

I - YEAR SYLLABUS

ANATOMY

THEORY

1. General Anatomy in brief:

- a) Basic tissues of body.
- b) Terminology and nomenclature

2. Elements of Anatomy in brief:

- 1) Osteology – Classification of Bones, Features of Bones
- 2) Arthrology – Types of Joints, Movements
- 3) Myology – Classification of Muscles
- 4) Neurology -

3. Regional Anatomy:

- Upper Limb, Lower Limb -Thorax – including diaphragm -Abdomen & Pelvis
- Head, Neck
- Brain and Spinal cord in brief

4. Embryology (General embryology) in brief: 1st week development, 2nd week development, 3rd week development, Embryonic Period, Fetal Period, Teratology.

- Development of individual organs and systems

5. Histology:

- General Histology: Cell, Primary tissue (Epithelium, Connective Tissue, Muscle, Nervous Tissue)
- Micro-anatomy of individual organs and system.

6. Applied Anatomy.

PAPER 1

COURSE CONTENT: (Related Regional Anatomy, Histology, Embryology, Myology, Arthrology & Osteology of Upper Limb, Head, Neck & Brain and Micro-anatomy)

I. GENERAL ANATOMY:

Introduction of Anatomy, Anatomical Terms, different branches of anatomy, Introduction of bones, its classification, functions, applied anatomy; Joints-types, actions, applied anatomy; cartilage-types, action, applied anatomy, basics of all the tissues and systems of the human body.

II. OSTEOLOGY (Bones of Skull & Upper limb)

Names of the bones and their positions; general features, Skull - all normal and interior of skull & mandible.

III. MUSCULAR SYSTEM (Head & Neck and Upper Limb)

Origin, Insertion, Nerve Supply and Action of the muscles with the applied anatomy and Clinical testing.

IV. ARTHROLOGY: (Head & Neck, Upper Limb)

General features of different types of joints. Brief study of the following joints of the body with movements: Shoulder, Elbow, Wrist and other smaller joints of Head & Neck, Upper Limb.

V. HEAD, NECK AND BRAIN

Head and neck- introduction, scalp, face and lacrimal apparatus, sides of the neck, sub occipital triangle, contents of vertebral canal (brief), meningeal layer, cavernous sinuses and other sinuses in brief, hypophysis cerebri, trigeminal ganglion, middle meningeal artery, contents of the orbit, triangles of the neck, ansa cervicalis, parotid gland, otic ganglion, submandibular gland, sublingual gland, thyroid gland, parathyroid gland, thymus, blood supply of deep structure, cervical ganglion, cervical plexus, styloid apparatus, oral cavity, palate, pharynx, auditory tube, nasal septum, paranasal sinuses, cartilage of larynx. Parts of nervous system, meninges, ventricles, motor and sensory pathways, cranial nerve, motor and sensory cortex and their blood supply with cross sectional studies in brief morphology of spinal cord.

Section of medulla –pyramidal decussation ,sensory decussation, upper part of medulla, pons-midlevel, Mid brain-mid superior colliculus ,inferior colliculus, cerebellum- horizontal mid-saggital section, horizontal section at interventricular formation, coronal section at anterior commissure, coronal section at mammillary body. Sensory organs (region wise)-gross anatomy of eyeball, ear nose and tongue in brief, blood brain barrier.

VI. UPPER LIMB

An introduction, breast, clavipectoral fascia, axilla, lumbar triangle, triangle of auscultation, bursa of upper limb, musculo- tendinous, cuff, intermuscular spaces, cubital fossa, synovial sheath, retinaculum of hand, palmar aponeurosis, spaces of hand, anatomical snuffbox.

VII. MICRO ANATOMY - 12 General topics, 15 systemic topics (Separate list attached)

- a) Study of microscope and artifacts.
- b) General Histology, study of the basic tissues of the body, functional correlation of the structural components of the organs.
- c) Systemic histology of concerned organs.

PAPER - II

COURSE CONTENT: Related Regional Anatomy, Histology, Embryology, Myology, Arthrology & Osteology of Thorax, Abdomen and Pelvis, Lower Limb and embryology.

