Pravara Institute of Medical Sciences (Deemed to be University)
All India Ph. D. Entrance Test
PIMS -AIPET
Syllabus for: Anatomy – Paper - II

Embryology, histology, general and gross anatomy, neuro anatomy, osteology, applied anatomy and recent advances.

General Anatomy: Introduction, subdivisions of Anatomy, Anatomical position, anatomical terms, general connective tissue / cartilage, bones, joints, muscles, blood vessels, lymphoid tissue, skin, nervous system

Gross Anatomy: Pectoral region and axilla, axilla, back, scapular region, front of arm, cubital fossa, back of arm, front of forearm, back of forearm, hand: palmar aspect hand : dorsum, joints of upper limb, some clinical correlation of the upper limb

Lower Extremity : Thigh, gluteal region, back of thigh, popliteal fossa, front of leg dorsum of foot, back of leg, sole of foot, joints of the lower limb, some clinical correlations of the lower limb

Thorax : Introduction to Thorax, joints of the thorax, intervertebral joints, walls of thorax, trachea, bronchi, lungs – bronchopulmonary segments, heart and pericardium, blood vessels of thorax, oesophagus, thymus, lymphatics of thorax. nerves of thorax, clinical correlations of the thorax

Abdomen and pelvis : Introduction to Abdomen, anterior abdominal wall, perineum and male and femal external genital organs, oesophagus, stomach and intestines, peritoneal reflections, liver, pancreas & spleen, blood vessels of stomach, intestines, liver, pancreas and spleen, kidney, ureter, suprarenal gland, posterior abdominal wall and some related structures, walls of the pelvis and peritoneal reflections, pelvic viscera – urinary bladder and prostate, rectum and anal canal, ovary, uterus and uterine tube, lymphatics and autonimic nerves of abdomen and pelvis, clinical correlations of abdomen and pelvis

Head, Neck & Face : Scalp, face, posterior triangle, suboccipital triangle, anterior triangle – submental, muscular, carotid, digastric, dural folds, venous sinuses, pituitary, trigeminal ganglion, thyroid gland and parathyroid gland, trachea & oesophagus, subclavian artery, vessels of the neck – carotid arteries, internal jugular vein, cranial nerves, cervical sympathetic chain, cervical plexus, pre & paravertebral muscles (scalenii), parotid gland, orbit, lacrimal gland, temporal & infratemporal region inclusive of maxillary artery, otic ganglion, temporomandibular joint, submandibular region, oral cavity, pharynx subdivision – nasopharynx, oro (palatine tonsil) & laryngopharynx, soft palate, mechanism of deglutition, AIPET- Anatomy eustachian tube, nasal cavity, paranasal air sinuses, maxillary nerve, pterygopalatine ganglion, larynx, tongue, external ear, tympanic mambrane, middle ear cavity, joints : atlanto – occipital, and jts.of cervical parts of vertebral column, applied anatomy of each region.

Neuroanatomy : Introduction of nervous system, spinal cord, ascending tract, descending tract, medulla oblongata, pons, midbrain, cerebellum, csf circulation, ventricles of brain, blood supply of brain, sulci & gyri of cerebrum, functional areas of cerebrum, white matter – association, commisural, projection fibres, internal capsule, thalamus hypothalamus, basal ganglion, limbic system, applied anatomy of cns

Histology : Cell, epithelium, glands, connective tissue, cartilage & bone, muscles blood bessels, skin, nervous tissue, respiratory system, endocrine glands, lip, tooth, tongue, salivary glands, oesophagus, stomach, duodenum, small intestine, large intestine, appendix, liver, gall bladder, pancreas, kidney, ureter, urinary bladder testis, epididymis, vas deferens, prostate, ovary, uterus, uterine tube, breast, placenta, umbilical cord, ganglion, cerebellum, cerebrum, eyeball, lacrimal gland Embryology :

General : Introduction, Oogenesis, spermatogenesis, ovary and uterine cycle, fertilization, bilaminar and trilaminar germ disc/primitive streak, intraembryonic of folds/umbilical cord, placenta and various anomalies

Systemic : Head, Neck, and Face.: Branchial arches, Ectodermal cleft, pharyngeal pouches and their derivatives, development of tongue

Cardio Vascular System. : Cardiac tube and its division /formation if atrium and its septation, development of ventricles, aortic arches and their fate, development of venous system / cardiac anomalies.

Alimentary Tract : Oesophagus, Stomach, Pancreas, Spleen, midgut and its derivatives, hind gut / cloaca and its fate

Urogenital System: Mesonephros / Meso and para mesonephric duct, development of kidney, gonads, urinary bladder, descent of testis, ovary, development of female genital organs, male and female external genitalia

Development of vertebral column, Diaphragm, tooth

Development of Eye

Embryological basis of various anomalies.

GENETICS : Mendel’s laws of Inheritence, genes and genome, molecular genetics, gene bank, karyotyping, various types of banding, chromosomal anomalies – numerical and structural, immunogenetics, genetic engineering, genetic basis of diseases, PCR and FISH, methods of prenatal diagnosis, gene therapy

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Syllabus for: Physiology-Paper-II

General & Cellular Physiology : Cell as the living unit of the body, the internal Environment, homeostasis, control system, organization of a cell, physical structure of a cell, transport across cell membranes, function systems in the cells genetic code, its expression, and regulation of gene expression, cell cycle and its regulation.

Hematology:
Erythrocytes- erythropoiesis, structure & function of RBCs, formation of hemoglobin destruction & fate of RBCs, anemias, polycythemias, leucocytes, genera, characteristics, genesis & life span of WBCs classification & function of each type of WBC, leucopenia, leukemias.
Blood Groups: Classification, Antigenicity, agglutination, blood typing, Hemostasis, components of hemostasis, mechanisms of coagulation, coagulation tests, anticoagulants,
Immunity: Innate immunity, acquired immunity, allergy, hypersensitivity and immunodeficiency.

Renal Physiology & Fluid Balance:
Body fluid compartments, water balance; regulation of fluid balance, urine formation, regulation of extracellular sodium and osmolarity, renal mechanisms for the control of blood volume, blood pressure & ionic composition, regulation of acid- base balance, micturition diuretics, renel failure.

Cardio- vascular Physiology:
Properties of cardiac cycle heart as a pump, cardiac output, nutrition & metabolism of heart, specialized tissues of the heart, generation and conduction of cardiac impulse, control of excitation & conduction, electrocardiogram, arrhythmias, principles of hemodynamics, neurohumoral regulation of cardiovascular function, microcirculation and lymphatic system regional circulations, cardiac failure, circulatory shock.

Respiration:
functional anatomy of respiration system, pulmonary ventilation alveolar ventilation, mechanics of respiration, pulmonary circulation, pleural fluid, lung edema, principles of gas exchange, oxygen & carbon dioxide transport, regulation of respiration, hypoxia, oxygen therapy & toxicity, artificial respiration, environmental physiology.

High altitude, aviation physiology, space physiology, deep sea diving & hyperbaric conditions.

Nerve & Muscle Physiology:
Resting membrane potential, action potential classification of nerve fibres, conduction, degeneration and regeneration in nerves, functional anatomy of skeletal muscle, neuro-muscular transmission and blockers, excitation-cotraction coupling, machanisms of muscle contaction, smooth muscle.

General, sensory & Motor Physiology:

General design of nervous system, classification of somatic senses, sensory receptors sensory transduction, information processing, dorsal column & medial lemniscal system, thalamus, somatosensory cortex, somatosensory association areas, pain, organization of spinal cord for motor function, reflexes & reflex arc, brain stem & cortical control of motor function , cerebellum, basal ganglia, maintenance of posture and equilibrium, motor cortex

Special Senses:
Optics of vision, receptors & neural function of retina, colour vision ,perimetry, visual pathways, cortical visual function, functions of external & middle ear, cochlea, semicircular canals, auditory pathways, cortical auditory function, deafness & hearing aids, primary taste sensations, taste buds, transduction & transmission of taste signals, perception of taste, peripherals olfactory mechanisms, olfactory pathways, olfactory perception

Limbic system and Higher Nervous System:
Autonomic nervous system, Limbic system and hypothalamus, EEG, sleep, emotions & behavior, learning & memory, yoga.

Gastro-intestinal System:
General principles of G-I function, mastication & swallowing, esophageal motility, salivary secretion, gastric mucosal barrier pancreatic & billiary secretion, gastrointestinal motility, diagestion & absorption function of colon, pathophysiology of peptic ulcer and diarrheal disease, liver functions.

Endocrines & Reproduction:
Classification pf hormones, mechanism of hormones action, measurement of hormones in blood, endocrine function of the hypothalamus, pituitary, thyroid, adrenals, the endocrine pancreas, pathophysiology of diabetics, parathyroid, calcitonin, vit d & calcium metabolism, pineal gland, testosterone & male sex hormones, spermatogenesis hyper & hypogonadism, menstrual cycle, female sex hormones, pregnancy & lactation, functions of placenta, parturition, lactation.

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Syllabus for: Biochemistry – Paper - II

- History and scope of Biochemistry.
- Cell structure and biochemical functions .Membrane structure and functions.
- Transport through biological cell membrane
- Chemistry and biological importance of carbohydrates ,proteins and amino acids, lipids, nucleic acids, porphyrins glycosaminoglycans, glycoproteins.
- Chemistry of blood and hemoglobin, plasma proteins,Blood coagulation.
- Enzymes and coenzymes –chemistry ,nomenclature properties and mode of action of enzymes, Enzyme kinetics, factors affecting enzyme activity. Enzyme inhibitions, applications of enzymes and isoenzymes, antienzymes
- Bioenergetics and biological oxidation-General concept of oxidation and reduction. Electron transport Chain (ETC)- functioning of ETC and inhibitors of ETC,
- Oxidative phosphorylation,Uncouplers and theories of Biological oxidation and oxidative phosphorylation.
- Principle, working and applications of,
    a) Colorimetry
    b) Spectrophotometry
    c) Flame photometry
    d) Flurometry
    e) Atomic absorption spectroscopy
    f) Ultra centrifugation
- Principle, types and applications of , a)Electrophoresis b)chromatography
- Autoanalyzers, Blood gas analyzers
- Automation in clinical chemistry
- pH, electrodes and methods of pH determination.
- Basics of Mass spectroscopy, Nuclear Magnetic Resonance, chemiluminescence.
- Electron – microscopy,
- Redioactive isotopes, their applications in biomedical research and diagnosis, measurement of radioactivity tracer techniques, autoradiography, RIA, ELISA
- Environmental Biochemistry – Definition, importance of pollution free and ecofriendly environment, exposure to cold stress, exposure to heat , air pollution water pollution and food pollution.
- Immunochemistry – The Immune system, Immunoglobins, antigen –antibody mediated immunity, mononuclear phagocytes –macrophages, elements of clinical immunity.
- Digestion and absorption from gastrointestinal tract.
- Intermediary metabolism, metabolism of carbohydrates, lipids, proteins , and Amino acids , Nucleic acids, Hemoglobin, metabolic control, energy production and regulation.
- Metabolic interrelationships and regulatory mechanisms
- Metabolic changes during starvation
- Energy metabolism-calorimetry,BMR- its determination and factors affecting it, SDA of food.
- Macro and micro –elements and their role in health and disease,
- Water metabolism and its regulation.

- Vitamins- chemistry, biological importance , deficiency manifestations and recommended daily allowance, anti vitamins.
- Principles of Nutrition –Nutritive importance of various food sources, calorific value of food , toxins and additives , obesity, protein energy Balanced diet and its planning.
- Malnutrition (PEM)- kwashirkor and marasmus.
- Diet in management in various diseases viz, diabetes mellitus, coronary artery disease, renal disorders, cancer, hypertension, anemia ,rickets and osteomalacia.
- Diet for over weight person, malnourish children and persons,pregnant woman and during lactation.
- Chemistry, composition and functions of blood, plasma, lymph, CSF, ascitic fluid, pleural fluid, and synovial fluid.
- Urine formation, excretion and urine analysis.
- Composition, chemistry and functions of specialized tissues like muscle, bone, nerve, connective tissue, and brain adipose tissue.
- Chemistry of respiration and acid base balance and imbalance and compensatory mechanisms.
- Hormones-: Communication among cells and tissues. Hormone- General mechanism of action of hormones, chemistry, functions, synthesis of steroid hormones , polypeptide hormones, and thyroid hormones. Chemistry and functions of hormones of pancreas, and parathyroid. local hormones. clinical disorders of hormones, hormone receptors.
- Biochemistry of diabetes mellitus, atherosclerosis, fatty liver , obesity and alcoholism.
- Organ function tests
    a) liver function tests
    b) kidney function tests
    c) thyroid function tests
    e) gastric function tests
    f) cardiac function tests
    g) pancreatic function tests
    h) adrenal function tests
- Biochemistry of aging.
- Neurochemistry in health and disease.
- Biochemical changes in pregnancy and lactation.
- Water and electrolytes balance and imbalance.
- Total Quality Management of laboratories.
    a) Internal Quality control
    b) External Quality control
    c) Accreditation of laboratories by NABL
- Basics of medical statistics
- Inborn errors of protein, carbohydrate, lipid and nucleic acid metabolism.
- Biotrasformations of xenobiotics
- Basic concepts of biochemical defense mechanisms
- Immunology: Structure functions, classifications and synthesis of immunoglobulins, antigen-antibody reaction, mechanisms and regulation of immune responses. Complement system, hypersensitivity, immunetolerance, immunity to infection, autoimmunity & auto immune diseases, tumor immunity, genetics of immune response, transplantation, experimental system used in immunology, vaccination and immunization strategies, hybridoma technology. Apoptosis, telomeres and telomerase, cytokine network, immunodiagnostics

- Central dogma, genetic code, protein biosynthesis and its regulation, inhibitors of protein biosynthesis, protein folding.
- DNA: structure, functions, replications, mutation and repair of DNA, DNA libraries.
- Sequencing of nucleotides in DNA, mitochondrial DNA, and DNA recombination, DNA finger printing.
- RNA: composition, types, structure and functions.
- Role of nucleic acids in diagnosis of molecular diseases and infectious diseases
- Mitochondrial DNA and diseases.
- Human Genome Project.
- Genes and chromosomes, gene mapping, chromosome walking etc.
- Gene expression and gene amplification and gene regulation, and biochemistry and molecular biology of cancer, tumor markers, growth factors and oncogenes.
- Genetic engineering: Recombinant DNA technology and its applications. restriction endonucleases, plasmids, cosmids, gene cloning, gene libraries.
- Basics techniques in genetic engineering.
    a) Isolation and purification of DNA, methods of DNA assay.
    b) Blotting techniques – Southern, Northern and Western blotting.
    c) Polymerase chain reaction and its applications.
    d) Ligase chain reaction and its applications.
- Biotechnology: Gene therapy, nucleic acid hybridization, and DNA probes, microarray of gene probes.
- Genomics and Proteomics
- Medical Bioinformatics
- Lipid peroxidation, free radicals and antioxidants, nitric oxide formation and its metabolism and its role in medicine.
- Biochemistry of AIDS
- Genetic control of Immunity
- Research Methodology and Medical ethics.

