the prevention and early detection of oral cancer.

13. Fractures of the jaws –

General considerations, types of fractures, aetiology, clinical features and general principles of management.

Mandibular fractures – Applied anatomy, classification. Diagnosis – Clinical and radiological

Management – Reduction closed and open Fixation and immobilisation

methods

Outline of rigid and semi-rigid internal fixation.

Fractures of the condyle – aetiology, classification, clinical features, principles of management. Fractures of the middle third of the face.

Definition of the mid face, applied surgical anatomy, classification, clinical features and outline of management.

Alveolar fractures – methods of management Fractures of the Zygomatic complex

Classification, clinical features, indications for treatment, various methods of

reduction and fixation.

Complications of fractures – delayed union, non-union and malunion.

14. Salivary gland diseases –
Diagnosis of salivary gland diseases’
Sialography, contrast media,
procedure. Infections of the salivary
glands
Sialolithiasis – Sub mandibular duct and gland and parotid
duct. Clinical features, management.
Salivary fistulae
Common tumours of salivary glands like Pleomorphic adenoma including minor salivary
glands.
15. Jaw deformities –
Basic forms – Prognathism, Retrognathism and open
bite. Reasons for correction.
Outline of surgical methods carried out on mandible and maxilla.
16. Neurological disorders –
Trigeminal neuralgia – definition, aetiology, clinical features and methods of
management including surgical.
Facial paralysis – Aetiology, clinical
features. Nerve injuries – Classification,
neurorrhaphy etc.
17. Cleft Lip and Palate –
Aetiology of the clefts, incidence, classification, role of dental surgeon in the management
of cleft patients. Outline of the closure procedures.
18. Medical Emergencies in dental practice –
Primary care of medical emergencies in dental practice particularly –
(a) Cardio vascular (b) Respiratory (c) Endocrine
(d) Anaphylactic reaction (e) Epilepsy
19. Emergency drugs, Intra muscular I.V. Injections –
Applied anatomy, Ideal location for giving these injections, techniques etc.
20. Oral Implantology
- History of implants, their design and surface characteristics and osseointegration.
 - Scope of oral and maxillofacial implantology & terminologies.
 - Bone biology, morphology, classification of bone and its relevance to implant treatment
& bone augmentation materials.
 - Soft tissue consideration in implant dentistry.
 - Diagnosis & treatment planning in implant surgery.
 - Pre-surgical preparation of patient.
 - Implant installation & armamentarium for the Branemark system as a role model.
 - First stage surgery-mandible-maxilla,
 - Healing period & second stage surgery
 - Management of surgical complications & failures.
 - Immediate implants.
 - Bone grafts and bone augmentation in sinus lift procedures.
21. Ethics

LOCAL ANAESTHESIA:

Introduction, concept of L.A., classification of local anaesthetic agents, ideal requirement,
mode of action, types of local anaesthesia, complications.

Use of Vaso constrictors in local anaesthetic solution –
 Advantages, contra-indications, various vaso constrictors
 used. Anaesthesia of the mandible –
 Pterygomandibular space – boundaries, contents
 etc. Inferior Dental Nerve Block – various
 techniques Complications
 Mental foramen nerve
 block Anaesthesia of
 Maxilla – Intra – orbital
 nerve block.
 Posterior superior alveolar nerve
 block Maxillary nerve block –
 techniques.

GENERAL ANAESTHESIA –

Concept of general anaesthesia.
 Indications of general anaesthesia in
 dentistry. Pre-anaesthetic evaluation of the
 patient.
 Pre-anaesthetic medication – advantages, drugs
 used. Commonly used anaesthetic agents.
 Complication during and after G.A.
 I.V. sedation with Diazepam and
 Medazolam. Indications, mode of action,
 technique etc. Cardiopulmonary
 resuscitation
 Use of oxygen and emergency
 drugs. Tracheostomy.

UNIVERSITY PRACTICALS EXAM – IV BDS ORAL & MAXILLOFACIAL SURGERY MARKS MAX. – 100

S. No.	Procedures	Marks	Total
1.	Case History	25	25
2.	Extraction	25	25
3.	Spotters	10	10
4.	Spot Viva	20	20
5.	Practical Viva	10	10
	Internal Assessment		10
			100

- Able to apply the knowledge gained in the basic medical and clinical subjects in the management of patients with surgical problems
- Able to diagnose, manage and treat patients with basic oral surgical problems
- Have a broad knowledge of maxillofacial surgery and oral implantology
- Should be familiar with legal, ethical and moral issues pertaining to the patient care and communication skills
- Should have acquired the skill to examine any patient with an oral surgical problem in an orderly manner
- Understand and practice the basic principles of asepsis and sterilization
- Should be competent in the extraction of the teeth under both local and general anaesthesia
- Competent to carry out certain minor oral surgical procedure under LA like trans-alveolar extraction, frenectomy, dento alveolar procedures, simple impaction, biopsy, etc.
- Competent to assess, prevent and manage common complications that arise during and after minor oral surgery
- Able to provide primary care and manage medical emergencies in the dental office
- Familiar with the management of major oral surgical problems and principles involved in in-patient management

RECOMMENDED BOOKS:

1. Impacted teeth; Alling John F et al.
2. Principles of oral and maxillofacial surgery; Vol. 1, 2 & 3 Peterson LJ et al.
3. Text book of oral and maxillofacial surgery; Srinivasan B.
4. Handbook of medical emergencies in the dental office, Malamed SF.
5. Killeys Fractures of the mandible; Banks P.
6. Killeys fractures of the middle 3rd of the facial skeleton; Banks P.
7. The maxillary sinus and its dental implications; McGovanda
8. Killey and Kays outline of oral surgery – Part – 1; Seward GR et al
9. Essentials of safe dentistry for the medically compromised patients; Mc Carthy FM
10. Oral & maxillofacial surgery, Vol 2; Laskin DM
11. Extraction of teeth; Howe, GL
12. Minor Oral Surgery; Howe. GL
13. Contemporary oral and maxillofacial surgery; Peterson I.J. et al
14. Oral and maxillofacial infections; Topazian RG & Goldberg MH

THEORY:

1. INTRODUCTION TO PAEDODONTICS & PREVENTIVE DENTISTRY
 - Definition, Scope, Objectives and Importance.
2. GROWTH & DEVELOPMENT:
 - Importance of study of growth and development in Paedodontics.
 - Prenatal and Postnatal factors in growth & development.
 - Theories of growth & development.
 - Development of maxilla and mandible and related age changes.
3. DEVELOPMENT OF OCCLUSION FROM BIRTH THROUGH ADOLESCENCE.
 - Study of variations and abnormalities
4. DENTAL ANATOMY AND HISTOLOGY:
 - Development of teeth and associated structures.
 - Eruption and shedding of teeth.
 - Teething disorders and their management.
 - Chronology of eruption of teeth.
 - Differences between deciduous and permanent teeth.
 - Development of dentition from birth to adolescence.
 - Importance of first permanent molar.
5. DENTAL RADIOLOGY RELATED TO PAEDODONTICS.
6. ORAL SURGICAL PROCEDURES IN CHILDREN.
 - Indications and contraindications of extractions of primary and permanent teeth in children.
 - Knowledge of Local and General Anaesthesia.
 - Minor surgical procedures in children.
7. DENTAL CARIES:
 - Historical background.
 - Definition, aetiology & pathogenesis.
 - Caries pattern in primary, young permanent and permanent teeth in children.
 - Rampant caries, early childhood caries and extensive caries:
 - * Definition, aetiology, Pathogenesis, Clinical features, Complications & Management
 - Role of diet and nutrition in Dental Caries.
 - Dietary modifications & Diet counselling.
 - Caries activity, tests, caries prediction, caries susceptibility & their clinical application.
8. GINGIVAL & PERIODONTAL DISEASES IN CHILDREN.
 - Normal gingival & periodontium in children.
 - Definition, aetiology & Pathogenesis.
 - Prevention & Management of gingival & Periodontal diseases.
9. CHILD PSYCHOLOGY:
 - Definition.
 - Theories of child psychology.
 - Psychological development of children with age.
 - Principles of psychological growth & development while managing child patient.

- Dental fear and its management.
- Factors affecting child's reaction to dental treatment.
- 10. BEHAVIOUR MANAGEMENT:
 - Definitions.
 - Types of behaviour encountered in the dental clinic.
 - Non-pharmacological & pharmacological methods of Behaviour Management.
- 11. PAEDIATRIC OPERATIVE DENTISTRY:
 - Principles of Paediatric Operative Dentistry.
 - Modifications required for cavity preparation in primary and young permanent teeth.
 - Various Isolation Techniques.
 - Restorations of decayed primary, young permanent and permanent teeth in children using various restorative materials like Glass Ionomer, Composites & Silver Amalgam. Stainless steel, Polycarbonate & Resin Crowns.
- 12. PAEDIATRIC ENDODONTICS
 - Principles & Diagnosis.
 - Classification of Pulpal Pathology in primary, young permanent & permanent teeth.
 - Management of Pulpally involved primary, young permanent & permanent teeth.
 - Pulp capping – direct & indirect.
 - Pulpotomy
 - Pulpectomy
 - Apexogenesis
 - Apexification
 - Obturation Techniques & material used for primary, young permanent & Permanent teeth in children.
- 13. TRAUMATIC INJURIES IN CHILDREN:
 - Classifications & Importance.
 - Sequelae & reaction of teeth to trauma.
 - Management of Traumatized teeth.
- 14. PREVENTIVE & INTERCEPTIVE ORTHODONTICS:
 - Definitions.
 - Problems encountered during primary and mixed dentition phases & their management.
 - Serial extractions.
 - Space management.
- 15. ORAL HABITS IN CHILDREN:
 - Definition, Aetiology & Classification.
 - Clinical features of digit sucking, tongue thrusting, mouth breathing & various other secondary habits.
 - Management of oral habits in children.
- 16. DENTAL CARE OF CHILDREN WITH SPECIAL NEEDS:
 - Definition, Aetiology, Classification, Behavioural and Clinical features & Management of children with:
 - Physically handicapping conditions.
 - Mentally compromising conditions.
 - Medically compromising conditions.
 - Genetic disorders.

17. CONGENITAL ABNORMALITIES IN CHILDREN:
 - Definition, Classification, Clinical features & Management.
18. DENTAL EMERGENCIES IN CHILDREN & THEIR MANAGEMENT.
19. DENTAL MATERIALS USED IN PAEDIATRIC DENTISTRY.
20. PREVENTIVE DENTISTRY:
 - Definition.
 - Principles & Scope.
 - Types of prevention.
 - Different preventive measures used in Paediatric Dentistry including pit and fissure sealants and caries vaccine.
21. DENTAL HEALTH EDUCATION & SCHOOL DENTAL HEALTH PROGRAMMES.
22. FLUORIDES:
 - Historical background.
 - Systemic & Topical fluorides.
 - Mechanism of action.
 - Toxicity & Management.
 - Defluoridation techniques.
23. CASE HISTORY RECORDING:
 - Outline of principles of examination, diagnosis & treatment planning.
24. SETTING UP OF PAEDODONTIC CLINIC.
25. ETHICS.

B. PRACTICALS:

Following is the recommended clinical quota for under-graduate students in the subject of paediatric & preventive dentistry.

1. Restorations – Class I & II only: 45
2. Preventive measures e.g. Oral Prophylaxis – 20
3. Fluoride applications – 10
4. Extractions – 25
5. Case History Recording & Treatment Planning – 10
6. Education & motivation of the patients using disclosing agents. Educating patients about oral hygiene measures like tooth brushing, flossing etc.

**UNIVERSITY PRACTICALS EXAM
– IV BDS PAEDIATRIC &
PREVENTIVE DENTISTRY MARKS
MAX. – 100**

S. No.	Procedures	Mark s	Tota l
1.	Chief Complaint & History taking	15	15
2.	Clinical Examination	15	15
3.	Tooth Identification	15	15
4.	Investigation & Diagnosis	15	15
5.	Treatment Plan	15	15
6.	Treatment Done	15	15
	Internal Assessment		10
			100

- Able to instill a positive attitude and behavior in children towards oral health and understand the principles of prevention and preventive dentistry right from birth to adolescence.
- Able to guide and counsel the guardian/Parents with regard to various treatment modalities including different facets of preventive dentistry
- Able to treat dental diseases occurring in the child patient
- Able to manage to physically and mentally challenged / disabled children effectively and efficiently, tailored to the needs of individual requirement and conditions.

BOOKS RECOMMENDED & REFERENCES:

1. Paediatric Dentistry (Infancy through Adolescence) – Pinkham.
2. Kennedy's Pediatric Operative Dentistry – Kennedy & Curzon.
3. Occlusal guidance in Paediatric Dentistry – Stephen H. Wei.
4. Clinical Use of Fluorides – Stephen H. Wei.
5. Paediatric Oral & Maxillofacial Surgery – Kaban.
6. Paediatric Medical Emergencies – P. S. Whatt.
7. Understanding of Dental Caries – Niki Foruk.
8. An Atlas of Glass Ionomer cements – G. J. Mount.
9. Clinical Pedodontics – Finn.
10. Textbook of Pediatric Dentistry – Braham Morris.
11. Primary Preventive Dentistry – Norman O. Harris.
12. Handbook of Clinical Pedodontics – Kenneth. D.
13. Preventive Dentistry – Forrester.
14. The Metabolism and Toxicity of Fluoride – Garry M. Whitford.
15. Dentistry for the Child and Adolescent – Mc. Donald.
16. Pediatric Dentistry – Damle S. G.
17. Behaviour Management – Wright.
18. Pediatric Dentistry – Mathewson.
19. Traumatic Injuries – Andreason.