I. THORAX

General Introduction

Pericardium, Thorax Wall, Position and Parts of the Heart, Conducting System, Blood Supply And Nerve supply of the Heart, Names of the Blood Vessels and their Distribution in the Body, Lungs & Pleura-General features Surface Markings, Broncho- Pulmonary Segments, Applied Anatomy, Mediastinum, Diaphragm, Oesophagus, Thoracic Duct.

II. ABDOMEN AND PELVIS

Peritoneum General disposition –horizontal and vertical, parts relation, blood supply, Nerve supply of abdominal organs, Pelvic Organs – Parts Position, Relation, blood supply, nerve supply.

III. LOWER LIMB

Deep fascia- modifications, saphenous vein, lymph nodes, adductor canal muscles –nerve supply, blood supply, Action, Arches of Foot and Joints of lower limb.

IV. EMBRYOLOGY IN BRIEF:

Definition of embryology, brief account of male and female, ovary; definition of gamete;

Sperm, Ovum, Gametogenesis, migration of primordial germ cells into gonadal ridge; Structure

of sperms, Growth of ovarian follicles, ovarian and uterine cycles.

Principles of family planning (contraception), In-vitro fertilization (for integrated teaching).

Systemic Embryology (Brief): Development of individual organ of digestive system, genital system, urinary system, respiratory system, cardio-vascular system, nervous system, special sensory organs (in brief) endocrine mammary gland.

Development abnormalities in brief.

PRACTICALS

Total Time: 32 -34 Weeks

GROSS ANATOMY: (Dissection /Demonstration of following parts of body)

Upper Limb: Dissection: Pectoral, scapular, shoulder, arm, forearm (5wks)
Prosected Parts: Joints, Palm and dorsum of hand.

Thorax: Dissection: Chest wall, Mediastinum, Lungs and heart.

Abdomen: Dissection: Anterior abdominal wall and inguinal region, viscera and posterior abdominal wall.

Pelvis: Dissection: Pelvic viscera and blood vessels and nerve saggital section (M&F)(2Wks)
Prosected Parts: Sole of the foot and joints.

Head and Neck: Dissection: Scalp, superficial and dissection of Face and Neck (8wks to10wks).

Prosected Parts: Orbit, eyeball, submandibular region, Temporal and Infra Temporal fossa, cranial cavity, Naso and Oro-pharyngeal regions, Ear, Larynx and Pharynx, Cross sections at C-4, C-6 levels, sagittal section of Head and Neck.

Nervous system: Section of brain and prosected specimens and major functional areas, Gross structure of brain and spinal cord and study of gross sections as mentioned earlier(in brief).

DEMONSTRATIONS:

- Bones as described in osteology section.
- Brain and Spinal cord.

SPECIFIC SKILLS: Students should learn the following skills

- 1) To localize important pulsations and the structure against which pressure can be applied in case of bleeding & Trauma of particular artery.
- 2) To elicit superficial reflexes and deep.
- 3) To demonstrate muscle testing and movements at joints.
- 4) To locate for: Lumbar puncture, Sternal puncture, Pericardial tapping, Liver biopsy.
- 5) To locate veins for venous Puncture.
- 6) To locate the site for emergency such as tracheotomy.

HISTOLOGY

General Histology

1. Microscope.
2. Cell.
3. Epithelial Tissue I
4. Epithelial Tissue II
5. Connective Tissue – Bones and Cartilages
6. Muscular Tissues
7. Nervous Tissues (TS &LS of Peripheral Nerve, Sensory & Sympathetic ganglion, Optic nerve).
8. Epithelial Glands (Serous, mucous and mixed salivary gland).
9. Circulatory System (Large Artery, Medium sized Artery, Larger Vein).
10. Lymphatic System (Lymph nodes, Thymus, Tonsils, Spleen).
11. Skin and Appendages.
12. Placenta and Umbilical cord.