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Syllabus for: Pathology - Paper-II

COURSE CONTENT

Pathologic Anatomy including all aspects of Pathology as encompassed in the branches of General and Systemic Pathology.

A) General Pathology: Normal cell and tissue structure and function.The changes in cellular structure and function in disease. Causes of disease and its pathogenesis. Reaction of cells, tissues, organ systems and the body as whole to various sublethal and lethal injuries.

B) Systemic Pathology: The study of normal structure and function of various organ systems and the aetiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease & functional correlation with clinical features.

C) Haematology: The study of Haematology including all aspects of the diseases of the blood and bone marrow. Study of the normal, and the causes of diseases and the changes thereof.

D) Laboratory Medicine (Clinical Biochemistry/Clinical Pathology including Parasitology).

E) Transfusion Medicine (Blood-Banking)

F) General acquaintance of techniques and principles and to interpret data using

a) Immunopathology
b) Electron microscopy
c) Histochemistry
d) Immunohistochemistry.
e) Cytogenetics
f) Molecular Biology
g) Maintainence of records
h) Information retrieval, Computer, Internet in medicine.

G) **Surgical Pathology** Knowledge Histogenetic and patho-physiologic processes associated with various lessions. Identify problems in the laboratory and offer viable.

H) Skills

Given identify the chief gross anatomic alterations in the surgically removed specimens received on an average day from

A students should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.

Chief hisotmorphological alterations in the tissue Use of various stains

1. Haematoxylin and eosin
2. Stains for collagen, elastic fibers and reticulin
3. Iron stain
4. PAS stain
5. Acid fast stains
6. Any other stains needed for diagnosis Principles of :
    i. Fixation of tissues
    ii. Processing of tissues for section cutting
    iii. Section cutting and maintenance of related equipment
    iv. Differential (Special) stains and their utility Immuno histochemical
    v. Stains especially in the diagnosis of tumour subtypes

I) **Autopsy Pathology**

Technique of autopsy and

Understanding of various disease processes for meaningful clinico-pathological correlation

J) **Cytopathology**: Principles and preparation of solutions of stains and their importance in cytopathology specimens.

K) **Haematology**: Principles of he practice of Haematology for the planning of tests, interpretation and diagnosis of diseases of the blood and bone marrow.

Equipments used in the Haematology laboratory.

Automation and quality assurance in Haematology.

Correctly and independently perform the following special tests, in addition to doing the routine blood counts:

i. Haemogram including Reticulocyte and Platelet counts.
ii. Bone marrow staining including stain for iron
iii. Blood smear staining
iv. Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, etc.
v. Hemolytic anemia profile including HbF, Hb eletrophoresis etc.
vi. Coagulation profile including PT, APTT, FDP.
vii. BM aspiration and BM biopsy

Demonstrate familiarity with the principle and interpretation of results and utility in diagnosis of the following:

i. Platelet function tests including platelet aggregation and adhesion and PF3 release
ii. Thrombophilia profile: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (AT III)
iii. Immunopheno typing of leukaemias
iv. Cytogenetics

Morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states

L) **Laboratory Medicine**

Normal range of values of the chemical content of body fluids, significance of the altered values and its interpretation.

Principles of following specialized organ function tests and the relative utility and limitations of each and significance of the altered values.

i. Renal function test
ii. Liver function test
iii. Gastric and Pancreatic function
iv. Endocrine function test
v. Tests for malabsorption

The principles, advantages and disadvantages scope and limitation of Automation in laboratory.

Know the principles and methodology of quality control in laboratory.

Skills: Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a ligical sequence, with a rational explanation of each step; Be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arive at a diagnosis.

Demonstrate familiarity with and successfully significance of

i. Routine Urinalysis including Physical, Chemical and Microscopic examination of the sediment
ii. Macroscopic and microscopic examination of Faeces and identify the ova and cysts of common parasites
iii. A complete examination; physical chemical and cell content of Cerebrospinal Fluid (C.S.F.), Pleural and Peritoneal fluid.
iv. Semen analysis
v. Examiination of Peripheral Blood for the commonly occurring parasites.

Independently and correctly perform at least the following Quantitative Estimations by principles of:

i. Blood urea
ii. Blood sugar
iii. Serum Proteins total & fractional
iv. Serum amylase

With the following Quantitative Estimations of blood Serum cholesterol, Uric acid, Serum Transaminases (ALT and AST/SGOT and SGPT) glucosylates haemoglobin etc.

Prepare standard solutions and reagents relevant to the above tests. Including the preparation of normal solution, molar solution and Bufferes.

Principle of Instrumentation, use and application of the instruments commonly used in the labs eg.

Photoelectric colorimeter, Sepectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, flow cytometer,

M) **Transfusion Medicine (Blood Banking)**

Basic immunology ABO and Rh groups

Clinical significance of other blood groups

Transfusion therapy including the use of whole blood and RBC concentrates.
Blood component therapy
Rationale of pre-transfusion testing Infections transmitted in blood
Adverse reactions to transfusion of blood and components Quality control in blood bank

Skills: Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.
ABO and Rh grouping
i. Direct antiglobullin test
ii. Antibody screening and titre
iii. Selection of blood for exchange transfusion
Demonstrate familiarity with principle and precedures involved in

i. Resolving ABO grouping problems
ii. Identification of RBC antibody.
iii. Investigation of transfusion reaction.
iv. Testing of blood for presence of
    (a) HBV (Hepatitis B Virus Markers)
    (b) HCV (Hepatitis C Virus Markers)
    (c) HIV (Human Immunodeficiency Virus Testing)
    (d) VDRL

N) **Basic Sciences (in relation to Pathology)**

a) Immunopathology Knowledge

(i) Current concepts of strucuture and function of the immune system, its aberrations and mechanisms thereof.

(ii) Scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology
    (a) ELISA techniques
    (b) Radioimmuno assay
    (c) HLA typing

(iii) Interpretation of immunological tests used in diagnosis of diseases and in research procedures.
    i. Immunoelectrophoresis
    ii. Immunofluorescence techniques especially on kidney and skin biopsies
    ii. Anti-nuclear Factor (ANF)
    iii. Anti-neutrophil cytoplasmic antibody (ANCA)

b) Electron Microscopy Knowledge

(i) Principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscope: TEM and SEM)

(ii) Normal subcellular organelles and their common abnormalities (with appropriate photographs)

c) Enzyme Histochemistry Knowledge

Principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, Chloroacetate Esterase.

d) **Immunohistochemistry** Knowledge

Principles and procedures of various immunohistochemical stains using both PAP (Perosidase Antiperoxidase) and AP-AAP (Alk, Phosphatase-anti Alk., Phosphatase) ABC (Avidin-Biotin Conjugate) Systems; employing monoclonal and polyclonal antibodies. Limitations of immuno his to chemistry.

Skills (desirable)

Immunohistochemical staining using paraffin section using antibodies (Cytokeratin or LCA) using PAP method.

e) **Molecular Biology** Knowledge

Principles of Molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests.

Principle & steps and interpretations of a Polymerase Chain Reaction (PCR Western Blot, Southern Blot, Northern Blot and Hybridisation procedures.

f) **Cytogenetics** Knowledge

Methods of Karyotyping and Fluorescent in – situ Hybridisation (FISH)

g) **Tissue Culture**

Knowledge

Principles of methods of tissue culture

h) **Principles of Medical Statistics** Knowledge

Statistical methods in assessing data from patient material and experimental studies.

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Syllabus for: Microbiology – Paper – II

- GENERAL MICROBIOLOGY: History and pioneers in Microbiology, Microscopy, Morphology of bacteria and other micro-organisms, Nomenclature and classification of microbes, Growth and nutrition of bacteria, Bacterial metabolism, Sterilization and disinfection, Biomedical waste disposal, Bacterial toxins, Bacteriocins, Bacterial genetics, Antibacterial substances used in treatment of infections and drug resistance in bacteria, normal flora of human body, hospital environment, air, water and milk, Host parasite relationship, Quality control and Quality Assurance in Microbiology, Accreditation of laboratories, Laboratory Biosafety, Health care associated infections- prevention and control.

- IMMUNOLOGY AND APPLIED ASPECTS: The normal immune system, Innate immunity, Antigens, Immunoglobulins, Complement, Antigen and antibody reactions, Hypersensitivity, Cell mediated immunity, Immunodeficiency, Autoimmunity, Immune tolerance, Transplantation immunity, Tumour immunity, Prophylaxis and immunotherapy, Measurement of immunity, Immunity and immunopathogenesis of specific infectious diseases, PCR, DNA probes, Cytokines, Vaccines in immunotherapy.

- SYSTEMATIC BACTERIOLOGY: Isolation, description and identification of bacteria. The epidemiology, pathogenesis, antigenic characteristics and laboratory diagnosis of disease, caused by them. Staphylococcus and Micrococcus, Streptococcus and Lactobacillus, Neisseria, Branhamnella and Moraxella, Corynebacterium and other coryneform organisms, Bacillus: the aerobic spore-bearing bacilli, Clostridium: the spore-bearing anaerobic bacilli, Non-sporing anaerobes, The Enterobacteriaceae, Vibrios, Aeromonas, Plasiomonas, Campylobacter and Spirillum, H.pylori, Erysipelothrix and Listeria, Pseudomonas, Chromobacterium, Flavobacterium, Acinetobacter and Alkaligens, Pasteurella, Francisella, Haemophilus and Bordetella, Brucella, Mycobacteria, Spirochaetes, Actinomyces, Nocardia and Actinobacillus, Mycoplasmatales: Mycoplasma, Ureaplasma and Acholeplasma, Rickettsiae, Coxiella, Chlamydiae, Emerging bacterial pathogens.

- VIROLOGY: General properties of viruses, Classification of viruses, Isolation and identification viruses, Morphology :virus structure, Virus replication, The genetics of viruses, DNA viruses of medical importance including Poxviridae, Herpesviridae, Adenoviridiae, Hepadna virus, Papova and Parvo viruses etc, RNA viruses of medical importance including Enteroviruses, Togaviridae, Flaviviruses, Orthomyxoviruses, Paramyxoviruses, Reoviridiae, Rhabdoviridae, Arenaviridae, Bunyaviridae, Human immunodeficiency virus, Arboviruses, Coronaviridae, Calci viruses, The pathogenicity of viruses, Epidemiology of viral infections, Vaccines and antiviral drugs, Bacteriophages, Pox viruses, Herpes viruses, Vesicular viruses, Marburg and Ebola viruses, Rubella virus, Orbi viruses,

- Influenza virus, Respiratory disease: Rhinoviruses, adenoviruses, corona viruses, Enteroviruses : Polio, Echo, Coxsackie viruses, Other enteric viruses, Hepatitis viruses, Rabies virus, Slow viruses, Human immunodeficiency viruses, Oncogenic viruses, Teratogenic

viruses, Viruses of gastroenteritis, Prion diseases, Emerging viral infections – SARS, Avian influenza.

- PARASITOLOGY: Protozoan parasites of medical importance : Entamoeba, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Balantidium,Isospora, Cyclospora,Microsporidium etc., Helminthology : All those medically important helminths belonging to Cestoda, Trematoda and Nematoda. Cestodes : Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dypyllidium, Multiceps etc. Trematodes : Schistosomes, Fasciola, Gastrodiscoides, Paragonimus, Clonorchis, Opisthorchis etc. Nematodes : Trichuris, Trichinella, Strongyloides, Ancylostoma, Nicator, Ascaris, Toxocara, Enterobius, Filarial worms, Dracunculus, etc., Ectoparasites : Common arthropods and other vectors viz.,Mosquito, Sandfly, Ticks, Mite, Cyclops, antiparasitic agents, entomology: common arthropods & other vectors viz. mosquito, sandfly, ticks, mite, Cyclops, louse, myasis.

- MYCOLOGY: The morphology and reproduction of fungi and antimycotic agents, Classification of fungi, Contaminant and opportunistic fungi, Fungi causing superficial mycoses, Fungi causing subcutaneous mycoses, Fungi causing systemic infections, Antifungal agents & invitro antifungal susceptibility tests.

- APPLIED CLINICAL MICROBIOLOGY: Epidemiology of infectious diseases, Hospital acquired infections and measures to control them, Infections of various organs and systems of the human body, Molecular genetics as applicable to Microbiology, Automation in Microbiology, Rapid diagnostic techniques for microbial diseases, Vaccinology: principle, methods of preparation, administration of vaccines, Outbreak investigations & disaster management, Biological warfare, Opportunistic infections, Sexually transmitted diseases, Gene cloning, Animal and human ethics involved in microbiology, Quality control and accreditation of laboratories.

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Syllabus for: Pharmacology-Paper-II

General Pharmacology Principles
Membranes and Drug action, Ligand –Receptor binding and tissue response, signal transduction and second messengers, Drug distribution, Metabolism . and excretion, Drug-drug interaction with an emphasis on drug metabolism and transport, Adverse drug resistance, Targeting cell cycle to kill cancer cells, Programmed cell death, Genomics and Proteomics in drug design and Discovery

Molecular Biology in Pharmacology
Gene expression, Pharmacogenomics, Proteomics, techniques involve in studying receptor dynamic. PCR, No4rthern blot, Southern blot and Western blot. Protein purification. Mono and polyclonal antibodie. Molecular biology in receptor identification. Antisense oligonucleotides, molecular targets of drug action.

Isolation of Compounds from Herbal Sources
Basic constituents of plants (chemical classification). Isolation of active constituent from plant materials. Percolation and maceration. Quantitative constituent characterisation techniques. Utilisation of HPTLC for the constituent analysis. Estimation of marker compound in biological fluid after crude plant material administration.

Systemic Pharmacology, Chemotherapy and Therapeutics Autonomic nerves system
Central nerves system
Autacoids and drug therapy of inflammation.
Drugs affecting kidney function and cardiovascular system Drugs affecting gastrointestinal and respiratory system Drugs affecting urine motility
Chemotherapy of parasite infections Chemotherapy of microbial diseases Antiviral agents
Antineoplastic agents Immunomodulators
Drug action on blood and blood forming organs Hormones and hormone antagonists

Experimental Pharmacology, Bioassay And Statistics
Experimental methodologies involved in the discovery of drug (in vivo, in vitro, ex vivo). Animal handling and animal care. Methods of anaesthetizing animals and methods of euthanasia. Restraining and blood collectin methods. Drug screening methods involved in the evaluation of anti-ulcer, antidepressant, antianginal, antihypertensive, antiarrhythmic, antidiabetic, anticataract, anti-platelet, anticancer, anti-inflammatory, antidiarrhoeala, ntiepileptic, analgesic, antithyroid, antipyretic, antiglaucoma, antihyperlipidemic antiasthmatics drugs and cough suppressants. Drug screening methods used in screening methods used in screening antifungal, antihelminthic, antibacterial, antiviral agents, drugs for heart failure, posterior pituitary, adrenal steroid (gluco and mineralo corticoid), testicular, parathyroid, ovarian, thyroid hormones, Methods involved in testing teratogenicity, carcinogenicity and organ toxicities in animals.