20. Occlusal guidance in Pediatric Dentistry – Nakata.
21. Pediatric Drug Therapy – Tomare
22. Contemporary Orthodontics – Profitt.
23. Preventive Dentistry – Depaola.
24. Metabolism & Toxicity of Fluoride – Whitford. G. M.
25. Endodontic Practice – Grossman.
26. Principles of Endodontics – Munford.
27. Endodontics – Ingle.
28. Pathways of Pulp – Cohen.
29. Management of Traumatized anterior Teeth – Hargreaves.

1. Identification and study of handcutting instruments chisels, gingival margin trimmers, excavators and hatchet.
2. Identification and use of rotary cutting instruments in contra angle hand pieces burs (Micromotor)
3. Preparation class I and extended class I and class II and MOD's and class V amounting to 10 exercises in plaster models.
4. Ten exercises in mounted extracted teeth of following: class I, 4 in number; class I extended cavities 2; class II 4 in number and Class V 2 in number. Cavity preparation base application, matrix and wedge placement restoration with amalgam.
5. Exercises on phantom head models which includes cavity preparation base and varnish application matrix and wedge placement followed by amalgam restoration.

Class I	5
Class I with extension	2
Class II	10
Class II Mods	2
Class V and III for glass ionomers	4
Class V for amalgam	2
6. Polishing of above restorations.
7. Demonstration of Class III and Class V cavity preparation. For composites on extracted tooth completing the restoration.
8. Polishing and finishing of the restoration of composites.
9. Identification and manipulation of varnish bases like Zinc Phosphate, Poly carboxylate, Glass Ionomers, Zinc Oxide, Eugenol cements.
10. Identification and manipulation of various matrices, tooth separators and materials like composites and modified glass ionomer cements.
11. Cast Restoration
 1. Preparation of Class II inlay cavity
 2. Fabrication of wax pattern
 3. Sprue for inner attachment investing
 4. Investing of wax pattern
 5. Finishing and cementing of class II inlay in extracted tooth.
12. Endodontics
 1. Identification of basic endodontic instruments
 2. Coronal access cavity preparation on extracted upper central incisors
 3. Determination of working length.
 4. Biomechanical preparation of root canal space of central incisor
 5. Obturation of root canal spaces. Absence of coronal access cavity.
 6. Closure of access cavity

**UNIVERSITY PRACTICALS EXAM
– II BDS PRECLINICAL
CONSERVATIVE
MARKS MAX. – 60**

S. No.	Procedures	Marks	Total
1.	Cavity preparation	25	25
2.	Base & matrix placement	15	15
3.	Restoration	20	20
			60

Practical and Viva Voce Only in University Examination:

Pre-clinical Prosthodontics

Pre-clinical Conservative Dentistry.....

Internal Assessment - 20

Practical - 60

Viva Voce - 20

100

OBJECTIVES:

The student shall acquire the skill to perform dental scaling, diagnostic tests of periodontal diseases; to use the instruments for periodontal therapy and maintenance of the same.

The student shall develop attitude to impart the preventive measures namely, the prevention of periodontal diseases and prevention of the progress of the disease. The student shall also develop an attitude to perform the treatment with full aseptic precautions; shall develop an attitude to perform the treatment with full aseptic precautions; shall develop an attitude to prevent iatrogenic diseases; to conserve the tooth to the maximum possible time by maintaining periodontal health and to refer the patients who require specialist's care.

1. Introduction: Definition of Periodontology, Periodontics, Periodontia, Brief historical background, Scope of Periodontics
2. Development of periodontal tissues, micro-structural anatomy and biology of periodontal tissues in detail Gingiva. Junctional epithelium in detail, Epithelial- Mesenchymal interaction, Periodontal ligament, Cementum, Alveolar bone.
3. Defensive mechanisms in the oral cavity: Role of Epithelium, Gingival fluid, Saliva and other defensive mechanisms in the oral environment.
4. Age changes in periodontal structures and their significance in Geriatric dentistry Age changes in teeth and periodontal structures and their association with periodontal diseases
5. Classification of periodontal diseases as described in World Workshop 1989
 Gingivitis:
 Plaque associated, ANUG, steroid hormone influence, Medication influenced, Desquamative gingivitis, other forms of gingivitis as in nutritional deficiency, bacterial and viral infections etc.

 Periodontitis:
 Adult periodontitis, Rapidly progressive periodontitis A&B, Juvenile periodontitis (localised, generalised, and post- juvenile), Prepubertal periodontitis, Refractory periodontitis
6. Gingival diseases Localised and generalised gingivitis, Papillary, marginal and diffuse gingivitis
 Aetiology, pathogenesis, clinical signs, symptoms and management of
 i) Plaque associated gingivitis

	ii) Systemically aggravated gingivitis (sex hormones, drugs and systemic diseases) iii) ANUG iv) Desquamative gingivitis-Gingivitis associated with lichen planus, pemphigoid, pemphigus, and other vesiculobullous lesions v) Allergic gingivitis vi) Infective gingivitis-Herpetic, bacterial and candidial vii) Pericoronitis viii) Gingival enlargement (classification and differential diagnosis)
7. Epidemiology of prevalence, periodontal diseases	- Definition of index, incidence, epidemiology, endemic, epidemic, and pandemic - Classification of indices (Irreversible and reversible) - Deficiencies of earlier indices used in Periodontics - Detailed understanding of Silness & Loe Plaque Index, Loe & Silness Gingival Index, CPITN & CPI. - Prevalence of periodontal diseases in India and other countries. - Public health significance All these topics are covered at length under community dentistry. Hence, the topics may be discussed briefly. However, questions may be asked from the topics for examination
8. Extension of gingival inflammation from gingival	Mechanism of spread of inflammation from area to deeper periodontal structures Factors that modify the spread
9. Pocket	Definition, signs and symptoms, classification, pathogenesis, histopathology, root surface changes and contents of the pocket
10.	Etiology - Dental Plaque (Biofilm) - Definition, New concept of biofilm - Types, composition, bacterial colonisation, growth, maturation & disclosing agents - Role of dental plaque in periodontal diseases - Plaque microorganisms in detail and bacteria associated with periodontal diseases - Plaque retentive factors - Materia alba - Food debris - Calculus

- Definition
- Types, composition, attachment, theories of formation
- Role of calculus in disease Food Impaction
- Definition
- Types, Aetiology
- Hirschfelds' classification
- Signs & symptoms & sequelae of treatment Trauma from occlusion
- Definition, Types
- Histopathological changes
- Role in periodontal disease
- Measures of management in brief Habits
- Their periodontal significance
- Bruxism & parafunctional habits, tongue thrusting, lip biting, occupational habits

IATROGENIC FACTORS

Conservative Dentistry

- Restorations
 - Contact point, marginal ridge, surface roughness, overhanging restorations, interface between restoration and teeth
- ##### Prosthodontics

- Interrelationship
- Bridges and other prosthesis, pontics (types), surface contour, relationships of margins to the periodontium, Gingival protection theory, muscle action theory & theory of access to oral hygiene.