Systemic Histology

1. Respiratory System.
2. Oesophagus and Stomach.
3. Liver, Gall bladder, Pancreas.
4. Urinary System I (Kidney)
5. Urinary System II (Ureter, Bladder, Urethra).
6. Small and Large Intestines
7. Reproductive System -Female
8. Reproductive System-Male
9. Upper GIT (Lip, Tongue)
10. Hypophysis cerebri, Thyroid and Suprarenal glands.
11. Eye – Cornea and Retina.

TEXT BOOKS

- | | |
|---|---------------------|
| 1. Text Book of Anatomy (Vol.I, II,III) | – By B.D. Chaurasia |
| 2. Text Book of Anatomy | - By Hamilton |
| 3. Practical Anatomy | - By Cunningham |
| 4. Human Embryology | - By Inderbir Singh |
| 5. Cunningham's Textbook of Anatomy | - By Cunningham |
| 6. Balley's Textbook of Histology | - By Balley |
| 7. Medical Embryology | - By Langman |

REFERENCE BOOKS

- | | |
|-----------------------------------|------------------------|
| 1. Textbook of Anatomy | - By Gray |
| 2. Atlas of Histology | - By Diforie |
| 3. Atlas of Histology | - By Poddar |
| 4. Textbook of Human Histology | -By Dr.Veena Bharihoke |
| 5. A color Atlas of Human Anatomy | - By McMinn |
| 6. Grant's method of Anatomy | - By Grant |
| 7. Regional & Applied Anatomy | - By R.J. Last |

MPMSU-BNYS SYLLABUS

PHYSIOLOGY

PAPER I

I. GENERAL PHYSIOLOGY

1. Cell structure and functions
2. Sub-cellular units
3. Cell membranes and their properties
4. Transport mechanisms
5. Bioelectrical potentials
6. Body fluids, Homeostasis and Thermoregulation.

II. BLOOD – Physical properties, composition and functions of blood.

1. Plasma Proteins

- a) Normal values
- b) Origin and methods of separation
- c) Functions and variations in health and disease.

2. Bone Marrow

- a) Formed elements
- b) Composition and functions

3. Erythrocytes

- a) Morphology and variations in health and diseases
- b) Development of erythrocytes
- c) Site and stages in development
- d) Necessary factors
- e) Regulation of development of erythrocytes
- f) Life-span and fate of erythrocytes
- g) Erythrocytes sedimentation rate (ESR)

4. Haemoglobin

- a) Structure, synthesis, function and metabolism
- b) Types of hemoglobin

5. Anaemia – Definition and classification

6. Jaundice – Definition and classification

- a) Role and function of spleen

7. Leucocytes

- a) Classification, morphology, development and functions
- b) Variation in health and disease

8. Thrombocytes

- a) Origin, morphology and functions
- b) Variation in health and disease

9. Haemostasis

- a) Mechanism of Haemostasis, Coagulation of blood.
- b) Fate of clot and disorders of clotting.

10. Anticoagulants

- a) Mechanism of action and clinical applications

11. Blood groups

- a) Classification
- b) ABO and RH system
- c) Blood transfusion, indication and hazards

12. Lymph and tissue fluids

- a) Lymph and reticular system
- b) Fluid compartments and Water Balance
- c) Principles of immune system
- d) Cellular and Humoral immunity

III - CARDIO-VASCULAR SYSTEM

Historical perspective and organization of cardiovascular system

1. Heart –

- a) Structure and properties of cardiac muscle
- b) Cardiac metabolism
- c) Enervation of heart, junction tissue of heart
- d) Regeneration and spread of cardiac impulse

2. Electrocardiography

- a) Enthovan's Law
- b) Various ECG leads, normal ECG and its interpretation
- c) Cardiac arrhythmias and heart block
- d) Cardiac vector

3. Cardiac cycle

- a) Pressure and volume change (mechanical events)
- b) Heart sound and Stethoscopy
- c) Principle of Echo-cardiography
- d) Measurement and regulation of cardiac output

4. Heart sounds

- a) Description, causation and relation to other events in cardiac cycle
- b) Clinical significance of heart sounds

5. Blood pressure

- a) Definition, regulation and factors influencing B.P.
- b) Measurement of blood pressure
- c) Physiology of haemorrhage and shock

6. Circulation

- a) Blood vessels
- b) Physical principle of blood flow, regulation of blood flow
- c) Jugular venous pulse tracing, radial pulse tracing
- d) Coronary, cerebral, renal and pulmonary circulation
- e) Splanchnic, cutaneous and capillary circulation

IV. RESPIRATORY SYSTEM

Introduction, internal and external respiration, physiological anatomy of respiratory system.