Instrumentation in Drug analysis

Qualitative testing, Basic and working principle of colorimeter, ultraviolet, atomic absorption spectrometer, fluorescence spectroscopy, NMR and mass Spectroscopy, Basic of Chromatography. Partition, adsorption and ionexchange chromatography, column chromatography, thin layer chromatography paper chromatography, immunoabsorbant chromatography, high performance liquid chromatography and gas chromatography, Radio immunoassay, processing of biological material for drug analysis, Calculations in drug analysis, Good laboratory practice. Validation of analytical procedure. Practical skill: Spectrophoto & flurimetric estimations of drug in biological fluids.

Biostatistics

Calculation of basic statistical parameter (mean, media, mode, standard deviation, standard error etc.). Metanalysis. Calculation for statistical significance in the given data for student paired and unpaired t test. Applying ANOVA to the given set of concentration Vs time data of two drug formulation to comment about their bio-equivalence.

Clinical Pharmacology and recent Advances

Pharmacokinetics Basic of pharmacokinetics, calculation of pharmacokinetic estimates (C-max,Tmax,T1/2,AUC(0-n),AUC(0-and dynamic studies. Lipinski's rule for drug like molecule, High throughput screening (invitro and invivo) for pre-clinical Trial-Types of clinical trials, clinical trial for a new investigational drug in India. Methods involve in the assessment of drugs in human volunteers and bio-equivalence studies. Key point in drafting protocol for a large scale multicentric drug trial in India.

Therapeutic Drug Monitoring(TDM)

Basic Principles of TDM. Therapeutic index. Trough level monitoring and dosage adjustments. Therapeutic audit: Drug utilization studies, essential drug concept, rational prescribing Drug delivery systems, sustained release, enteric coated formulations and liposome etc. Pharmacovigilance, Pharmacoeconomics, Pharmacogenetics and Drug Information.

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Syllabus for Forensic Medicine & Toxicology- Paper II

I. **General Principles of Forensic Medicine and Toxicology**

i. Role of anatomy, physiology, biochemistry, microbiology, pathology, blood bank, psychiatry, radiology, forensic science laboratory as well as other disciplines of medical science to logically arrive at a conclusion in medico-legal autopsies and examination of medico-legal cases.

ii. Basic principles of techniques used in toxicological laboratory namely TLC, GLC, ASS, HPLC and Breath Alcohol Analyzer.

iii. Execute the skills and knowledge expected at undergraduate level.

II. **Basic Sciences and allied Subjects**

A. Anatomy: Anatomy of parts and organs of the body which are important from the medico-legal aspect.

i. Surface and regional anatomy of head, neck, chest and abdomen.
ii. Gross anatomy and blood supply of heart, brain, lungs, spleen, liver and kidneys
iii. Gross anatomy of male and female genitalia.
iv. Comparative anatomy of male and female skeleton.
v. Histological examination of various tissues.
vi. Development of fetus.

B. Physiology and Biochemistry: Mechanism of phenomena that is important in the body from the medico-legal viewpoint.

i. Mechanism of fluid and electrolyte balance, thermoregulation in newborn and adults, endocrine functions. ‘
ii. Physiology of sexual behavior.
iii. Physiological functioning of circulatory system, digestive system, respiratory system, haemopoietic system, central nervous system and reproductive system including pregnancy.

C. Pathology: Pathophysiology of vital processes and response mechanisms that modulate tissue and organ reaction to all forms of injury and have a bearing on antemortem and postmortem appearance in medico-legal cases, assessment of the duration of injuries and correlate trauma and disease.

i. Pathology of inflammation and repair, immunity and hypersensitivity, Thrombosis and embolism, electric and ionizing radiation injuries, genetic factors in disease, deficiency disorders and malnutrition.
ii. Pathology of myocardial infarction, congenital heart diseases, tuberculosis of lungs, cirrhosis of liver, diseases of glomeruli and tubules and interstitial; tissues of Kidney, tumours, endocrine disorders, venereal diseases, spontaneous intracranial hemorrhages.
iii. Pathology of sudden death.
iv. Local and systemic response to trauma and patho-physiology of shock.
v. Pathology of common infections and infestations of medico-legal significance.

D. Dentistry: Adequate knowledge of dentistry for solution of medico-legal problems like, injuries, age determination and identification

E. Radiology: Adequate knowledge of radiological procedures for solution of medico-legal problems.

F. Fundamentals of Forensic Medicine:

i. General forensic principle of ballistics, serology, analytical toxicology and photography.
ii. Interpretation of the scene of crime.
iii. Role of DNA profile and its application in medico-legal practice.
iv. Examination of bloodstains for blood grouping, nuclear sexing, HLA typing, seminal stains and hair for medico-legal purpose.
v. Ethical aspects of Forensic Procedures including Narco-analysis, Brain mapping and Polygraph.

III. **Medical Ethics and Law (Medical Jurisprudence)**

i. History of Forensic Medicine.
ii. Legal and medico-legal system in India.
iii. Medical ethics and the law in relation to medical practice, declarations, oath, etiquette, Medical Council of India, disciplinary control, rights and duties of a registered medical practitioner's professional misconduct, consent, confidentiality, medical negligence (including all related issues) and Consumer Protection Act.
iv. Medical ethics and law in relation to organ transplantation, biomedical human research and experimentation, human rights, cloning, genetic engineering, human genome, citizen's charter and International codes of medical ethics.
v. Ethics and law in relation to artificial insemination, abortion, antenatal sex, foetus, genetics and euthanasia.
vi. Interpretation of the ethics and law applicable to the human (clinical trials) and animal experimentation.
vii. Ethics in relation to elderly, women and children.
viii. Medical ethics and law in relation to nursing and other medical services/practices.
ix. Understanding about bio-ethics

IV. **Clinical Forensic Medicine**

i. Legal implications and preparation of report or certificate in cases of physical assault, suspected drunkenness, sexual offences, consummation of marriage and disputed paternity.
ii. Collection, preservation and dispatch of the specimen/material to the concerned authority and interpretation of the clinical and laboratory findings which are reported.
iii. Medico-legal report preparation of injured person and initiate management.
iv. Age and establishment of identity of an individual for medico-legal purpose.
v. Assessment of disability in industrial accidents and diseases.
vi. Examination and interpretation of findings for medico-legal purposes in cases pertaining to pregnancy, delivery, artificial insemination, abortion, sterilization, Impotence, AIDS and infectious disease.
vii. Normal and abnormal sexual behavior and its medico-legal implications.
viii. Examination and assessment of medical fitness of a person for insurance, government service, sickness and fitness on recovery from illness.

ix. Examination of medico-legal problems related to clinical disciplines of medicine and allied subjects, Pediatrics, Surgery and allied subjects, ENT, Ophthalmology, Obstetrics and Gynecology, Dermatology and Anesthesiology.
x. Examination of medico-legal problems related to children, women and elderly.
xi. Identification of the cases of torture and violation of human rights and issues thereto

V. **Forensic Pathology**

i. Applications of principles involved in methods of identification of human remains by race, age, sex, religion, complexion, stature, hair, teeth, anthropometry, dactylography, foot prints, hairs, tattoos, poroscopy and superimposition techniques.
ii. Medico-legal postmortem performance and be able to exhume, collect, preserve and dispatch specimens or trace evidence to the appropriate authority.
iii. Diagnosis and description of the pathology of wounds, mechanical and regional injuries, ballistics and wound ballistics, electrical injuries, lightening, neglect and starvation, thermal injuries, deaths associated with sexual offences, pregnancy, delivery, abortion, child abuse, dysbarism and barotraumas.
iv. Patho-physiology of shock and neurogenic shock.
v. Patho-physiology of asphyxia, classification, medico-legal aspects and postmortem findings of different types of asphyxial deaths.
vi. Diagnosis and classification of death, identification of the signs of death, postmortem changes, interpret autopsy findings, artifacts and results of the other relevant investigations to logically conclude the cause, manner (suicidal, homicidal and accidental) and time of death. vii. Management of medico-legal responsibilities in mass disasters involving multiple deaths like fire, traffic accident, aircraft accident, rail accident and natural calamities.
vii. Demonstration of postmortem findings in infant death and to differentiate amongst live birth, still birth and dead born.
viii. Postmortem examination performance in cases of death in custody, torture and violation of human rights.
ix. Postmortem examination performance in cases of death due to alleged medical negligence as in operative and anesthetic deaths.

VI. **Toxicology**

i. Law relating to poisons, drugs, cosmetics, narcotic drugs and a. psychotropic substances.
ii. Examination and diagnosis of poisoning cases and apply principles of general management and organ system approach for the management of poisoning cases.
iii. Basic principles of pharmacokinetics and pharmacodynamics of poisonous substances.
iv. Determination of toxic hazards of occupation, industry, environment and the principles of predictive toxicology.
v. Collection, preservation and dispatch material/s for analysis, interpretation of the laboratory findings and perform the Medico-legal formalities in a case of poisoning.
vi. Demonstration of the methods of identification and analysis of common poisons Description of the signs, symptoms, diagnosis and management of common acute

and chronic poisoning due to: a. Corrosives b. Nonmetallic substances c. Insecticides and weed killers d. Metallic substances e. Vegetable and organic irritants f. Somniferous compounds g. Inebriant substances h. Deliriant substances i. Food Contamination/adulteration. j. Substances causing spinal and cardiac toxicity k. Substances causing asphyxia (Asphyxiants) l. Household toxins m. Toxic envenomation n. Biological and chemical warfare o. Environmental intoxicants P. Occupational intoxicants

VII. **Forensic Psychiatry**

i. Common terminologies of forensic importance in Psychiatry.
ii. Medico-legal aspects of Psychiatry and mental health.
iii. Medico-legal aspects of drug addiction.
iv. Role of Psychiatry in criminal investigation, punishment and trial.
v. Civil and criminal responsibilities of a mentally ill person.
vi. Role of Psychology in criminal investigation, punishment and trial

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Syllabus For: Ophthalmology- Paper II

1. **Basic Sciences – applied**
   i. Anatomy
      - Anatomy of lids
      - Lacrimal passage
      - Extra ocular muscles
      - Cornea
      - Angle of anterior chamber
      - Uveal tract
      - Lens
      - Vitreous
      - Retina;
      - Optic nerve and visual pathway

   ii. Developmental Anatomy of Eye
      - Bony orbit, spaces of orbit and cranial fossa
      - Cavernous sinuses
      - Blood supply to the eye and adnexa
      - Blood supply of visual pathway – circle of willis
      - Cranial nerves
      - Autonomous supply to the eye
      - Ventricles of the brain

   iii. Physiology
      - Maintenance of corneal transparency
      - Lacrimal secretion and tear film layers
      - Formation and circulation of intra ocular fluid
      - Maintenance of intra ocular tension
      - Papillary reaction and their pathway
      - Papillary reflexes
      - Theories of accommodation
      - Accommodation – covergence relationship
      - Blood aqueous barrier
      - Physiology of vision
      - Theories of colour vision
      - Binocular vision
      - Blood retinal barrier
      - Electrophysiology
      - Axonal transmission of impulses
      - Visual perception of cerebral cortex

iv. Biochemistry

- Carbohydrate metabolism
- Metabolic disorders of lipids
- Amino acid – normal and abnormal metabolism
- Metabolism of cornea
- Metabolism of crystalline lens
- Biochemical changes of lens leading to cataract
- Photochemistry of vision
- Structure and metabolism of vitreous

v. Pharmacology

- Miotics, mydriatics, cycloplegics
- Parasympatholytic drugs
- Cholinergic drugs
- Sympathomimetic drugs
- Sympatholytic drugs
- Penetration of topically applied drugs
- Teat replacement substances
- Drug penetration of blood aqueous barrier
- Principles of cortisone and ACTH therapy
- Principles of antibiotic therapy
- Fluoroscein eye
- Anticoagulants
- Anti viral drugs
- Anti fungal; drugs
- Immunosuppressive drugs
- Vasodilators
- Drugs used in glaucoma
- Anti neoplastic medications
- Preanasthetic medications
- Topical anesthesia
- Local anesthesia
- Anti diabetic drugs
- Anti hypertensive drugs
- Shock therapy
- Vitreous substitutes and aqueous substitutes

vi. Pathology

- General consideration of inflammation of eye and adnexa
- Vascular changes un age, hypertension, and diabetes
- Benign and malignant tumours of eye and adnexa
- Dystrophy and degeneration of conjunctiva, cornea and retina
- Metabolic diseases
- Fungal granuloma
- AIDS

vii. Microbiology

- General microbiological characteristics of bacteria, viruses, fungi and parasites
- Resistance and immunity
- Antigen antibody reactions
- Toxicity and hypersensitivity reactions
- Gram positive group – staphylococci, streptococci, pneumococci, corynebacterium diphtheris and xerosis
- Gram negative group – neisseria, moraxella, kochs bacilli, brucella, pseudomonas
- Mycobacteria and micrococcacia
- Viruses
- Herpes zoster
- AIDS viruses
- Fungi
- Aspergillus
- Fusarium
- Candida
- Parasites
- Cysticercus
- Hydatid cyst
- Loa loa
- Microfilaria
- Intestinal nematodes

2. Applied optics

- Geometric and ophthalmic Optics
- Basic physical optical devices
- Ophthalmic optics
- Applied optics including optical devices

3. Clinical Ophthalmology

- Disorders of refraction
- Disorders of the lids
- Disorders of the lacrimal system
- Disorders of the conjunctiva
- Disorders of the sclera
- Disorders of the cornea
- Disorders of the uveal tract
- Disorders of the lens
- Disorders of the retina
- Disorders of the optic nerve and visual pathway
- Disorders of the orbit
- Glaucoma
- Neuro Ophthalmology
- Paediatric Ophthalmology

- Systemic Ophthalmology (Ocular involvement in systemic diseases)
- Immune ocular disorders
- Strabismus and ambylopia
- Recent trends in Ophthalmology
- Community Ophthalmology

4. Essential Diagnostic Skills – Instrumentation Tonometry

- Applanation
- Indentation (Commonly schiotz)

Assessment of epiphora

- Jone's dye test
- Syringing – performance and interpretation

Dry eye evaluation

- Schrimer's test
- Rose Bengal staining
- Tear meniscus evaluation

Corneal ulceration

- Taking a corneal scraping
- Inoculation into media
- Evaluation of Gram's stain
- Evaluation of KOH preparation