Orthodontics

- Interrelationship, removable appliances & fixed appliances
- Retention of plaque, bacterial changes

Systemic diseases

- Diabetes, sex hormones, nutrition (Vit.C & proteins)
- AIDS & periodontium
- Haemorrhagic diseases, Leukemia, clotting factor disorders, PMN disorders

Risk factors Definition. Risk factors for periodontal

11. diseases

12.

Host response - Mechanism of initiation and progression of periodontal diseases

- Basic concepts about cells, Mast cells, neutrophils, macrophages, lymphocytes, immunoglobulins,

- complement system, immune mechanisms & cytokines in brief
- Stages in gingivitis-Initial, early , established & advanced
 - Periodontal disease activity, continuous paradigm, random burst & asynchronous multiple burst hypothesis
13. Periodontitis - Aetiology histopathology, clinical signs & symptoms, diagnosis and treatment of adult periodontitis
- Periodontal abscess; definition, classification, pathogenesis, differential diagnosis and treatment
 - Furcation involvement, Glickmans' classification, prognosis and management
 - Rapidly progressive periodontitis
 - Juvenile periodontitis: Localised and generalised
 - Post-juvenile periodontitis
 - Periodontitis associated with systemic diseases
 - Refractory periodontitis
14. Diagnosis - Routine procedures, methods of probing, types of probes, (According to case history)
- Halitosis: Aetiology and treatment. Mention advanced diagnostic aids and their role in brief.
15. Prognosis - Definition, types, purpose and factors to be taken into consideration
16. Treatment plan - Factors to be considered
17. Periodontal therapy A. General principles of periodontal therapy. Phase I, II, III, IV therapy.
- Definition of periodontal regeneration, repair, new attachment and reattachment.
- B. Plaque control
- i. Mechanical tooth brushes, interdental cleaning aids, dentifrices
 - ii. Chemical; classification and mechanism of action of each & pocket irrigation
18. Pocket eradication -
- Scaling and root planning: Procedures - Indications
- Aims & objectives
 - Healing following root planning
 - Hand instruments, sonic, ultrasonic & piezo-electric scalers
 - Curettage & present concepts
 - Definition
 - Indications
 - Aims & objectives
 - Procedures & healing response

	- Flap surgery - Definition - Types of flaps, Design of flaps, papilla preservation - Indication & contraindications - Armamentarium - Surgical procedure & healing response
19. disease	Osseous Surgery Osseous defects in periodontal - Definition - Classification - Surgery: respective, additive osseous surgery (osseous grafts with classification of grafts) - Healing responses - Other regenerative procedures; root conditioning - Guided tissue regeneration
20. & periodontal plastic classification of surgeries	Mucogingival surgery Definition Mucogingival problems: etiology, gingival recession (P.D. Miller Jr. And Sullivan and Atkins) Indications & objectives Gingival extension procedures: lateral pedicle graft, frenectomy, frenotomy Crown lengthening procedures Periodontal microsurgery in brief
21.	Splints - Periodontal splints - Purpose & classification - Principles of splinting
22.	Hypersensitivity Causes, Theories & management
23.	Implants Definition, types, scope & biomaterials used. Periodontal considerations: such as implant-bone interface, implant-gingiva interface, implant failure, peri-implantitis & management
24. objectives, and principles (SPT)	Maintenance phase - Aims, - Importance - Procedures - Maintenance of implants
25.	Pharmaco-therapy - Periodontal dressings - Antibiotics & anti-inflammatory drugs - Local drug delivery systems
26. management of patients medically compromised patients	Periodontal Topics concerning periodontal management of medically compromised
27.	Inter-disciplinary care - Pulpo-periodontal involvement - Routes of spread of infection - Simons' classification - Management

- | | | | |
|-----|---|----------------------------|------------------------------------|
| 28. | weight babies etc.
Periodontal diseases In brief | Systemic effects of | Cardiovascular diseases, Low birth |
| 29. | various aseptic procedures | Infection control Protocol | Sterilisation and |
| 30. | Ethics | | |

TUTORIALS DURING CLINICAL POSTING:

- 1) Infection control
- 2) Periodontal instruments
- 3) Chair position and principles of instrumentation
- 4) Maintenance of instruments (sharpening)
- 5) Ultrasonic, Piezoelectric and sonic scaling – demonstration of technique
- 6) Diagnosis of periodontal disease and determination of prognosis
- 7) Radiographic interpretation and lab investigation
- 8) Motivation of patients – oral hygiene instructions

Students should be able to record a detailed periodontal case history, determine diagnosis, prognosis and plan treatment. Student should perform scaling, root planning local drug delivery and SPT. Shall be given demonstration of all periodontal surgical procedures.

DEMONSTRATIONS:

- 1) History taking and clinical examination of the patients
- 2) Recording different indices
- 3) Methods of using various scaling and surgical instruments
- 4) Polishing the teeth
- 5) Bacterial smear taking
- 6) Demonstration to patients about different oral hygiene aids
- 7) Surgical procedures – gingivectomy, gingivoplasty, and flap operations
- 8) Follow up procedures, post operative care and supervision

REQUIREMENTS:

- 1) Diagnosis, treatment planning and discussion and total periodontal treatment – 25 cases
- 2) Dental scaling, oral hygiene instruction – 50 complete cases / equivalent
- 3) Assistance in periodontal surgery – 5 cases
- 4) A work record should be maintained by all the students and should be submitted at the time of examination after due certification from the head of the department.

Student should have to complete the work prescribed by the concerned department from time to time and submit a certified record for evaluation.

**UNIVERSITY PRACTICALS EXAM
– IV BDS PERIODONTOLOGY
Marks Max.- 100**

S. No.	Procedures	Marks	Total
1.	Scaling	50	50
2.	Clinical Viva	20	20
3.	Grand Viva	20	20
	Internal Assessment		10
			100

- Diagnose the patients periodontal problem, plan and perform appropriate periodontal treatment
- Competent to educate and motivate the patient
- Competent to perform thorough oral prophylaxis, subgingival scaling, root planning and minor periodontal surgical procedures
- Give proper post treatment instructions and do periodic recall and evaluation
- Familiar with concepts of osseointegration and basic surgical aspects of implantology

PRESCRIBED BOOK:

- 1) Glickman's Clinical Periodontology – Carranza

REFERENCE BOOKS

- 1) Essentials of Periodontology and periodontics - Torquil MacPhee
- 2) Contemporary periodontics – Cohen
- 3) Periodontal therapy – Goldman
- 4) Orbans' periodontics – Orban
- 5) Oral Health Survey – W.H.O.
- 6) Preventive Periodontics – Young and Stiffler
- 7) Public Health Dentistry – Slack
- 8) Advanced Periodontal Disease – John Prichard
- 9) Preventive Dentistry – Forrest
- 10) Clinical Periodontology – Jan Lindhe
- 11) Periodontics – Baer & Morris

UBD17PHCT428	PUBLIC HEALTH DENTISTRY
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GOAL:

To prevent and control oral diseases and promote oral health through organized community efforts

OBJECTIVES:**Knowledge:**

At the conclusion of the course the student shall have a knowledge of the basis of public health, preventive dentistry, public health problems in India, Nutrition, Environment and their role in health, basics of dental statistics, epidemiological methods, National Oral Health Policy

Skill and Attitude:

At the conclusion of the course the students shall acquire the skill of identifying health problems affecting the society, conducting health surveys, conducting health education classes and deciding health strategies. Students should develop a positive attitude towards the problems of the society and must take responsibilities in providing health.