1. Mechanics of respiration

- a) Inspiration and expiration
- b) Role of respiratory muscles and Thoracic cage.
- c) Pressure and volume change during respiration
- d) Work of breathing, lung compliance and its significance in health and diseases.

2. Lung volumes and capacities

- a) Lung volumes and capacities and their measurements
- b) Respiratory minute volume and maximum voluntary ventilation

3. Alveolar ventilation Composition of atmospheric, inspired, alveolar and expired air

4. Pulmonary circulation

- a) Pulmonary circulation, ventilation-perfusion relationship
- b) Diffusion of gases across pulmonary membrane
- c) Oxygen uptake, transport and delivery
- d) Carbon-dioxide uptake, transport and delivery

5. Organization of the respiratory centers

- a) Nervous and chemical regulation of respiration
- b) Classification and characteristics of hypoxia, cyanosis, asphyxia, Hypercapnea, Hypocapnea, Dyspnoea, Apnoea and orthopnea and periodic breathing.
- c) Respiratory aspects of high altitude
- d) Physiology of Acclamatisation and hyperbarrism
- e) Respiratory / pulmonary function tests
- f) Non-respiratory functions of lungs
- g) Artificial respiration

V. DIGESTIVE SYSTEM

- 1. Introduction, organization and plan of digestive system**
- 2. Saliva**
 - a) Composition, functions, regulation of secretion
 - b) Methods of study of above aspects of saliva
- 3. Stomach**
 - a) Functions of stomach
 - b) Composition and functions of gastric juice
 - c) Regulation of secretion and mechanism of HCL secretion
 - d) Gastric emptying time and its regulation
 - e) Methods of study of gastric function and its applied aspect.
- 4. Pancreas**
 - a) Composition and functions of pancreatic juice
 - b) Regulation of pancreatic secretion
 - c) Methods of study of pancreatic secretion
- 5. Liver**
 - a) Function, formation, storage and emptying of bile
 - b) Composition, function and regulation of release of bile
 - c) Entero-hepatic circulation
 - d) Tests for liver functions
- 6. Small intestine**
 - a) Succus entericus
 - b) Composition, function and mechanism of secretions

VI. Environmental Physiology

1. Introduction to environmental physiology
2. Body temperature regulation
3. Man in cold environment
4. Man in hot environment
5. Hypothermia and its clinical applications
6. Physiological responses to high attitude
7. Physiological responses to high atmospheric pressure

PAPER II

VI. EXCRETORY SYSTEM

1. General introduction organs of excretion with special emphasis on evolution of excretory mechanisms
2. Renal system-functional anatomy and renal circulation
3. Nephron
 - a) Mechanism of urine formation, glomerular filtration, tubular function
 - b) Concentration and acidification of urine
 - c) Composition of normal urine, and abnormal constituents of urine
 - d) Renal function tests
4. Non-excretory functions of kidney
 - a) Physiology of micturition and its abnormalities
5. Skin-Structure and functions

VII. ENDOCRINAL SYSTEM

1. Introduction-hormones, evolutionary back-ground and organization of endocrine control systems
2. Methods of study
 - a) Classification of hormones and mechanism of hormonal action
 - b) Regulation of hormone secretion and feed-back system
3. Hyp thalamo- hypophyseal system
Releasing hormones
4. Active principles
 - a) Chemical nature, biosynthesis, role of action
 - b) Control of secretion, excretion and its aspect.
 - c) Clinical study of their hypo-and hyper function
 - d) Laboratory diagnosis of pituitary (anterior and posterior) gland, thyroid, parathyroid, adrenal cortex and medulla and islets of Langerhans.