Direct Ophthalmology

- Distant direct
- Media assessment
- Use of filters provided'

In Direct Ophthalmology

- Scleral depression
- Fundus drawing capability
- Use of filters provided

Slit lamp Examination

- Diffuse examination
- Focal examination
- Retroillumination – direct and indirect
- Sclerotic scatter
- Specular refection
- Staining modalities and interpretation

Slit lamp Accessories

- Applanation tonometry – Goldman' applanation
- Gonioscopy-
    - single mirror gonioscope
    - grading of the angle
    - testing for occludability
    - indentation of gonioscope
- 3 – mirror examination of the fundus
- 78 – D/ 90- D/ 60 – D Examination

Colour vision evaluation

- Ishihara pseudoisochromatic plates

Use of Amsler's grid

- instructing in the use of and interpreting the chart

Keratometry

- Performance and interpretation of keratometry
- Diagnosis of situations like keratoconus
- Keratoscopy

Fundus photography and fundus fluorescein angiography (FFA, FAG)

- Performance of and interpretation
- Performance of indirect fluorescein angiography

Refraction

- Retinoscopy
- Streak retinoscopy
- Use of trial set
- Use of jackson's cross – sylinder
- Subjective and objective refraction

5. Diagnosis and assessment of squint

- Ocular position and motility examination
- Versions, ductions and vergences
- Convergence facility estimation
- Cover/uncover/alternate cover test
- Use of prisms bars of free prisms in assessment of squint
- Use of Bagolini's striated glasses/red filters/ Maddox red
- Use of Worth's four dot test
- Use of major amblyoscope
- Use and interpretation of the Hess chart/Less screen
- performance and interpretation of diplopia charting
- diagnosis of ambylopia

6. Exophthalmometry

- measurement of proptosis or exophthalmos

7. Use and evaluation of ophthalmic ultrasound

- A scan ultrasound with biometry & B scan

8. Interpretation of perimetry

- Lister's & Automated Perimetry'
- Interpretation of commonly managed problems

9. Radiology

- AP – 20 (Caldwell's view)
- PNS (Water's view)
- Lateral
- Submentovertical
- Optic acnal views
- Localisation of intra ocular and intra orbital FB's

a) Interpretation of cantrast studies

- Interpretation of CT scans – orbital CT Interpretation

10. OPERATING THEATRE

A. Anaesthesia

a. Retrobulbar anesthesia
b. Peribulbar anesthesia
c. Facial blocks
   1. O' Brien
   2. Atkinson
   3. Van Lint & Modification
d. frontal blocks
e. infra orbital blocks
f. blocks for sac surgery

- Magnification

Operating microscope – familiarity with use is essential

- Lid surgery

Tarsorraphy
Ectropion and entropion procedures
Lid repair following trauma epilation

Ptosis correction

- Destructive procedures

Evisceration with or without implant
Enucleation with or without implant

Exentration

- Sac surgery

Dacryocystectomy
Dacrocystorhinostomy
Probing for congenital obstruction of nasolacrimal duct

- Extraocular muscle surgery

Recession and resection procedures of the horizontal recti

Vertical & oblique muscle surgery

- Cataract Surgery

Standard ECCE with or without IOL implantation
Small incision ECCE with or without IOL implantation
Secondary AC or PC IOL implantation
Vectis extraction
Phacoemulsification
H. Orbit surgery

- Incision and drainage via anterior orbitotomu for abscess

- Vitrectomy

Intra vitreal and intra cameral (anterior chamber) injection techniques and dosages, particularly for endophthalmitis management.
Needs to know the basis of open sky vitrectomy (anterior segment) as management of cataract surgery complication

- Keratoplasty

Assisting penetrating keratoplasty (therapeutic, optical)

- Glaucoma surgery
    - Trabeculectomy
    - Pharmacological modifications of traneculectomy
    - Cyclocryotherapy
- Surface ocular procedures
    - Pterygium excision with modification
    - Conjenctival graftings

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Syllabus for: Community Medicine/PSM – Paper – II

- History of Public Health in India
  History of Health Services in India, Indigenous Systems of Medicines in India, Bhore committee's and other committee Reports on Health Services, Health care and Health Professional Education in India, national Health Policy, an update of achievements of the country vis-à-vis the Health for all Indicators

- History of Public Health in the World influence of the various systems of medicine i.e. Chinese, Mesopotamian, Egyptian etc.,concepts in public health, disease control, health promotion, social engineering, health for All

- Primary Health Care Concepts of primary health care, principles of primary health care, elements of primary health care, models of delivery of primary health care, current status of primary health care the world over

- The Health Care System in India – Structure and Function Central level, state level, district level, taluka level, primary health centre level, village level, urban level

- SOCIO- CULTURAL DIMENSION IN HEALTH Principles of Sociology and the Behavioral Sciences: Concepts of sociology and behavioral sciences, influence of social and cultural factors on health and disease, social structures and social organization

  Principles of Social Psychology: principles of psychology, principles of behavioral sciences, principles of social anthropology

  Application of Sociology in Health and Development: Social Problems in Health and Disease, Use of Sociology in addressing problems in Health and Disease

- PRINICIPLES OF EDUCATIONAL SCIENCE AND TECHNOLOGY
  Curriculum planning, educational objectives, principles of learning, teaching/ learning methods, teaching skills including micro teaching, preparation and use of teaching aids and learning research materials, methods of evaluation

- PRINCIPLES AND PRACTICE OF INFORMATION, EDUCATION AND COMMUNICATION.
  Principles of IEC Health Education: objectives of Health Education, Content of Health Education
  Communication Skills: Principles of Communication, communication blocks, body language, the use of media for IEC, practice (methods) of IEC and its application in community health, evaluation of impact

- PRINCIPLES OF NUTRITION AND APPLIED NUTRITION

Nutrients, Daily Requirements, Balanced Diet, Primordial Prevention of Lifestyle related disease: classification of foods, daily requirements of nutrients, balanced diet nutritional profiles of major foods

Nutritional Deficiencies: Nutritional requirements, protein energy malnutrition, vitamin deficiencies, mineral deficiencies, deficiencies of trace elements

Assessment of Nutritional status in a community and approach to a programme: assessment of an individual's nutritional status, assessment of community nutritional status

Nutritional Programmes in India – critical review, nutritional problems in india, programmes to combat these problems, nutritional surveillance, social problems in nutrition

Other Aspects of Nutritional: Food Borne Disease, food Hygiene, food Adulteration including PFA Act

- PRINCIPLES OF ENVIRONMENTAL HEALTH
  Water: Sources of water, water pollution, purification of water, water quality standards, water borne disease – epidemiology and control – investigation of outbreak of water borne disease and report including water testing

  Air: Indices of thermal comfort, air pollution including monitoring, effects of air pollution and prevention and control, ventilation. Housing including domestic and industrial housing standards, noise and noise pollution,

  Disposal of Waste and Sanitation: Sources and classification of wastes, disposal of solid wastes, excreta disposal, sewage disposal, health care and hospital waste management

  Environmental Pollution: Sources of environmental pollution, monitoring of environmental pollution, prevention and management of environmental pollution

  Medical Entomology: Insecta: mosquito, flies, lice, fleas and bugs, arachnida: ticks and mites, crustacea: Cyclops, identification of the arthropods, diseases transmitted by arthropods, control of arthropods and disease borne by them, insecticides and insecticide resistance, rodents and anti-rodent measures, integrated vector control

- MATERNAL HEALTH, CHILD HEALTH AND FAMILY WELFARE (RCH)
  Common Maternal and child health problems at an individual level: antenatal care, risk approach, antenatal visits, preventive services, intranetal care, postnatal care, care of the mother, child health problems, low birth weight, growth and development, childhood infections, care of the infant

  Genetics and Health: Common genetic problems, management of genetic problems, preventive and social measures in genetics

Structure of MCH and Family Welfare services in India: problems of maternal health in india, delivery of maternal and child health services, trends in the MCH services, MCH related programmes in india eg.RCH, ICDS, family planning, methods of family planning, indicators of MCH care

Demographic Trends in India: Demographic cycle, trends in the world, demography related indicators, demographic trends in India

School Health services: Objectives, components of school health services, planning for school health services, care of handicapped children, behavioral and learning problems in children.

Social Paediatrics: Juvenile Delinquency, child abuse, child labour, street children, child guidance clinic, child marriage

- PRINCIPLES AND APPLICATION OF EPIDEMIOLOGIC METHODS IN HEALTH

  RESEARCH: Research Methodology: principles of epidemiology

  Epidemiologic studies: Descriptive, analytical, experimental

  BIOSTATISTICS: Collection/ organisation of data / measurement scales, presentation of data, measures of central tendency, measures of variability, sampling and planning of health survey, probability, normal distribution and inductive statistics, estimating population values, tests of significance (parametric/non-parametric including qualitative methods), analysis of variance association, correlation and regression, vital statistics, evaluation of health and measurement of morbidity / mortality, life table and its uses, Use of computers Census

- PRINCIPLES OF TROPICAL MEDICINE
  Infectious and non Infectious Disease Epidemiology: Respiratory Diseases such as Chicken Pox, Measles, Mumps, Rubella, Diphtheria, Pertussis, Influenza, Tuberculosis, ARI etc., Intestinal Infections such as Poliomyelitis, Hepatitis, Food Poisoning, cholera, Enteric Fevers, Amoebiasis, Worm Infestations etc., arthropod Borne Infections such as Malaria, Filaria, Dengue and others, Zoonotic Diseases such as Brucellosis, Rickettsial Diseases, Parasitic, Surface Infectious Diseases of Public Health Importance, Non-Infectious Diseases of Public Health Importance, Cardiovascular diseases, diabetes, blindness, accidents, cancers, Emerging and reemerging disease.

- NATIONAL HEALTH PROGRAMMES: The origin, historical development, interventions, current state and critique of the, different National Health Programmes: National Family Welfare Programme (NFWP)
  - Revised National Tuberculosis Control Programme
  - National Leprosy Eradication Programme
  - National Diarrhoeal Diseases Control Programme
  - National Malaria Eradiation Programme
  - National Filariasis Control Programme
  - National Acute Respiratory Infections (ARI) Control Programme

- National AIDS Control Programme
- National Guinea Worm Eradication Programme
- National Kala Azar Control Programme
- National Japanese Encephalitis (JE) Control Programme
- National Iodine Deficiency Disorders (IDD) Programme
- National Programme for the Control of Blindness
- National Cancer Control Programme
- National Mental Health Programme
- National Diabetes Control Programme
- Reproductive Child Health (RCH)
- Universal Immunization Programme (UIP)
- National Water Supply and Sanitation Programme
- Minimum Needs Programme
- National Health Mission
- The implementation of NHPS at a programme level and in the community

- COMMUNITY MENTAL HEALTH

  Principles of Mental Health: Types, Causes and Warning signals of Mental Illness, Preventive aspects of mental Health

  The Approach to Mental Health Problems in a Community: Primary Health Care approach to mental health problems, Mental Health Services in the country
- OCCUPATIONAL HEALTH

  Principles of Occupational Health: Occupational Environment, occupational hazards, absenteeism, problems of industrialization, health protection of workers, prevention of occupational disease.

  Legislation in Occupational Health: Factories Act, employees state insurance act, workmen's compensation act, plantation labour act

  Basics of Industrial Toxicology
  Principles of Industrial Psychology
  Basics of Ergonomics

- HEALTH CARE OF THE AGED AND THE DISABLED

  Community Geriatrics: Implications of demographic charges in Indian Population, health problems of the aged, preventive health services for the aged.

  The Disabled and Rehabilitation: Problem of disabled in the country, types of disabilities and their management, rehabilitation of the disabled, Community Based Rehabilitation.

  Health Care of Tribal people: Voluntary sector in health, role of the voluntary sector in health, activities undertaken by VOS in the health sector, activities of specific VOS in health, innovative approaches in the voluntary effort in health.

- HEALTH CARE ADMINISTARTION AND HEALTH MANAGEMENT

  Principles of Planning and Evaluation: Plan Formulation, execution, evaluation, planning cycle

Health Management: Methods and Techniques of Health Management, behavioral sciences in management, quantitative methods in health management

Basics of Health Systems Research Basics of Health Economics
Basics of Health Information Systems

- RECENT ADVANCES AND TOPICS OF CURRENT INTEREST
  Rational drug policy, Nutrition Policy, Health Policy, Population Policy, agricultural medicine and plantation health, introduction to counseling, community ophthalmology, qualitative research and operational research, disaster management and public health emergencies, nosocomial infection and hospital infection control.

- INTERNATIONAL HEALTH
  Introduction
  Rockefeller Foundation Ford Foundation
  CARE International
  International Red Cross World Bank
  World Health Organization
  UNICEF

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Syllabus for: General Medicine- Paper II

Course contents:

Basic Sciences

1. Basics of human anatomy as relevant to clinical practice
    - Surface anatomy of various viscera
    - Neuro-anatomy
    - Important structures/organs location in different anatomical locations in the body
    - Common congenital anomalies

2. Basic functioning of various organ-system, control of vital functions, pathophysiological alteration in diseased states, interpretation of symptoms and signs in relation to patho-physiology.

3. Common pathological changes in various organs associated with diseases and their correlation with clinical signs; understanding various pathogenic processes and possible therapeutic interventions possible at various levels to reverse or arrest the progress of diseases.

4. Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help; important organisms associated with tropical diseases, their growth pattern/life-cycles, levels of therapeutic interventions possible in preventing and/or eradicating the organisms.

5. Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases kidneys/liver etc. which may need alteration in metabolism/excretion of the drugs; rational use of available drugs.
6. Knowledge about various poisons with specific reference to different geographical and clinical settings, diagnosis and management.

7. Research Methodology and Studies, epidemiology and basic Biostatistics.

8. National Health Programmes.

9. Biochemical basis of various diseases including fluid and electrolyte disorders; Acid base disorders etc.

10. Recent advances in relevant basic science subjects. Systemic Medicine.

11. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bio-terrorism.

12. Aging and Geriatric Medicine: • Biology • epidemiology • neuro-psychiatric aspects of aging.

13. **Clinical Pharmacology**:
    - Principles of drug therapy
    - Biology of addiction
    - Complementary and alternative medicine

14. **Genetics:**
    - Overview of the paradigm of genetic contribution to health and disease
    - Principles of Human Genetics
    - Single gene and chromosomal disorders
    - Gene therapy

15. **Immunology:**
    - Innate and adaptive immune systems
    - Mechanisms of immune mediated cell injury
    - Transplantation immunology

16. **Cardio-vascular diseases:**
    - Approach to the patient with possible cardio-vascular diseases
    - Heart failure
    - Arrhythmias
    - Hypertension
    - Coronary artery disease
    - Valvular heart disease
    - Infective endocarditis
    - Diseases of the myocardium and pericardium
    - Diseases of the aorta and peripheral vascular system

17. **Respiratory system:**
    - Approach to the patient with respiratory disease
    - Disorders of ventilation
    - Asthma
    - Congenital Obstructive Pulmonary Disease (COPD)
    - Pneumonia
    - Pulmonary embolism
    - Cystic fibrosis
    - Obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum.