Communication abilities:

At the conclusions of the course the student should be able to communicate the needs of the community efficiently, inform the society of all the recent methodologies in preventing oral disease

PUBLIC HEALTH DENTISTRY

Syllabus:

1. Introduction to Dentistry: Definition of Dentistry, History of dentistry, Scope, aims and objectives of Dentistry.
2. Public Health:
 - i. Health & Disease: - Concepts, Philosophy, Definition and Characteristics
 - ii. Public Health:- Definition & Concepts, History of public health
 - iii. General Epidemiology: - Definition, objectives, methods
 - iv. Environmental Health: - Concepts, principles, protection, sources, purification, environmental sanitation of water, disposal of waste, sanitation, then role in mass disorder
 - v. Health Education: - Definition, concepts, principles, methods, and health education aids
 - vi. Public Health administration: - Priority, establishment, manpower, private practice management, hospital management.

- vii. Ethics and Jurisprudence: Professional liabilities, negligence, malpractice, consents, evidence, contracts, and methods of identification in forensic dentistry.
- viii. Nutrition in oral diseases
- ix. Behavioural science: Definition of sociology, anthropology and psychology and their relevance in dental practice and community.
- x. Health care delivery system: Centre and state, oral health policy, primary health care, national programmes, health organizations.

Dental Public Health:

1. Definition and difference between community and clinical health.
2. Epidemiology of dental diseases-dental caries, periodontal diseases, malocclusion, dental fluorosis and oral cancer.
3. Survey procedures: Planning, implementation and evaluation, WHO oral health survey methods 1997, indices for dental diseases.
4. Delivery of dental care: Dental auxiliaries, operational and non-operational, incremental and comprehensive health care, school dental health.
5. Payments of dental care: Methods of payments and dental insurance, government plans
6. Preventive Dentistry – definition, Levels, role of individual, community and profession, fluorides in dentistry, plaque control programmes.

ENVIRONMENT STUDIES

Unit 1: Introduction to environmental studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

Unit 2: Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems:
 - a) Forest ecosystem
 - b) Grassland ecosystem
 - c) Desert ecosystem
 - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources: Renewable and Non-renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forest, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit 4: Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value.

Unit 5: Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

Unit 6: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit 8: Field work

- Visit to an area to document environmental assets: river/forest/flora/fauna, etc.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

Research Methodology and Dental Statistics

1. Health Information: - Basic knowledge of Computers, MS Office, Window 2000, Statistical Programmes
2. Research Methodology: - Definition, types of research, designing a written protocol
3. Bio-Statistics: - Introduction, collection of data, presentation of data, Measures of Central tendency, measures of dispersion, Tests of significance, Sampling and sampling techniques-types, errors, bias, blind trials and calibration.

Practice Management

1. Place and locality
 2. Premises & layout
 3. Selection of equipments
 4. Maintenance of records/accounts/audit. Dentist Act 1948 with amendment.
- Dental Council of India and State Dental Councils Composition and responsibilities.
- Indian Dental Association
- Head Office, State, local and branches.

PRACTICALS/CLINICALS/FIELD PROGRAMME IN COMMUNITY DENTISTRY:

These exercises designed to help the student in IV year students:

1. Understand the community aspects of dentistry
2. Take up leadership role in solving community oral health programme

Exercises:

- a) Collection of statistical data (demographic) on population in India, birth rates, morbidity and mortality, literacy, per capita income
- b) Incidence and prevalence of common oral diseases like dental caries, periodontal disease, oral cancer, fluorosis at national and international levels
- c) Preparation of oral health education material – posters, models, slides, lectures, play acting skits etc.
- d) Oral health status assessment of the community using indices and WHO basic oral health survey methods
- e) Exploring and planning setting of private dental clinics in rural, semi urban and urban locations, availment of finances for dental practices-preparing project report.
- f) Visit to primary health centre-to acquaint with activities and primary health care delivery
- g) Visit to water purification plant/public health laboratory/centre for treatment of waste and sewage water
- h) Visit to schools to assess the oral health status of school children, emergency treatment and health education including possible preventive care at school (tooth brushing technique demonstration and oral rinse programme etc.)
- i) Visit to institution for the care of handicapped, physically, mentally, or medically compromised patients
- j) Preventive dentistry: in the department application of pit and fissure sealants, fluoride gel application procedure, A.R.T., comprehensive health for 5 patients at least 2 patients

The colleges are encouraged to involve in the N.S.S. programme for college students for carrying out social work in rural areas

SUGGESTED INTERNSHIP PROGRAMME IN COMMUNITY DENTISTRY:

I. AT THE COLLEGE:

Students are posted to the department to get training in dental practice management.

- a) Total oral health care approach in order to prepare the new graduates in their approach to diagnosis, treatment planning, cost of treatment, prevention of treatment on schedule, recall

maintenance of records etc. at least 10 patients (both children and adults of all types posting for at least one month).

- b) The practice of chair side preventive dentistry including oral health education

II. AT THE COMMUNITY ORAL HEALTH CARE CENTRE (ADOPTED BY THE DENTAL COLLEGE IN RURAL AREAS)

Graduates posted for at least one month to familiarise in:

- a) Survey methods, analysis and presentation of oral health assessment of school children and community independently using WHO basic oral health survey methods.
b) Participation in rural oral health education programmes
c) Stay in the village to understand the problems and life in rural areas
III DESIRABLE: Learning use of computers-at least basic programme.

Examination Pattern

I. Index: Case History

- a) Oral hygiene indices simplified – Green and Vermilion
b) Silness and Loe index for Plaque

c) Loe and Silness index for gingival
d) CPI
e) DME: T and S, Df: t and s
f) Deans fluoride index

II. Health Education

1. Make one – Audio visual aid
2. Make a health talk

III. Practical work

1. Pit and fissure sealant
2. Topical fluoride application

**UNIVERSITY PRACTICALS EXAM
– IV BDS PUBLIC HEALTH
DENTISTRY
MARKS MAX.- 100**

S. No.	Procedures	Marks	Total
1.	Case History	50	50
2.	Chair Side (Viva)	20	20
3.	Grand Viva	20	20
	Internal Assessment		10
			100

- Apply the principles of health promotion and disease prevention
- Have knowledge of the organization and provision of health care in community and in the hospital service
- Have knowledge of the prevalence of common dental conditions in India.

- Have knowledge of community based preventive measures
- Have knowledge of the social, cultural and environmental factors which contribute to health or illness.
- Administer oral hygiene instructions, topical fluoride therapy and fissure sealing.
- Educate patients about the aetiology and prevention of oral disease and encourage them to assure responsibility for their oral health.

BOOKS RECOMMENDED & REFERENCE:

1. Dentistry Dental Practice and Community by David F. Striffler and Brian A. Burt, Edn. – 1983, W. B. Saunders Company
2. Principles of Dental Public Health by James Morse Dunning, IV Edition, 1986, Harvard University Press.
3. Dental Public Health and Community Dentistry Ed by Anthony Jong Publication by The C. V. Mosby Company 1981
4. Community Oral Health-A system approach by Patricia P. Cormier and Joyce I. Levy published by Appleton-Century-Crofts/New York, 1981
5. Community Dentistry-A problem oriented approach by P.C. Dental Hand Book series Vol 8 by Stephen L. Silverman and Ames F. Tryon, Series editor-Alvin F. Gardner, PSG Publishing company Inc. Littleton Massachusetts, 1980.
6. Dental Public Health- An Introduction to Community Dentistry. Edited by Geoffrey L. Slack and Brian Burt, Published by John Wright and sons Bristol, 1980
7. Oral Health Surveys- Basic Methods, 4th edition, 1997, published by W. H. O. Geneva Available at the regional office New Delhi.
8. Preventive Medicine and Hygiene-By Maxcy and Rosenau, published by Appleton Century Crofts, 1986.
9. Preventive Dentistry-by J. O. Forrest published by John Wright and sons Bristol, 1980.
10. Preventive Dentistry by Murray, 1997.
11. Text Book of Preventive and Social Medicine by Park and Park, 14th edition.
12. Community Dentistry by Dr. Soben Peter.
13. Introduction to Bio-statistics by B. K. Mahajan
14. Research methodology and Bio-statistics
15. Introduction to Statistical Methods by Grewal

AIM:

At the end of the course the student should be competent to:
Apply the scientific study of disease processes, which result in morphological and functional alterations in cells, tissues and organs to the study of pathology and the practice of dentistry.

OBJECTIVES:

Enabling the student

1. To demonstrate and analyze pathological changes at macroscopically and microscopical levels and explain their observations in terms of disease processes.
2. To Integrate knowledge from the basic sciences, clinical medicine and dentistry in the study of Pathology.
3. To demonstrate understanding of the capabilities and limitations of morphological pathology in its contribution to medicine, dentistry and biological research.
4. To demonstrate ability to consult resource materials outside lectures, laboratory and tutorial classes.

GENERAL PATHOLOGY SYLLABUS

A. General Pathology –

1. Introduction to Pathology
Terminologies
The cell in health
The normal cell structure
The cellular functions
2. Aetiology and Pathogenesis of Disease
Cell Injury
Types – Congenital
Acquired
Mainly Acquired causes of disease
(Hypoxic injury, chemical injury, physical injury, immunological injury)
3. Degenerations
Amyloidosis
Fatty change
Cloudy swelling
Hyaline change, mucoid degeneration
4. Cell death & Necrosis
Apoptosis
Def, causes, features and types of necrosis

Gangrene – Dry, wet,
gas Pathological
Calcifications (Dystrophic
and metastatic)

5. Inflammation
 - Definition, causes types, and features
 - Acute inflammation
 - a. The vascular response
 - b. The cellular response
 - c. Chemical mediators
 - d. The inflammatory cells
 - e. Fate
 - Chronic inflammation
 - Granulomatous inflammation
6. Healing
 - Regeneration
 - Repair
 - a. Mechanisms
 - b. Healing by primary intention
 - c. Healing by secondary intention
 - d. Fracture healing
 - e. Factors influencing healing process
 - f. Complications
7. Tuberculosis
 - Epidemiology
 - Pathogenesis (Formation of tubercle)
 - Pathological features of Primary and secondary TB
 - Complications and Fate
8. Syphilis
 - Epidemiology
 - Types and stages of syphilis
 - Pathological features
 - Diagnostic criterias
 - Oral lesions
9. Typhoid
 - Epidemiology
 - Pathogenesis
 - Pathological features
 - Diagnostic criterias
10. Thrombosis
 - Definition, Pathophysiology
 - Formation, complications & Fate of a thrombus
11. Embolism
 - Definition
 - Types
 - Effects
12. Ischaemia and Infraction

- Definition, etiology, types
- Infraction of various organs
- 13. Derangements of body fluids
 - Oedema – pathogenesis
 - Different types
- 14. Disorders of circulation
 - Hyperaemia
 - Shock
- 15. Nutritional Disorders
 - Common Vitamin Deficiencies
- 16. Immunological mechanisms in disease
 - Humoral & cellular immunity
 - Hypersensitivity & autoimmunity
- 17. AIDS and Hepatitis.
- 18. Hypertension
 - Definition, classification
 - Pathophysiology
 - Effects in various organs
- 19. Diabetes Mellitus
 - Def, Classification, Pathogenesis, Pathology in different organs
- 20. Adaptive disorders of growth
 - Atrophy & Hypertrophy, Hyperplasia, Metaplasia and Dysplasia
- 21. General Aspects of neoplasia
 - a. Definition, terminology, classification
 - b. Differences between benign and malignant neoplasms
 - c. The neoplastic cell
 - d. Metastasis
 - e. Aetiology and pathogenesis of neoplasia, Carcinogenesis
 - f. Tumour biology
 - g. Oncogenes and anti-oncogenes
 - h. Diagnosis
 - i. Precancerous lesions
 - j. Common specific tumours, Squamous papilloma & Carcinoma, Basal cell Carcinoma, Adenoma & Adenocarcinoma, Fibroma & Fibrosarcoma, Lipoma and liposarcoma

B. Systemic Pathology –

- 22. Anaemias
 - Iron Deficiency anaemia, Megaloblastic anaemia
- 23. Leukaemias
 - Acute and chronic leukaemias, Diagnosis and clinical features
- 24. Diseases of Lymph nodes
 - Hodgkin's disease, Non Hodgkins lymphoma, Metastatic carcinoma
- 25. Diseases of oral cavity
 - Lichen planus, Stomatitis, Leukoplakia, Squamous cell Carcinoma, Dental caries, Dentigerous cyst, Ameloblastoma

26. Diseases of salivary glands
 - Normal structure, Sialadenitis, Tumours
27. Common diseases of Bones
 - Osteomyelitis, Metabolic bone diseases, Bone Tumours, Osteosarcoma, Osteocalstoma, Giant cell Tumour, Ewing's sarcoma, Fibrous dysplasia, Aneurysmal bone cyst
28. Diseases of Cardiovascular system
 - Cardiac failure
 - Congenital heart disease – ASD, VSD, PDA Fallot's Tetralogy
 - Infective Endocarditis
 - Atherosclerosis
 - Ischaemic heart Disease
29. Haemorrhagic Disorders
 - Coagulation cascade
 - Coagulation disorders
 - Platelet function
 - Platelet disorders