18. **Nephrology:**
    - Approach to the patient with renal diseases
    - Acid-base disorders
    - Acute kidney injury
    - Chronic kidney disease

- Tubulo-interstitial diseases
- Nephrolithiasis
- Diabetes and the kidney
- Obstructive uropathy and treatment of irreversible renal failure

19. **Gastro-intestinal diseases:**
    - Approach to the patient with gastrointestinal diseases
    - Gastrointestinal endoscopy
    - Motility disorders
    - Diseases of the esophagus
    - Acid peptic disease
    - Functional gastrointestinal disorders
    - Diarrhea
    - Irritable bowel syndrome
    - Pancreatitis and diseases of the rectum and anus

20. **Diseases of the liver and gall bladder:**
    - Approach to the patient with liver disease
    - Acute viral hepatitis
    - Chronic hepatitis
    - Alcoholic and non-alcoholic steatohepatitis
    - Cirrhosis and its sequelae
    - Hepatic failure and liver transplantation
    - Diseases of the gall bladder and bile ducts

21. **Haematologic diseases:**
    - Haematopoiesis
    - Anaemias
    - Leucopenia and leucocytosis
    - Myelo-proliferative disorders
    - Disorders of haemostasis and haemopoietic stem cell transplantation

22. Oncology:
    - Epidemiology
    - Biology and genetics of cancer
    - Paraneoplastic syndromes and endocrine manifestations of tumours
    - Leukemias and lymphomas
    - Cancers of various organ systems and cancer chemotherapy

23. **Metabolic diseases** - inborn errors of metabolism and disorders of metabolism.

24. **Nutritional diseases** - nutritional assessment, enteral and parenteral nutrition, obesity and eating disorders.

25. **Endocrine** - principles of endocrinology, diseases of various endocrine organs including diabetes mellitus.

26. **Rheumatic diseases:**
    - Approach to the patient with rheumatic diseases
    - Osteoarthritis
    - Rheumatoid arthritis
    - Spondyloarthropathies
    - Systemic lupus erythematosus (SLE)
    - Polymyalgia
    - Rheumatic fibromyalgia and amyloidosis

27. **Infectious diseases:**
    - Basic consideration in Infectious Diseases
    - Clinical syndromes
    - Community acquired clinical syndromes
    - Nosocomial infections
    - Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria o miscellaneous bacterial infections
        - Mycobacterial diseases
        - Spirochetal diseases
        - Rickettsia
        - Mycoplasma and Chlamydia
        - viral diseases
        - DNA viruses
        - DNA and RNA respiratory viruses
        - RNA viruses
    - Fungal infections, protozoal and helminthic infections.

28. **Neurology** - approach to the patient with neurologic disease, headache, seizure and other movement disorders, motor neuron disease, meningitis and encephalitis, peripheral neuropathies, muscle diseases, diseases of neuromuscular transmission and autonomic disorders and their management.

29. The mental condition characterized by complete self absorption with reduced ability to communicate with the outside world (Autism), abnormal functioning in social interaction with or without repetitive behaviour and/or poor communication etc.

30. **Dermatology:**
    - Structure and functions of skin
    - Infections of skin
    - Papulo-squamous and inflammatory skin rashes
    - Photo-dermatology
    - Erythroderma
    - Cutaneous manifestations of systematic diseases
    - Bullous diseases
    - Drug induced rashes
    - Disorders of hair and nails
    - Principles of topical therapy

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Syllabus for: General Surgery - Paper-II

History of Surgery

Clinical History and examination – detailed systematic history taking, clinical examination fo various systems, coming to a provisional working diagnosis **Rationale of diagnostic tests** – Ordering diagnostic tests with prioritizing the needs, based on the clinical, hospital and the patient's socioeconomic condition, **Informed consent / Medico legal issues** – Understanding, the implications of acts of omission and commission in practice. Issues regarding Consumer Protection Act. – Implications in a medico-legal case like accidents, assaults etc.

Concept of Essential Drugs and Rational use of drugs Pharmacoeconomics Surgical audit – Understanding the audit of process and outcome. Methods adopted for the same, **basic statistics**.

Evidence based medicine – Understanding journal based literature study; the value of textbook, reference book articles; value of review articles; original articles and their critical assessment. Understanding the value of retrospective, prospective, randomized controlled and blinded studies. – Understanding the principles and meanings various biostatistical tests applied in these studies.

Use of computers in surgery: Retrieval of important information, Record keeping, Power Point presentations for teaching, Statistical methods

Preoperative evaluation of patients with Co-morbid conditions

Principles of operative surgery like asepsis, antisepsis and sterilization, Basic surgical techniques; properties of suture materials; appropriate use of sutures, drains, prosthetic grafts. Postoperative care – concept of recovery room care; airway management, assessment of wakefulness; management of cardiovascular instability in this period, Post operative pain management as well as care of terminally ill patients especially cancer patient, Basic surgical instrumentation – Principles of surgical instrumentation; their maintenance and troubleshooting, Familiarize with minimal access surgery instruments, Diathermy & lasers.

Wound management: wound healing; factors influencing healing;

Assessment of trauma; Assessment of head, chest and abdominal trauma and triage Assessment of a trauma victim; resuscitation; care at the site; triage; care in the accident department; criteria for immediate surgery; immediate workup and logical referral criteria, Multiple injured patient, closed abdominal and chest injuries, penetrating injuries; fractures, pelvis; urological injuries; vascular injuries; trauma score.

Surgical infections – asepsis and antisepsis; microbiological priniples; rational use of antibiotics; special infections like synergistic gangrene and diabetic foot infections.

Hepatitis and AIDS

Surgical nutrition – nutritional assessment, metabolic response to stress; need for Nutritional support; enteral nutrition; routes of access to GI tract; parenteral nutrition; access to cental veins for nutritional support.

Acute abdomen – Appendicitis / Peritonitis / Perforated viscus / Intestinal obstruction **Hernias** – Simple and complicated – various types of hernias; their repair; prosthetic materials.

Critical care – Cardiorespiratory failure – management of shock; including monitoring, sepsis scores; pharmacological support.

Fluid and electrolyte balance / Acid – Base metabolism – The body fluid Compartments, metabolism of water and electrolytes; factors maintaining homeostasis; causes for and treatment of acidosis and alkalosis Homeostasis.

Pain control – acute and chronic pain; cancer and non-cancer pain; patient controlled analgesia.

Principles of oncology – cell kinetics; causation of tumours; principles of oncologic surgery, radiotherapy and chemotherapy; paraneoplastic syndromes; cancer pain management; palliative care

Principles of burn management – types of thermal injury; assessment of extent; immediate management; late management; skin cover; rehabilitation

Principles of fracture management – fracture healing; principles of immobilization; complications; principles of internal fixation.

Airway obstruction / management – anatomy of the airway; principles of keeping the airway patent; mouth to mouth resuscitation; oropharyngeal airway; endotracheal intubation; crico-thyroidetomy; tracheostomy.

Breast disease – benign and malignant disease; diagnosis; investigation; screening for cancer; genetics of breast cancer

Thyroid disease – solitary nodule; investigations; multinodular goiter; Hashimoto's disease; cancer

Imminology & Surgery

Specialty Topics Include

GI endoscopy and Laparoscopy:

Principles of GI endoscopy Diagnositc and therapeutic GI endoscopy including upper GI, lower GI and pancreatobiliary systems, Physiology of pneumoperitoneum. Diagnostic laparoscopy & Laparoscopic therapeutic procedures.

Neurosurgery: Head and neck trauma; acute management and rehabilitation Concept of brain death / medico-legal implications, Peripheral nerve injuries, Neoplasms of the brain and meanings, Acute and chronic infections of the brain and meninges, Hydrocephalus, Spinal injuries, Monitoring intracranial tension

Urology : Urological injuries, Urothelial tumours / Chemotherapy, Prostatic hypertrophy, Hypospadias, Pyelonephritis / perinephric abscess, GU tuberculosis Scrotal disease, Endourology, Peritoneal dialysis / CAPD / haemodialysis, Transplantation / harvesting kidney, Urinary diversion, Infertility / Vasectomy Pyeloplasty / hydronephrosis.

Oncology: Breast, thyroid and GI malignancies Chemotherapy / Adjuvant therapy, Head and neck tumours, Imaging CT/MRI CT guided FNAB/C, Post excision reconstruction Radiotherapy.

Plastic Surgery: Burns management, Cleft lip and palate, Congenital defects of hand, Details of skin flap, Facial injuries, Hand injuries / tendon injury, Hypospadias, Nerve repair, Pressure sores, Principles of microsurgery, Principles of tissue transfer, Vascular repair.

Cardio-thoracic Surgery: Flail chest / thoracic trauma Bronchogenic carcinoma Lobectomies, Pneumonectomy, Endocarditis prophylaxis, Pulmonary function tests Control of major haemorrhage, Operations on the diaphragm, Coronary artery disease, Valvular heart disease, Lobectomies and pneumonectomies, Oesophageal disease, Operations on thoracic aorta, Mediastinal tumours, Basics of congenital heart disease, Vascular surgery, Vascular imaging, A V malformations, Exposure of major arteries and veins / vascular anastamosis, varicose veins, Chronic venous insufficiency, Vascular emergencies – trauma, embolism, Peripheral vascular disease – Atherosclerosis, arteritis, Details of vascular prosthesis.

Paediatric Surgery: Fluid and electrolyte management, Preparation for surgery / post op care, Hernias, Spinal fusion defects Ventral defects
Surgical audit
Day care surgery

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Syllabus for: Orthopaedics - Paper-II

Course Content

Basic sciences related to orthopaedics
Orthopaedics including operative surgery
Injuries of bones & joints & recent advances in management
Recent advances in orthopaedics, orthotics & rehabilitation
Metabolic Bone Diseases
Bone Infection – pyogenic, tubercular and mycotic

- Arthritis
- Tubercular
- Non – tubercular
- Congenital Deformities
- Development conditions
- Diseases of Joints and Surgical treatments
- Orthopaedic Neurology
- Poliomyelitis, Cerebral palsy
- Nerve injuries (Traumatic and non-traumatic)
- Spina bifida and related disorders
- Tumours of Bone-including secondary tumours of bone
- Diseases of Muscles
- Fibrous Diseases
- Unclassified Diseases of Bone
- Paget's Diseases
- Tumours of Haemopoetic Tissue
- Histocytic Lymphoma
- Tumours Invading Bone from overlying structures.
- Peripheral vascular diseases
  Bleeding disorders and orthopaedic manifestation, hemoglobinopathies and its orthopaedic manifestations.
- Regional Orthopaedic Condition of Adults and Children
- Spine
- Cervicobrachial Region
- The shoulder
- The Elbow
- The Hand
- The Wrist
- The Hip
- The Knee
- The Foot and the ankle
- The Pelvis
- Skin grafting & flaps
- Trauma

- Limb Length inequality & its management
- Microsurgical techniques in orthopaedics
- Spinal cord injuries
- Orthotics and prosthetics
- AIDS related orthopaedic conditions
- Theatre techniques and sterilization
- Disaster relief
- Advance trauma life support
- Fractures:
- Definitions, types, grades, patterns, complications.
- Pathology of Fracture and fracture healing
- Clinical & radiological features of fractures & dislocations.
- General principles of fracture treatment
- Fractures of lower extremity
- Fractures of hip & pelvis
- Fractures & upper extremity & shoulder girdle
- Fracture & dislocation in children
- Malunited fractures
- Delayed union & non union of fractures
- Fractures, dislocations & fracture dislocations of spine
- Dislocation & Subluxation:
- Acute dislications
- Old unreduced dislocations
- Recurrent dislications
- Traumatic Disorders of joints:
- Ankle injuries
- Knee injuries
- Shoulder & elbow injuries
- Wrist and hand injuries
- Arthrodesis:
- Arthrodesis of lower extremity & hip
- Arthrodesis of upper extremity
- Arthrodesis of Spine
- Bone grafts & Bone substitute (Bone banking)
- Arthroplasty:
- Biomechanies of joints and joint replacement
- Hip
- Knee
- Ankle
- Shoulder
- Elbow
- Arthroscopy:
- General principles of Arthroscopy
- Arthroscopy of knee & ankle
- Amputations and disarticulation:

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Syllabus for : Pediatrics- Paper II

1. **Growth and development.** Principles and factors governing Growth and development including assesment from conception to completion of adolescence, physiology, deviations and disturbances of G&D, e.g., Micro and Macrocephaly, Short and tall stature, underweight and overweight problems - obesity, Pubertal and adolescent development- normal and abnormal precocious and delayed puberty, specific and global developmental delay , psychological and behavioural development –normal and abnormal – psychological, developmental and learning problems.

2. **Perinatology and Neonatology.** Perinatal care, normal newborn, high risk pregnancy and high risk neonates, care in the labor room and resuscitation, preterm and low birth weight newborn, other high risk and sick newborn states, neonatal diseases including antenatal, prenatal problems and disturbances. Newborn feeding, common transient phenomena, respiratory distress, apnea, prenatal, perinatal and postnatal infections, jaundice, anemia and bleeding disorders, neurologic disorders, gastrointestinal disorders, renal disorders, malformations, thermoregulation and its disorders, neonatal emergencies-metabolic, infections, cardiac, respiratory, gastrointestinal, endocrinal, renal and neurologic -understanding of perinatal medicine and pharmacology.

3. **Nutrition.** Maternal nutritional disorders: impact on fetal outcome, nutrition for the low birth weight, breast feeding and lactation management and infant feeding including complementary feeding, IYCF, nutritional deficiency and excess states - protein energy malnutrition (underweight, wasting, stunting), vitamin, mineral and other micronutrient deficiencies, failure to thrive, complementary feeding, trace elements of nutritional importance, obesity, adolescent nutrition, nutritional management in diarrhea, nutritional management of systemic illnesses, parenteral and enteral nutrition in neonates and children, And National nutritional policies.

4. **Fluid, Electrolyte and Acid-Base Balance:** Normal physiology, Normal and Disturbances-Recognition and Management.

5. **Preventive Paediatrics.** Childhood and adolescent immunizations, prevention of communicable diseases, Nutritional, adult onset diseases and environmental problems like lead poisoning , fluorosis, endemic goiters, etc and psychological problems.'