PRACTICALS

1. Urine – Abnormal constituents
 - Sugar, albumin, ketone bodies
2. Urine – Abnormal constituents
 - Blood, bile salts, bile pigments
3. Haemoglobin (Hb) estimation
4. Total WBC count
5. Differential WBC count
6. Packed cell volume (PCV,) Erythrocyte Sedimentation Rate (ESR)
7. Bleeding Time & Clotting Time
8. Histopathology
 - Tissue
 - Processing
 - Staining
9. Histopathology slides
 - Acute appendicitis, Granulation tissue, fatty liver
10. Histopathology slides
 - CVC lung, CVC liver, Kidney amyloidosis
11. Histopathology slides
 - Tuberculosis, Actinomycosis, Rhinosporidiosis
12. Histopathology slides
 - Papilloma, Basal cell Ca, Sq cell Ca
13. Histopathology slides
 - Osteosarcoma, osteoclastoma, fibrosarcoma
14. Histopathology slides
 - Malignant melanoma, Ameloblastoma, Adenoma
15. Histopathology slides
 - Mixed parotid tumour, metastatic Carcinoma in lymph node

**UNIVERSITY PRACTICALS EXAM
– II BDS GENERAL PATHOLOGY
MARKS MAX. – 50**

S. No.	Experiments	Marks	Total
1.	Blood Differential Count	15	15
2.	Urine analysis	20	20
3.	Spotters	10	10
	Internal Assessment		5
			50

List of Textbooks

1. Robbins – Pathologic Basis of Disease Cotran, Kumar, Robbins
2. Anderson's Pathology Vol 1 & 2 Editors – Ivan Damjanov & James Linder
3. Wintrobe's clinical Haematology Lee, Bithell, Foerster, Athens, Lukens

1. Introduction to Prosthodontics
 - Aim and scope of Prosthodontics
 - Branches of Prosthodontics
2. Anatomical landmarks
 - Microscopic and Macroscopic
 - Anatomy of maxilla and mandible
3. Steps in complete denture fabrication
 - Impression – theories, objectives, material
 - Diagnostic impression
 - Diagnostic cast
 - Special tray
 - Border moulding
 - Secondary impression
 - Beading and boxing
 - Master cast
 - Occlusal rims
 - Jaw relation
 - Articulators
 - Teeth arrangement
 - Wax try in
 - Processing-flasking and Packing
 - Finishing and polishing the dentures.
4. Requirements of cast beading and boxing
 - Difference between primary and master cast
 - Requirements of an ideal cast
 - Uses of beading and boxing
 - Materials and techniques used for beading and boxing
 - Standard dimensions of the cast
5. Special trays
 - Definition of special tray, tissue stop and spacer
 - Uses of special tray
 - Other names
 - Materials used for making special tray Spacer designs
 - Techniques of fabricating special trays
6. Record Bases
 - What are record bases?
 - Definition, Uses and Requirements material used and technique.
7. Occlusal rims
 - What are occlusal rims?
 - Definition, Uses of occlusal rims,
 - Materials used to fabricate Occlusal rims
 - Dimensions of Occlusal rims method of fabrication

8. Articulators

- Basic information
- Definition
- Basic and additional requirements Classification
- Uses
- Purpose of articulation
- Method of articulation

9. Artificial teeth arrangement

- Basic principles of arrangement, compensating curves ideal occlusion-Molar and canine occlusion
- Over jet and Overbite
- Arrangement of anterior teeth individual tooth orientation
- Arrangement of posterior teeth

10. Processing of complete denture

- Flasking
- Dewaxing
- Packing
- Curing
- Finishing and Polishing.

FIXED PARTIAL DENTURE

1. Introduction and classification

- Definition
- Types
- Parts

2. Impressions

- Mouth Preparation
- Impressions

3. Clinical procedures

- Principles of preparations
- Geometry
- Finish lines

4. Materials

- Metal
- Metal ceramic
- All ceramic

5. Lab procedures

- Definitive case and dies
- Wax pattern
- Investing
- Casting
- Colours
- Glazing

6. Clinical procedures
 - Cementation
 - Post-operative care

REMOVABLE PARTIAL DENTURE

1. Introduction and Classification
 - Definition
 - Indications
 - Contra-indications
 - Advantages
 - Disadvantages
 - Kennedy's Classification
 - Applegate's Rule
2. Components of RPD
 - Definition
 - Classification
 - Difference between tissue supported and tooth supported
3. Major Connectors
 - Maxillary major connectors
 - Mandibular Major connectors
 - Types
 - Indication and contraindication
4. Minor connectors
 - Definition
 - Types
5. Rest and Rest Seat
 - Definition
 - Types
 - Indication
6. Direct Retainers
 - Definition
 - Classification
 - Types
 - Parts
 - Principles
 - Indication
7. Indirect Retainers
 - Definition
 - Classification
 - Uses
8. RPD designing
 - Principles of designing

9. Surveyor
 - Definition
 - Types, Parts and tools
 - Need of surveying
 - Colour coding
10. Impression in RPD
 - Impression techniques and materials
 - Anatomic impression
 - Functional impression
 - Hindel's / Mclean / Altered cast technique

MAXILLO FACIAL PROSTHESIS

1. Introduction
 - Definition
 - Types
2. Classification
 - Maxillary defects
 - Mandibular defects
 - Acquired defects
 - Surgical defects
3. Material
 - Acrylic
 - Silicone
 - Pigmentation and colours
4. Retention
 - Bandages
 - Implants
 - Cyanoacrylates
 - Other retentive aids
5. Obturators
 - Types
 - Defect
6. Sleep apnea
 - Etiology
 - Management
7. Lab procedures
 - Ear, eyes, limbs, facial, fingers
8. Impression procedures
 - Facial moulage
 - Impression techniques
 - Impression materials

Total number of hours required for Preclinical – 51 hours

**UNIVERSITY PRACTICALS EXAM
– II BDS PRE CLINICAL
PROSTHODONTICS MARKS
MAX.- 60**

S. No.	Procedures	Marks	Total
1.	Occlusal rim	5	5
2.	Articulation	5	5
3.	Teeth Setting	40	40
4.	Finishing	10	10
			60

Practical and Viva Voce Only in University Examination:

Pre-clinical Prosthodontics

Pre-clinical Conservative Dentistry.....

Internal Assessment - 20

Practical - 60

Viva Voce - 20

100

Complete Dentures

- A. Applied Anatomy and Physiology.
 - 1. Introduction
 - 2. Biomechanics of the edentulous state.
 - 3. Residual ridge resorption.
- B. Communicating with the patient Understanding the patients.
 - Mental attitude.
 - 2. Instructing the patient.
- C. Diagnosis and treatment planning for patients-
 - 1. With some teeth remaining.
 - 2. With no teeth remaining.
 - a) Systemic status.
 - b) Local factors.
 - c) The geriatric patient.
 - d) Diagnostic procedures.
- D. Articulators – discussion
- E. Improving the patient's denture foundation and ridge relation – an overview.
 - a) Pre-operative examination.
 - b) Initial hard tissue & soft tissue procedure.
 - c) Secondary hard & soft tissue procedure.
 - d) Implant procedure.
 - e) Congenital deformities.
 - f) Postoperative procedure.
- F. Principles of Retention, Support and Stability
- G. Impressions – detail.
 - a) Muscles of facial expression.
 - b) Biologic considerations for maxillary and mandibular impression including anatomy landmark and their interpretation.
 - c) Impression objectives.
 - d) Impression materials.
 - e) Impression techniques.
 - f) Maxillary and mandibular impression procedures.
 - i) Preliminary impressions.
 - j) Final impressions.
 - g) Laboratory procedures involved with impression making (Beading & Boxing, and cast preparation).
- H. Record bases and occlusion rims-in detail.
 - a) Materials & techniques.
 - b) Useful guidelines and ideal parameters.
 - c) Recording and transferring bases and occlusal rims.
- I. Biological consideration in jaw relation & jaw movements – craniomandibular relations.

- a) Mandibular movements.
- b) Maxillo mandibular relation including vertical and horizontal jaw relations.
- c) Concept of occlusion discuss in brief.
- J. Relating the patient to the articulator.
 - a) Face bow types & uses - discuss in brief.
 - b) Face bow transfer procedure - discuss in brief.
- K. Recording maxilla mandibular relation.
 - a) Vertical relations.
 - b) Centric relation records.
 - c) Eccentric relation records.
 - d) Lateral relation records.
- L. Tooth selection and arrangement.
 - a) Anterior teeth.
 - b) Posterior teeth.
 - c) Esthetic and functional harmony.
- M. Relating inclination of teeth to concept of occlusion – in brief.
 - a) Neurocentric concept.
 - b) Balanced occlusal concept.
- N. Trial dentures.
- O. Laboratory procedures.
 - a) Wax contouring.
 - b) Investing of dentures.
 - c) Preparing of mold.
 - d) Preparing & packing acrylic resin.
 - e) Processing of dentures.
 - f) Recovery of dentures.
 - g) Lab remount procedures.
 - h) Recovering the complete denture from the cast.
 - i) Finishing and polishing the complete denture.
 - j) Plaster cast for clinical denture remount procedure.
- P. Denture insertion.
 - a) Insertion procedures.
 - b) Clinical errors.
 - c) Correcting occlusal disharmony.
 - d) Selective grinding procedures.
- R. Treating problems with associated denture use – discuss in brief (tabulation/flowchart form).
- S. Tresting abused tissues – discuss in brief.
- T. Relining and rebasing of dentures – discuss in brief.
- V. Immediate complete denture construction procedure – discuss in brief.
- W. The single complete denture – discuss in brief.
- X. Overdentures – discuss in brief.
- Y. Dental implants in complete denture – discuss in brief.

Note: It is suggested that the above mentioned topics be dealt with wherever appropriate in the following order so as to cover

1. Definition
2. Diagnosis (of the particular situation/patient selection/treatment planning)
3. Types / Classification
4. Materials
5. Methodology – Lab / Clinical
6. Advantages & disadvantages
7. Indications, contraindications
8. Maintenance Phase
9. Oral Implantology
10. Ethics

Removable Flexible Dentures

1. Introduction
 - Terminologies and scope
2. Classification.
3. Examination, Diagnosis & Treatment planning & evaluation of diagnostic data.
4. Components of a removable partial denture.
 - Major connectors,
 - Minor connectors,
 - Rest and rest seats.
5. Components of a Removable Partial Denture.
 - Direct retainers,
 - Indirect retainers,
 - Tooth replacement.
6. Principles of Removable Partial Denture Design.
7. Survey and design – in brief.
 - Surveyors.
 - Surveying.
 - Designing.
8. Mouth preparation and master cast.
9. Impression materials and procedures for removable partial dentures.
10. Preliminary jaw relation and aesthetic try-in for some anterior replacement teeth.
11. Laboratory procedures for framework construction-in brief.
12. Fitting the framework – in brief.
13. Try-in of the partial denture – in brief.
14. Completion of the partial denture – in brief.
15. Inserting the Removable Partial Denture – in brief.
16. Post-insertion observations.
17. Temporary Acrylic Partial Dentures.
18. Immediate Removable Partial Denture.
19. Removable Partial Dentures opposing Complete denture.

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1. Definition
2. Diagnosis (of the particular situation / patient selection / treatment planning)
3. Types / Classification
4. Materials
5. Methodology – Lab / Clinical
6. Advantages & disadvantages
7. Indications, contraindications
8. Maintenance Phase

Fixed Partial Dentures

Topics To Be Covered In Detail –

1. Introduction
2. Fundamentals of occlusion – in brief.
3. Articulators – in brief.
4. Treatment planning for single tooth restorations.
5. Treatment planning for the replacement of missing teeth including selection and choice of abutment teeth.
6. Fixed partial denture configurations.
7. Principles of tooth preparations.
8. Preparations for full veneer crowns – in detail.
9. Preparations for partial veneer crowns – in brief.
10. Provisional Restorations
11. Fluid Control and Soft Tissue Management
12. Impressions
13. Working Casts and Dies
14. Wax Patterns
15. Pontics and Edentulous Ridges
16. Aesthetic Considerations
17. Finishing and Cementation

Topics To Be Covered In Brief –

1. Solder Joints and Other Connectors
2. All – Ceramic Restorations
3. Metal – Ceramic Restorations
4. Preparations of intracoronar restorations.
5. Preparations for extensively damaged teeth.
6. Preparations for periodontally weakened teeth
7. The Functionally Generated Path Technique
8. Investing and Casting
9. Resin – Bonded Fixed Partial Denture

Note: It is suggested that the above mentioned topics be dealt with wherever appropriate in the following order so as to cover –

1. Definition
2. Diagnosis (of the particular situation / patient selection / treatment planning)

3. Types / Classification
4. Materials
5. Methodology – Lab / Clinical
6. Advantages & disadvantages
7. Indications, contraindications
8. Maintenance Phase

**UNIVERSITY PRACTICALS EXAM –
IV BDS PROSTHODONTICS AND
CROWN & BRIDGE MARKS MAX. –
100**

S. No.	Procedures	Marks	Total
1.	Case History Sheet	10	10
2.	Border molding	25	25
3.	Final Impression	25	25
4.	Tooth Preparation	30	30
	Internal Assessment		10
			100

- Able to understand and use various dental materials
- Competent to carry out treatment of conventional complete and partial removable dentures and fabricate fixed partial dentures
- Able to carry out treatment of routine prosthodontic procedures.
- Familiar with the concept of osseointegration and the value of implant-supported Prosthodontic procedures

RECOMMENDED BOOKS:

1. Syllabus of Complete denture by – Charles M. Heartwell Jr. And Arthur O. Rahn. Boucher's "Prosthodontic treatment for edentulous patients"
- Essentials of complete denture prosthodontics by – Sheldon Winkler. Maxillofacial prosthetics by – William R. Laney.
- McCracken's Removable partial prosthodontics
- Removable partial prosthodontics by – Ernest L. Miller and Joseph E. Grasso.