6. **Clinical Epidemiology, medical biostatistics principles and Research Methodology and Vital Statistics.**

7. **Genetics.** Genetic principles, modes of genetic inheritance, genetic diseases, Chromosomal disorders, single gene disorders, multifactorial/polygenic disorders, dysmorphological states, malformation syndromes, genetic counseling, genetic diagnosis and prenatal diagnosis.

8. **Inborn Errors of Metabolism (I.E.M)** I.E.M of Protein and aminoacids, carbohydrate, Lipids,etc.

9. **Infections.** Principles of investigative work-up, collection and handling of specimens, pyrexia, prolonged pyrexia with and without localizing signs, recurrent infections, Viral, HIV Bacterial, tuberculosis, fungal, rickettsial, mycoplasma, Chlamydia, pneumocystis carinii infections, protozoal and metazoal infections and infestations, nosocomial infections, prevention of specific infections and hospital infections**, c**ontrol of epidemics and infection prevention.

10. **GIT, Liver and Pancreas.** Embryology, Malformation, Functions, Disturbances and diseases of GIT- Acute, persistent and chronic diarrhea, abdominal pain and distension, ascitis, vomiting, constipation, gastrointestinal bleeding,. Diseases of mouth, oral cavity and tongue, disorders of deglutition and esophagus, peptic ulcer disease, H. pylori infection, foreign body, congenital pyloric stenosis, intestinal obstruction, malabsorption syndromes, irritable bowel syndrome, ulcerative colitis, Hirschsprung's disease, anorectal mal-formations, liver disorders: hepatitis, hepatic failure, chronic liver disease, metabolic diseases of liver, cirrhosis of various causes, Wilson's disease, Budd-Chiari syndrome, portal hypertension, acute, chronic and recurrent pancreatitis.

11. **Respiratory System.** Embryology, pulmonary functions, disturbances and diseases of upper and lower respiratory tract, approach to acute cough/chronic cough, noisy breathing, wheezy child, respiratory distress, hemoptysis, congenital and acquired disorders of nose, infections of upper respiratory tract, tonsils and adenoids, obstructive sleep apnea, congenital anomalies of lower respiratory tract, bronchitis, bronchiolitis, aspiration pneumonia, GER, acute pneumonia, recurrent and interstitial pneumonia, suppurative lung diseases, atelectasis, lung cysts, emphysema and hyperinflation, bronchial asthma, pulmonary edema, bronchiectasis, pleural effusion, pulmonary leaks and mediastinal mass.

12. **Cardiovascular System.** Physiology and anatomy of fetal circulation , embryology, Normal and abnormal rate and rhythm patterns, congenital (cyanotic and acyanotic shunt and obstructive) and acquired heart diseases (rheumatic fever and rheumatic heart disease), congestive heart failure, systemic hypertension, arrhythmia, shock, infective endocarditis, diseases of myocardium (cardiomyopathy and myocarditis), diseases of pericardium and hyperlipidemia in children.

13. **Genito – Urinary:** Embryology, functions, evaluation, disturbances and diseases of kidneys and bladder, hematuria/dysuria, bladder incontinence, inguinoscrotal swellings, renal failure (acute and chronic). Acute and chronic glomerulonephritis, nephrotic syndrome, hemolytic uremic syndrome, urinary tract infections, VUR and renal scarring, renal involvement in systemic diseases, renal tubular disorders, congenital and hereditary renal disorders, renal and bladder stones, posterior urethral valves, hydronephrosis, voiding dysfunctions, enuresis, undescended testis, Wilms tumor and fluid-electrolyte disturbances.

14. **Hemato-oncology.** Embryology, Functions blood cellular elements, Disturbances and diseases of blood and lymphoreticular system, anemia, bleeding and coagulation disorders, lymphadenopathy, Nutriotnal anemia, hemolytic anemia, aplastic anemia, pancytopenia, disorders of hemostasis, thrombocytopenia, blood component therapy, transfusion related infections, bone marrow transplant/stem cell transplant, acute and chronic leukemia, myelodysplastic syndrome, Hodgkin disease, non-Hodgkin's lymphoma, neuroblastoma, hypercoagulable states.

15. **Neuromuscular system.** Embryology, Functions, assessment and clinical evaluation, Limping child, convulsions, abnormality of gait, intracranial space occupying lesion, paraplegia, quadriplegia, large head, small head, floppy infant, acute flaccid paralysis, cerebral palsy and other neuromotor disability, headache. Seizure and non seizure paroxysmal events, epilepsy and epileptic syndromes of childhood, meningitis, brain abscess, coma, acute encephalitis and febrile encephalo-pathies, Guillain-Barre syndrome, neurocysticercosis and other neuroinfestations, HIV encephalopathy, SSPE, cerebral palsy, neurometabolic disorders, mental retardation, muscular dystrophies, acute flaccid paralysis and AFP surveillance, ataxia, movement disorders of child-hood, CNS tumors and malformations.

16. **Endocrine Systems.** Embryology, functions and disturbances of various endocrinal organs- Pituitary, Thyroid, Parathyroid, Adrenals, Gonads and Pancreas-Hypopituitarism / hyperpituitarism, Diabetes insipidus, pubertal disorders, hypo- and hyper-thyroidism, hypo- and hyperparathy-roidism, adrenal insufficiency, Cushing's syndrome, adrenogenital syndromes, diabetes mellitus, hypoglycemia, short stature, failure to thrive, gonadal dysfunction and intersexuality, pubertal changes and gynecological disorders.

17. **Immunological System.** Embryological development, types and functions of immunological system and congenital and acquired immunodeficiency states, Autoimmune, Allergic disorders and collagen vascular disorders.

18. **Skeletal system:** Bone and Joint Diseases, trauma, deformities, tumors, Major congenital orthopedic deformities, bone and joint infections (pyogenic and tubercular).

19. **Accidents, Poisonings, Insect, reptile and animal bites, environmental medicine**

20. **Skin/Eye/ENT.**

    SKIN: Skin rashs, Pigmentary leasions, Exanthematous illnesses, vascular lesions, pigment disorders, vesicobullous disorders, infections: pyogenic, fungal and parasitic; Steven-Johnson syndrome, eczema, seborrheic dermatitis, drug rash, urticaria, alopecia, icthyosis.
    ENT. Pain/discharge from ear, hearing loss, epistaxis, Acute and chronic otitis media, conductive/sensorineural hearing loss, acute/chronic tonsillitis/adenoids, allergic rhinitis/sinusitis and foreign body aspiration.
    Eye: Refractory and accommodation errors, blindness- partial/total loss of vision, cataract, eye discharge, redness, squint, proptosis, night blindness, chorioretinitis,

strabismus, conjunctival and corneal disorders, retinopathy of pre-maturity, retinoblastoma, optic atrophy and papilledema.

21. **Paediatric Pharmacology.** Principles of essential and rational drug therapy, Pharmacokinetics, Phrmacogenomics, Pharmacoepidemiology and adverse drug reactions.

22. **Emergency and Critical care.** Emergency care of shock, cardio-respiratory arrest, respiratory failure, congestive cardiac failure, acute renal failure, status epilepticus, fluid and electrolyte disturbances and its therapy, acid-base disturbances, poisoning, accidents, scorpion,snake bites, diabetic keto acidosis, endocrine emergencies, status asthmaticus and foreign body aspirations.

23. **Behavioral and psychological disorders.** Eating disorders like rumination, pica, bulimia, etc., elimination disorders like enuresis, encopresis,functional constipation, etc., sleep disorders, habit disorders, breath holding spells, anxiety disorders, mood disorders, temper tantrums, attention deficit hyperactivity disorder, pervasive disorders, adolescent disorders and delinquency.

24. **Social Paediatrics.** National health programs related to health of neonates. Children and adolescents, IMNCI, Reproductive child health programme child abuse and neglect, child labor, adoption, disability and rehabilitation, rights of the child, national policy of child health and population and school health programs.

25. **Lymphoreticular system.** Tonsils, adinoids, Lymphadenopathy, spleenic disorders including, hyperspleenism and histocytosis.

26. **General Neoplasams**: Includes importants of childhood malagnancies, neoplastic and paraneoplastic disorders.

27. **Basic and applied Sciences**
    - Embryogenesis of different organ systems especially, heart, genito-urinary system, gastro-intestinal system and brain
    - Gross and applied anatomy of liver, lung, heart, kidney, brain & spinal cord and endocrine glands and their functions.
    - Osteology
    - Details of various metabolic pathways
    - Physiology of micturition and defecation
    - Physiology of Placenta
    - Integrative physiology (environmental physiology, exercise physiology and yoga).
    - Foetal and neonatal circulation
    - Regulation of temperature (especially newborn) and blood pressure
    - Growth and development at different ages
    - Puberty and its regulation
    - Nutrition and normal requirements of various nutrients
    - Basic immunology

- Bio-Statistics, clinical epidemiology, ethical and medicolegal issues; teaching methodology and management skills
- Pharmacology of commonly used drugs in neonates and children
- Pharmaco-epidemology of common drugs
- Common microbial agents and their epidemiology
- Morphological properties of organisms causing childhood diseases
- Vitamins and their functions
- Haematopoiesis and Haemostasis and Bilirubin metabolism
- Calcium metabolism
- Acid-Base balance and Fluid electrolyte balance
- Aetio-pathogenesis of common neonatal and childhood diseases
- Histopathology
- Basics of Genetics

28. **Community and Social Paediatrics:** National health nutrition programs, nutrition screening of community, prevention of blindness, school health programs, prevention of sexually transmitted diseases, contraception, health legislation, national policy on children, adolescence, adoption, child labor, juvenile delinquency, government and non-government support services for children, investigation of adverse events following immunization in the community, general principles of prevention and control of infections including food borne, waterborne, soil borne and vector borne diseases, investigation of an outbreak in a community and disasters management.

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Syllabus for: Obstetrics & Gynecology-Paper-II

OBSTETRICS:

Basic Sciences:

Applied Anatomy of genito urinary system, abdomen, pelvis, pelvic floor, anterior and abdominal wall and breast, Anatomy of fetus,

Fundamentals of reproduction : Gametogensis fertilization, implantation & early Development of human embryo. Placenta- development, structure, functions, Amniotic fluid- formation and function fetal growth & development, fetal physiology, Birth defects, genetics & teratology & counseling. Physiological changes during pregnancy, labour and puerperium Endocrinology of pregnancy. Lactation Immunology of pregnancy Molecular biology.

Normal pregnancy, labour & puerperium, Breast feeding: baby friendly initiative

Early recognition and prompt management of pregnancy complication,- Hypermesis gravidarum abortions, ectopic pregnancy, hydetidiform mole, pre-eclampsia, eclampsia, Pathophysiology of PIH, Antepartum hemorrhage, multiple pregnancy, polyhydramnios , oligohydramnios & Prolonged pregnancy.

Management of pregnancies complicated by medical, surgical or gynaecological disease, in consultation with the concerned specialities by team approach.

Anemia, Heart disease, diabetes mellitus, Liver disorders, Respirstory diseases, Renal diseases, CNS disorder, Skin, Psychiatry Hypertensive disorders.

Acute abdomen, Acute Appendicitis, Intentinal obstruction, perforations. Fibroids, Ovarian tumors, Carcinoma cervix, genital prolapsed, Recent advances in medical and surgical managemen.

Infections in pregnancy: Malaria, Toxoplasmosis, viral infectins (Rubella,CMV, Hepatitis B, Herpes) syphilis and Other sexually transmitted infections including HIV, Leptospirosis, Parents to child transmission of HIV infection. (PPTCT).

Evaluation of the fetal and maternal health in complicated pregnancy by making use of available diagnostic modalities and plan for safe delivery of the fetus while safeguarding the maternal health. Identification of fetus at risk and management,

High risk pregnancy- Post caesarean pregnancy, prolonged gestation, preterm labour, fetal growth restriction, premature rupture of membranes, blood group incompatibility, restriction pregnancy wastages. Imaging techniques, CTG.

Prenatal diagnosis of fetal abnormalities and appropriate care, fetal therapy. PNDT act and its implications.

Partographic monitoring of labour progress, early recognition of dysfunctional labour and appropriate intervention during labour including active management of labour.

Obstetrical analgesia and anesthesia. Induction and augmentation of labour.

Management of abdominal labour: Abnormal pelvis, soft tissue abnormalities in birth passage, Malpresentation and malpositions of fetus, abnormal uterine action, obstructed labour and cervical dystocia. Third stage complications – PPH including, surgical management, retained placenta, uterine inversion, post partum collapse, amniotic fluid embolism.

Abnormal puerperium, puerperal sepsis Thrombophlebitis, Mastitis, Puerperal venous sinus thrombosis, psychosis.
National Health Programmes to improve the maternal and child health, social obstetrics and vital statistics.(Maternal and perinatal mortality)
Drugs used in obstetric practice including prostaglandins.FDA Classification Coagulation disorders in obstetrics, Blood and component therapy.
Operative obstetrics – decision making, technique, recognition and management of complications – C.S. instrumental delivery, obstetrics, hysterectomy, role of destructive surgery. Manipulations-version, MRP etc. Forceps, Vaccum, Internal iliac artery ligation
Intensive care in obstetrics for critically ill patient. Fluid and electrolyte balance, volume status maintenance, protecting vital organ function.
Provision of safe abortion services – selection of case, techniques, and management of complications. Septic abortion, Criminal abortion, MTP Act Adoption laws.

NEW BORN
Care of newborn care of preterm, S.G.A. neonates, infants of diabetic mother.
Asphyxia & Neonatal resuscitation (Respiratory distress syndrome and Meconium aspiration syndrome)
Neonatal sepsis – prevention, Early detection & management. Neonatal hyperbilirubinemia, investigation and management. Birth trauma - prevention, early detection & management.
Detection of congenital malformations in new born and make timely referrals for surgical corrections.
Management of the common problems in neonatal period.

GYNAECOLOGY :
Basic sciences: Development of genital tract and associated malformations.
Basic of breast diseases related to ob/gy Applied anatomy of female genital ovulation, physiology of spermatogenesis, Endocrinology – hypothalamus pituitary, thyroid and adrenal glands neurotransmitters, common menstral disorders and their management.
Diagnosis and surgical management of clinical conditions related to congenital malformations of genital tract, Reconstructive surgery in gynaecology.
Chromosomal abnormalities and intersex, Ambiguous sec at birth.
Reproductive Endocrinology : Evaluation of primary and secondary amenorrhoea, management of hyperprolactinemia, Hirsutism, chronic anovulation and PCOD,. Thyroid dysfunction.
Endometriosis and adenomysis – medical and surgical management.
Infertility evaluation and management. Use of ovulation induction methods and tubal microsurgery, Assisted reproduction techniques, management of immunological factors in infertility. Adoption law, medico-legal and ethical issues.
Reproductive tract infections, sexually transmitted infections, HIV/ AIDS: Prevention, Diagnosis and management. Genital Tuberculosis.
Screening for genital malignancies – Cytology, colposcopy and biochemistry. Management of premalignant lesions.
Benign and malignant tumors of genital tract – early diagnosis and management.
Principles and practice of oncology in gynaecology – chemotherapy, radiotherapy, palliative treatment.
Support of pelvic organs, genital prolapsed, surgical management of genital prolapse.

Common erological problems in gynaecology – SUI, voiding difficulties, VVF, urodynamics, surgical repair of genital fistulae, uretric and bladder injuries.
Management of menopause, prevention of complications, HRT, cancer screening – genital, breast.

Recent advances.
Newer diagnostic aids – USG, interventional sonography, other imaging techniques, endoscopy.
Hyperoscopy, laparoscopy – diagnostic, simple surgical procedure, including laparoscopic tubal occlusion, endometrial ablative techniques, colposcopy.
Medicolegal aspects, ethics, communications and counseling.(SEXUAL / ASSAULTS)
Operative gynaecology – Selection of case, technique and management of complications of minor and major gynaecology procedures.

- Abdominal and vaginal hysterectomy o Surgical procedure for genital prolapsed
- Surgical management of benign and malignant genital neoplasms o Repair of genital fistulae, SUI
- Operative endoscopy – Laparoscopic, Hysteroscopic Recent advances in gynaecology-diagnostic and therapeutic
- Special group – Pediatric and adolescent gynaecology, geriatric gynaecology Evidence based management

FAMILY PLANNING

- Demography and population Dynamics.
- Contraception – Temporary methods. Permanent method (vasectomy and female sterilization) Legal Issues.
- MTP Act and procedures of MTP in first & second trimester.(Recent Amendments, Legal/ethical issues)
- Emergency contraception.
- Recent advances, New development, Future research work in contraceptive technology.

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Syllabus for: Radiotherapy & Oncology– Paper - II

SYLLABUS: M.D.(RADIOTHERAPY)

Basic Medical Sciences as applied to Radiotherapy

1. Applied Anatomy and Physiology

a) Anatomy of oral cavity , larynx ,pharynx ,paranasal sinuses, CSF pathways, salivary glands, middle ear, breast, broncho-pulmonary segments, mediastinum,oesophagus, liver, spleen, small and large bowls, pelvic and genito- urinary organs (bladder,uterus,ovary,testis ,rectum anal canal etc)
b) Lymphatic systém and drainage
c) Relationship of vital structures
d) General principles of physiology of respiratory ,cardio-vascular ,nervous and biliary systems

2. Pathology of Benign and Malignant diseases

a) Principles and methods of definite diagnosis surgical biopsy
b) Exfoliative Cytology ,Fine needles aspiration Cytology and biopsy
c) General histological & cytologic features of malignancy.
d) Classification of benign and malignant tumours and their interpretation
e) Methods of dissemination of cancer and its biological behaviour
f) Degree of differentiation of cancer
g) Radiation Pathology

3. Various investigation and Imaging procedures in Diagnosis ,Staging,Management and Follow up of different types of Cancer.

Clinical Radiotherapy including Chemotherapy

1. Clinical Practice of Radiotherapy and Oncology

a) Principles of Radiotherapy
b) Techniques of Radiotherapy
c) Clinical Practice
d) Treatment Planning and Presentation

2. Diagnosis and management of following cancers

a) Central nervous systém,Occular and Adnexal tumour ,Ear tumours, head and neck tumors, Salivary gland, Thyroid
b) Endocrine systém, Breast cancer, Bronchus ,G.l. cancers ,Urogenital systém, Skin cancer, Bone tumours, Soft tissue tumours, Leukamia ,Lymphoma ,Cancer in childhood, Multiple Myeloma, Aids-related cancer.
c) Total body & Hemi body irradiation.

3. Cancer Chemotherapy ,Hormones and Immunotherapy

a) Chemotherapy: Structure, mechanism of action, pharmacokinetic, indication, doses, schedules, side effects and interaction

b) Hormone therapy
c) Immunotherapy
d) Gene Therapy

4. Related Specialties

a) Principles and Practice of general surgery, gynaecology & paediatric surgery as related to cancer, Surgical treatment decisions ,Surgical diagnosis and staging of cancer, Clinical staging, Staging procedures, Methods of clinical staging and TNM classification
b) Terminal care of cancer patients, Principles and practice of control of pain.
c) Cancer registry and epidemology
d) Prevention and early detection in cancer
e) Cancer education and oncology organization
f) Stastical methods.

Physics as applied to Radiotherapy, Nuclear Medicine & Radiobiology

(A) Physics

1. Atomic and Nuclear Structure
2. Radioactive Decay including artificial & natural radioactivity
3. Production and properties of X-rays
4. Clinical Radiation Generators
5. Interactions of ionizing radiation with matter
6. Brachytherapy
7. Measurement of ionizing radiation: Dosimetric aspects
8. Radiation Quantities & Quality assurance
9. Calibration of High Energy Photon and electron Beams
10. Dose Distribution of External Beam Therapy
11. TPS & Manual treatment planning
12. Radiation Protection & Hazards
13. Planning of New Radiotherapy Department and maintenance

(B) Nuclear Medicine

1. Radioactive Isotopes in Clinical Medicine and Clinical diagnosis
2. Sealed and unsealed source
3. Types of diagnostic test
4. Organ scanning
5. Gamma Camera & Whole body counter
6. Caliberation and standerization of Radioactive Isotopes
7. Internal therapeutic uses of Radioactive Isotopes and their dosemetry

(C) Radiobiology

1. Mammalian Cell Radiosensitivity: Interphase and reproductive death, Cell Survival curves in vitro, Characterization of cell survival curves, Critical sites and target theory, Dose response curves in vivo, Quantitative normal tissue reaction based on systems.
2. Factors that modify Radiation Response: The oxygen effect, The age response function, Potentially lethal damage, Sublethal damage, Dose Rate, Radiosensitizers, Radioprotectors.
3. Linear Energy Transfer (LET) and Relative Biological Effectiveness(RBE)

4. Cells and tissue Kinetics: The cell cycle, Autoradiography, Constituent parts of the cell cycle, Percent labeled mitoses technique, Growth fraction, Cell loss factor, Growth Kinetics of human tumours.
5. Tissue Radiosensitvity: Classification based on radiation pathology, Types of cell populations.
6. Time-dose and Fractionations: The 4 R's of radiobiology, The basis of Fractionations, The Strandquist's plot, Nominal standard dose, Linear Quadratic equation.
7. New Radiation Modalities: Protons, Neutrons, Pions, High energy heavy ions
8. Hyperthermia: Methods for heating, Systematic hyperthermia, Localised heating, Cellular response to heat, Repair of thermal damage, Thermotolerance, Hyperthermia combined with ionising radiation, Time sequence of heat and irradiation, Hypoxic cells and heat, Effect of pH on the response of Hypothermia, Response of transplanted tumours to heat, Response of spontaneous tumours to heat , Response of normal tissues to heat, heat and therapeutic gain factor, Hyperthermia and Chemotherapy.
9. Total body Irradiation and its acute effects: Prodromal radiation syndrome, Central nervous systém /cerebrovascular systém, Gastrointestinal syndrome, Hematopoetic syndrome, Mean Lethal dose, Treatment of radiation accidents
10. Total body Irradiation and itsLate Effects: Non-specific life shortening, Carcinogenesis.
11. Mechanism of Radiation Carcinogenesis and Genetics of irradiations
12. Radiation protection in the Developing Embryo and Fetus
13. Radiophysiology of human Tissues: Effects of irradiation of the skin, bone & cartilage, kidney, lung, nervous tissues, ovary, testis, eye, lymphoid tissues, bone marrow, oral, pharyngolaryngeal & esophgeal mucous membrane, salivary glands, human embryo and Radiation effects observable in clinical radiotherapy.

Recent Advances in Radiotherapy

1. Recent advances in field of Radiotherapy & delivery methods including machines, modifiers and immobilisation devices.
2. Recent advances in chemotherapeutic drugs including recent trials.
3. Recent advances in field of Radiobiology.
4. Recent advances in diagnostic aspects of oncology.
5. Current trends in Radionuclieds.
6. Current recommendation in management in clinical oncology.
7. Current trials as being published in standard Oncology/Radiotherapy journals.

Clinical Oncology

1. Introduction to Oncology.
2. Principles of clinical and pathological staging of cancers
3. Basics of Radiation Therapy
4. Basics of cancer chemotherapy
5. Basics of cancers surgery
6. Decision making process in oncology
7. Combined modality of RT + Surgery
8. Combined modality of RT + Chemotherapy
9. Basics of Radiation treatment planing: Clinical aspects.

PHYSICS

1. Electromagnetic radiation and the atomic structure

2. Radioactivity
3. Radioactive sources use in radiotherapy
4. Production of X Rays: The basic X Ray tube
5. Interaction of X Rays With matter
6. Teletherapy machines: Telecobalt & linac
7. The Roentgen and its measurement
8. Machine calibration and acceptance test quality assurance
9. Principles of radiation protection
10. Beam modifying devices
11. ICRU guidelines : Teletherapy & Brachytherapy
12. Basics of treatment planning and Dosmetric physical aspects.

RADIOBIOLOGY

1. Cell survival curve
2. Cell tissue and tumor kinetics
3. Factors affecting radiosensitivity
4. LET, OER, and RBE
5. Radio-sensitizers
6. Radio- protectors
7. Hyperthermia
8. Acute and late effects of whole body irradiation
9. Radiation Carcinogenesis

CANCER BIOLOGY

1. Cellular structure and function
2. Cell membrane and Cytoplasm
3. Nucleus
4. Signal pathway
5. Cell cycle control and cancer
6. Hyperplasia, dysplasia and neoplasia
7. Oncogenes – Introduction
8. Multistage Carcinogenesis and metastatic cascade
9. Human Genome Project

CLINICAL ONCOLOGY

1. Nasopharyngeal & PNS cancers
2. Oral Cavity & Oropharyngeal cancers
3. Cancers of Hypoparynx and larynx
4. Tumours of salivary glands, ear, orbit, and Thyroid
5. Management of CNS Tumours
6. Lung cancer and Mediastinal tumors
7. Principles of CT and MR imaging
8. Oesophageal and gastric
9. Pancreas, Bile duct and liver cancers
9. Cancers of Colon, Rectum & Anal canal
10. Oncological emergencies
11. Management of Breast cancer
12. Cervical cancer

13. Cancers of the uterus, Ovary, Urethra etc.
14. Kidney, prostate, bladder, and penile cancers
15. Testicular tumours
16. Acute leukaemias
17. Chronic leukaemias and myeloma
18. Non Hodgkin's lympoma
19. Hodgkin's disease and mycosis fungoides
20. Bone tumours
21. Soft tissue sarcoma and skin cancers

CLINICAL ONCOLOGY [Practicals] – Second year

1. Knowledge about treatment options and decision making for various cancers.
2. Discussing Randomized Trails with patients and obtaining their consent.
3. Management of patients with Renal failure G.I. obstruction, SVCO, TOF , Cord compression, severe vaginal bleeding neutropaenic sepsis, hypercalcaemia, necrosis, pathological fractures etc.
4. Management of patients in severe pain and of bying patients, palliative care.
5. Hospice care: use of morphine
6. Divergent blocks (Mantle, Inverted Y, Rectum, Brain etc.) Electron cuts outs.
7. Simulation Techniques e.g. Conservative Breast, Mantle, Inverted Y, Dog Leg, Pancreas, Nasopharynx, PNS, Vocal Cord, Brain, Planning CT Scans.
8. Hemi Body irradiation
9. Computer treatment planning: Parallel opposed, antero, lateral, 3 or 4-field beam arrangement with equal and unqual weightage. Intracavitary and simple interstitial brachytherapy plans of breast, template buccal mucosa.
10. Organizing and maintaining central lines (Hickmans), Parentral Nutrition, Cytotoxic drugs such as Doxorubicin, Vincristine, Mitoxantrone, Cisplatinum.
11. Assisting Interstitial Implants/ ILRT/ EBRT Procedures. Performing simple procedures like Intracavitary, CVS etc.
12. Retrieving information from medline, Internet etc.

PHYSICS

1. Evolution of brachytherapy dosage systems
2. Modern brachytherapy dosage calculation
3. Electron beam therapy
4. Remote afterloading LDR and HDR machine
5. Computer treatment planning systems
6. Use of unsealed sources for therapy
7. principles of CT and MR imaging

RADIOBIOLOGY

1. Acute and late responding tissue and dose response relationship
2. Time Dose Fractionation and the evolution of bioeffect models
3. linear Quadratic Model
4. Predictive assays of radiation response
5. Radiation effect on embryo & Foetus

CANCER BIOLOGY

1. Genetic predisposition to cancer
2. Proto Oncogenes and tumour suppressor genes
3. Basic principles of molecular biology techniques e.g. PCR, FCM, Electrophoresis, cloning etc.
4. Tissue culture techniques and clonogenic assays.

CLINICAL ONCOLOGY

1. Management of paediatric solid tumours
2. Histological featuresof round cell tumours and paediatric solid tumours
3. Biology & Pathology of Lymphoma
4. Pathology of Bone Tumours and STS
5. Interstitial brachytherapy in Head and Neck cancers
6. Gynecological Brachytherapy
7. Problem solving in areas and difficult cases
8. The 'Truth' about cancer: When to tell, How much to tell & whom?
9. Is Quality of life an important outcome measure of curative palliative treatment? Factors affecting the Quality of life.
10. Quality of life assessment tools for clinical trails and routine practice
11. Symptom control in advanced cancer
12. Care of the dying patients and Hospice care
13. Medical ethics: A clinician's perspective
14. Ethics in Biomedical research
15. Nation cancer control programme
16. Screening for common cancers : Pragmatic approaches for our country
17. Rehabilitation of cancer patients
18. Chemotherapy in head and neck cancers
19. Post operative RT in gastric, oesophageal and renal cancers
20. Surgery versus Radical Radiotherapy in prostate and bladder cancers
20. oesophageal cancer
21. Setting up Radiotherapy Departments in India. Equipment and facilities needed?
22. Oncologists as managers of Health care system.

PHYSICS

1. Principles and practice of stereotactic RT
2. PET and SPECT
3. Dosimetric aspects of magna field therapy
4. Complex field arrangements and mixed beam, electrons arcs, matching fields asymmetric fields.
5. Recent developments and future trend in RT planning and treatment delivery
6. 3 dimensional conformal planning
7. Electronic portal imaging
8. Networking
9. Quality assurance tests in stereotactic radiotherapy

RADIOBIOLOGY [Theory] – Third year

1. Dose rate effect in Brachytherapy

2. How to compensate for missed treatment days?

CANCER BIOLOGY [Theory] – Third year

1. Molecular basis of radiation sensitivity
2. Molecular basis of cytotoxic drug action and drug resistance
3. Immunological aspects of cancers and cancer vaccines.
4. Antisense and Gene therapy

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Syllabus for: Radio-Diagnosis- Paper II

1. **BASIC SCIENCES RELATED TO RADIO-DIAGNOSIS**
   (a) Radiation physics and Radio-Biology,
   (b) Radiological anatomy and pathology of various organ systems
   (c) Imaging Techniques,
   (d) Radiography.

2. **Includes all aspects of:** Fundamentals of electromagnetic radiation, X-Ray production, characteristic properties of X-Rays, units of radiation, radiation measurement, X-ray equipments, X-Ray films, intensifying screens, other X-Ray appliances, dark room equipments and procedures, II TV, cine fluorography, tomography.
   - Quality assurance.
   - Radiation hazards and principle and methods of radiation protection.
   - Contrast media: types, chemistry, mechanisms of action, dose schedule, routes of administration, their potential adverse reactions and management.
   - Clinical applications of important isotopes and instrumentation in Nuclear medicine with advances in both.
   - Physics and applications of advanced imaging i.e., Ultrasound, CT, MRI, Angiography (DSA), PET etc.
   - Practical experiments in physics : A list of experiments, which a resident should be able to do and interpret the results, is available in the department.

3. **RESPIRATORY SYSTEM:** Diseases of the chest wall, diaphragm, pleura and airways; pulmonary infections; pulmonary vasculature; pulmonary neoplasms; diffuse lung disease; mediastinal disease; chest trauma; post- operative lung and X-Rays in intensive care.
   - Localization of the chest pathology into one of the following compartments: pulmonary,pleural, mediastinal, extra-pleural, extra-thoracic, diaphragmatic, infradiaphragmatic.
   - Recognition of chest pathology that requires urgent or emergency treatment and describe this in an adequate manner: Pneumothorax, traumatic aortic rupture, esophageal rupture, acute pulmonary embolism, CHF and tracheo-bronchial foreign bodies.
   - Recognition of acute and chronic patterns of bacterial and viral pneumonia’s, occupational diseases, allergic states.
   - Recognition of acute and chronic cardiac failure patterns and non-cardiogenic edemas.
   - Understanding of the radiographic features and precipitating causes of adult and infant respiratory distress syndrome.
   - Recognition of and describe appropriately the various manifestations of benign and malignant neoplasm’s of the lung.

4. **GASTROINTESTINAL (GIT) AND HEPATO-BILIARY-PANCREATIC SYSTEM:** Diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery, acute abdomen, abdominal trauma using conventional and newer imaging methods like CT, MRI, DSA, isotope studies. Diseases and disorders of hepato-biliary-pancreatic system using conventional & newer imaging methods.
   - Evaluation of the clinical condition & needs of a patient and to decide the appropriate studies and approach for examining the GIT or hepato-biliary-pancreatic system of a patient.
   - Evaluation to know a proper approach to fluoroscopy: this includes developing proficiency in GIT fluoroscopy, mastering the equipment and using proper radiation protection measures (both for the patient and the operator).
   - Basic pathology and patho-physiology of GIT/hepato-biliary-pancreatic diseases.
   - Interpretation to communicate the findings both at fluoroscopy and in films, in an accurate, succinct and meaningful way.

5. **GENITO-URINARY SYSTEM** Imaging : conventional, ultrasound, CT, MRI, angiography; of various diseases and disorders of genitourinary system. These includes : congenital, inflammatory, traumatic, neoplastic, calculus and miscellaneous conditions.
   - Recognition and evaluate emergency conditions involving the urinary tract including trauma, infection, vascular compromise and obstruction.
   - Recognition and understanding the patho-physiology of stone disease.
   - Recognition of patterns of infectious diseases and the modalities necessary for diagnostic evaluation.
   - Understanding the complete evaluation of renal mass lesions and the evaluation of other urinary tract neoplasms, including the detection and staging of the tumor.
   - Recognition the difference between the pattern of diseases affecting the genito-urinary tract of adults and that of children and understand and identify the common conditions affecting the peadiatric genito-urinary system on imaging.

6. **MUSCULOSKELETAL SYSTEM:** Imaging (Conventional, ultrasound, CT, MRI, angiography, Radio-isotope studies) and interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, neoplastic and miscellaneous conditions.
   - Communication cogently radiographic descriptions of bone and joint trauma.
   - Differentiation of various forms of arthritis and know correlative laboratory and clinical findings.
   - Enumeration of the radiogrphic features that differentiate benign and malignant bone tumors with a basic familiarity of more common tumors.
   - Knowledge of radiographic features of acute and chronic osteomyelities and discitis (including tuberculosis).
   - Recognition differential features of osteoporosis (including Bone Mineral Density or BMD assessment techniques e.g; US,CT,Dexa) including various endocrine and metabolic diseases e.g; osteomalacia, hyperparathyrodism etc.
   - Application and interpretation of ultrasound/CT/MRI/angiography in one or more of the above situations.

7. **CARDIOVASCULAR RADIOLOGY/ECHO CARDIOGRAPHY:** Diseases and disorders of cardiovascular system including congenital conditions and the role of imaging by conventional, ultrasound, Echo, color-Doppler, CT, MRI, angiography (including DSA) and radionuclide studies. It also includes interventional procedures e.g; balloon angioplaty, embolization etc.
    - Understanding the anatomy and common pathology of congenital and acquired cardiac conditions.
    - Correlation between plain film findings of common congenital abnormalities with those shown by angiography and explain the pathophysiology including abnormal pressure measurements.
    - Correlation between plain film findings and the echocardiographic studies of patients with acquired valvular diseases and other common pathologic conditions including pericardial pathology.
    - Understanding the role of newer modalities like CT/MRI, in aortic diseases e.g., aorto-arteritis, aortic dissection and aortic aneurysm.
    - Knowledge of fluoroscopy on patients before and after valve replacement and identify those with complications after valve replacement.
    - Understanding the principle and logic behind various interventional procedures carried out in the cardiovascular labs e.g; PTCA, balloon dilatation of valvular lesions, septostomy etc.

8. **NEURORADIOLOGY:** Includes imaging (using conventional and newer methods) and interpretation of various diseases and disorders of the head, neck and spine covering congenital lesions, infective lesions, vascular lesions, traumatic conditions and neoplasia. It also includes a number of interventional procedures carried out in the department of neuroradiology.

    - Know detailed normal neuro-imaging anatomy on different imaging modalities.
    - Identification of pathologic conditions (listed under the content) on images acquired using different techniques and communicate the report in a concise manner.

9. **GENERAL RADIOLGY**
    - Learning to direct and perform radiography on patients.
    - Decision on further imaging views based on the clinical suspicion and the initial imaging.
    - Reporting on the radiographs obtained in a methodical, concise and precise way and communicate it to the referring unit.

10. **ULTRASOUND (INCLUDING GYNAE/OBSTETRICS)**
    - Determination or select the appropriate diagnostic procedure for the clinical problem.
    - Demonstration proficiency in patient scanning using appropriate techniques and instrumentation.
    - Modification the procedure, if required, based upon the observed abnormalities (pathology).
    - Analysis the results of the diagnostic procedure, make diagnosis and record the findings.

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Syllabus for: Anesthesiology- Paper II

1. Human Anatomy and Physiology: Various organ systems and cellular components in relation to Anaesthesia including muscles, neuromuscular junction, nerve plexuses, cardiovascular, respiratory, neurological, hepatobiliary, renal, endocrine and temperature homeostasis, theories of mechanism of production of anaesthesia, changes during pregnancy, various tests/investigations to evaluate the functional status of organ systems as applied to Anaesthesia Management, Intensive Care Practice and Pain Relief.

2. Pharmacology: As applied to Anaesthesia, Intensive Care Practice and Pain Relief including General Pharmacological Principles, Pharmacokinetics and Pharmacodynamics of Anaesthetic Drugs (including Uptake and Distribution of Inhaled Anaesthesia agents and All the Adjuncts used in Anaesthesia, Drugs used for treatment of various Diseases and Drug Interaction).

3. Pathophysiology of various diseases: Including disorders of cardiovascular, respiratory, neurological, hepatobiliary, renal, endocrine and immune systems, various tests/investigations to grade/measure the disease process of various organ systems as applied to anaesthesia management, intensive care practice and pain relief.

4. Medicine: As applied to the practice of Anaesthesia including diagnosis and management of Diabetes, Hypertension, Bronchial Asthma, Chronic Obstructive Pulmonary Diseases, Respiratory Failure, ARDS, Myocardial Ischemia / Infarction, Arrhythmia, Shock, Congestive Heart Failure, Acute / Chronic Renal Failure, Head Injury, Unconscious patients, Status Epilepticus / Asthmaticus, Endocrine Disorders, Diseases related to Dysfunction of Hepatobiliary, Muscular, Connective Tissues and Immune system, Management of Perioperative Infection, Neuromuscular Disorders, Poisoning etc. and interpretation of ECG / Blood Gases / Other Biochemical Values and Function Tests.

5. Physics: As applied to Anaesthetic gases, vapours, anaesthesia machine, breathing systems, monitors, ventilators, therapeutic devises & other relevant equipment including physical principles involved in their construction and functioning.

6. Perioperative Anaesthesia management: Including pre-operative evaluation, intra-operative management as well as postoperative care, monitoring (invasive as well as non-invasive) as applied to various surgical specialities and age groups.

7. Theory and practice of various techniques / aspects of Routine & Emergency cases of General Anaesthesia (e.g., Intravenous / Inhalational, Endotracheal / Mask / LMA / COPA, Spontaneous/Controlled mode of ventilation, induced hypotension / hypothermia etc.), Regional Blocks (Spinal, Epidural & Peripheral Nerve block) and Local Anaesthesia, including various postures required for anaesthetic/surgical procedures, their effects and recent advances for most minor to supra major surgeries in the field of:

i. General surgery: Minor cases like haemorrhoidectomy to supra major cases like Liver transplant.
ii. Gynaecology and Obstetrics
iii. ENT and Head & Neck
iv. Orthopaedics
v. Ophthalmology
vi. Pediatric & Neonate: Differences between adult and pediatric Anatomy, Physiology, Pharmacology, Anaesthesia principles, pediatric/neonatal emergencies, postoperative care, fluid & ventilator management etc.
vii. Cardiac, Vascular & Thoracic: Conduct of closed heart as well as open heart surgeries (Valvular, Ischemic, Congenital -Cyanotic & Acyanotic), CABG (including off pump), Pulmonary Cases (Insertion of Double Lumen Tube, one lung anaesthesia), Thymus and Vascular surgeries etc. Ability to go on Cardiopulmonary bypass and disconnect from bypass, Ability to take, manage and interpret Arterial, Central Venous and P.A. Lines, postoperative care, management of re-explorations etc.
viii. Neurosurgery: Ability to monitor ICP, Management of head injuries, bleeds, tumours, etc with raised ICT. Ability to safely manage cases in sitting, prone, lateral, jack-knife positions and Anaesthetic management for neuroradiology procedures.
ix. Urology: Management of endoscopic surgeries like TURP/TURBT etc, Problems related to TURP, extracorporeal shock wave lithotripsy, percutaneous placement of nephrostomy etc., anaesthetic management of patients with acute and chronic renal failure, anaesthetic management of renal transplant cases of donor as well as recipient.
x. Plastic: Management of burns contractures, congenital faciomaxillary abnormalities like cleft lip and palate, faciomaxillary injuries like fracture mandible, maxilla, zygoma, panfacial fractures, difficult intubations, microvascular surgeries, reconstructive surgeries, aesthetic surgeries etc.
xi. Dental: Monitored Anaesthesia Care, Anaesthetic management of pedodontia patients, maxillofacial surgeries including TMJ Ankylosis, Awake, Retrograde & Fibreoptic intubations.
xii. Endoscopies / laparoscopies: Anaesthetic management, specific requirement and complications of various endoscopies like cystoscopy, ureteroscopy, PCNL, hysteroscopy, thoracoscopy, mediastinoscopy etc. and Lap. Assisted/laparoscopic surgery like hysterectomy, tube ligation, appendicectomy, cholecystectomy etc.
xiii. Anaesthesia for various diagnostic, therapeutic and specialized procedures.
xiv. Anaesthesia for Geriatric patients.
xv. Anaesthesia for surgery using LASER.
xvi. Anaesthesia / Sedation techniques out side operating room
xvii. Electroconvulsive shock therapy (ECT), Electrophysiologic tests, Radiofrequency ablation, Cardioversion, Cardiac catheterization, Special anaesthetic considerations in radiology and interventional radiology related to Dye allergies, Embolization, Monitoring / Equipment options in the MRI suite.

8. History of Anaesthesia
9. Airway Management: Assessment of difficult airway, Awake, Retrograde, Use of intubating LMA's, Intubating Stylets, Various laryngoscopes designated for difficult airway, Insertion of Combitube, Ability to perform Cricothyrotomy and use of Venturi, Minitrach & Fibreoptic intubations etc.

10. Basic & Advanced Cardiopulmonary & Cerebral Resuscitation (CPCR) For all age group of patients under different situations e.g., neonates, pregnant females, poisoning cases, trauma victims etc.
11. Acid base & Fluid management Including use of Crystalloids, Colloids, blood & blood products.
12. Arterial, Central Venous and P.A. Lines Establishment, management and interpretation.
13. Anaesthetic drugs used in perioperative care
14. Equipments (Minor to advanced monitoring) – Their use, maintenance, sterilisation and care.
15. Medical gases: Knowledge of Manufacturing, Storage and Central pipeline Systems.
16. Day Care / Outpatient Anaesthesia.
17. Remote Location Anaesthesia: Anaesthetic practice during disasters and for large turnover surgeries in camps / mass casualties.
18. Emergency Anaesthesia.
19. Monitored Anaesthesia Care.
20. Labour Analgesia.
21. Pain relief :Acute & Chronic.
22. Critical care practice: Including oxygen therapy, respiratory therapy, ventilatory support, haemodynamic monitoring, prevention and management of multi organ failure, and care of patients with brain damage or brain dead patients for organ Transplant.
23. Advanced Trauma Life Support (ATLS)
24. Occupational Hazards
25. Safety in Anaesthesia
26. Complications of Anaesthetic procedures, its prevention, detection and management.
27. Record keeping in Anaesthesia
28. Medical Audit
29. Quality Assurance
30. Anaesthesia standards: e.g., Minimum monitoring standard
31. Medicolegal aspects in Anaesthesia
32. Ethics in Anaesthesia
33. Principles of Evidence Based Medicine
34. Basic Research Methodology and Clinical Trials
35. Bio-statistics
36. Computers: Utility, computer assisted learning and data storage, Computerised anaesthesia records.
37. Skills: For planning of Operation Theater, pain clinic, recovery room, intensive care etc. including selection and purchase of equipments.