VIII. REPRODUCTIVE SYSTEM

1. **Physiology of reproduction**
 - a) Introduction to physiology of reproduction
 - b) Sex determination and sex differentiation and chromosomal study
2. **Male reproductive system**
 - a) Growth, development and structure of testes
 - b) Gonadotropins and gonadal hormones
 - c) Functions of testes and spermatogenesis
 - d) Composition of semen
3. **Female reproductive system**
 - a) Ovary, gonadotropins
 - b) Structure of ovary and corpus luteum
 - c) Function of ovary, ovarian hormones
 - d) Physiology of menstruation cycle and physiology of pregnancy
 - e) Physiology of placenta, gestation and parturition
 - f) Physiological basic of tests for ovulation and pregnancy
4. **Physiology of lactation**

IX. NERVE MUSCLE PHYSIOLOGY

1. **Neurons**
 - a) Morphology and measures of excitability
 - b) Classification and properties of nerve fibers
2. **Muscle**
 - a) Types of muscles and their properties and morphology
 - b) Neuro-muscular junction, excitation-contraction coupling
 - c) Myasthenia gravis
 - d) Starlings law and its applications

X. CENTRAL NERVOUS SYSTEM

1. Structural and functional organization of central nervous system

2. Neuron

- a) Neuroglia, functional types of neurons

3. Cerebro-spinal fluid

- a) Formation, circulation, functions of CSF
- b) Methods of collection and clinical significance of CSF

4. Synapse

- a) Types of synapses and their structure
- b) Sympathetic transmission
- c) General properties of neuro-transmitters

5. Sensory Physiology

- a) Classification and general properties of receptors
- b) Sensory modalities and stereognosis

6. Reflexes

- a) Reflex and general properties of reflexes (with examples)

7. Ascending tracts

- a) Origin, course, termination and functions
- b) Specific reference to pain pathway and physiology of pain

8. Organisation of motor systems

- a) Pyramidal and extra-pyramidal system
- b) Upper and lower motor neurones and their lesions
- c) Brown-sequard syndrome
- d) Syringomyelia

9 Cerebellum

- a) Functional anatomy, connections and functions
- b) Effects of lesions and tests for cerebellar function

10. Basal ganglion

- a) Functional anatomy, connections and functions
- b) Diseases of basal ganglion and its clinical evaluation

11. Vestibular apparatus

- a) Functions anatomy, connections and functions
- b) Effects of lesions and their assessment
- c) Physiology of maintenance and regulation of muscle tone, posture and equilibrium
- d) Decerebrated rigidity and righting reflexes

12. Thalamus

- a) Functional anatomy, connections and functions
- b) Effects of lesions of thalamus

13. Hypothalamus

- a) Functional anatomy, connections and functions
- b) Effects of lesions of hypothalamus

- 14. Body temperature regulation**
 - a) Normal body temperature, pyrexia and hypothermia.
- 15. Cerebral cortex**
 - a) Functional anatomy
 - b) Methods of study of cortical functions.
- 16. Limbic system**
 - a) Functional anatomy, connections and functions.
 - b) EEG, Physiology of sleep and wakefulness.
- 17. Higher functions**
 - a) Learning, speech, memory, behaviour and emotions.

XI. AUTONOMIC NERVOUS SYSTEM

- 1. Sympathetic nervous system
- 2. Parasympathetic nervous system

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XII. SPECIAL SENSE

1. Smell

- a) Physiology of olfaction and olfactory discrimination
- b) Olfactory pathway and defects of olfaction

2. Receptors, primary taste sensation and taste pathway

3. Vision

- a) Functional anatomy of eye, extra and intra-ocular muscles
- b) Errors of refraction and their correction, visual acuity
- c) Physiology of aqueous humour.
- d) Cornea, lens, intraocular pressure, accommodation
- e) Retina, rhodopsin cycle, dark and light adaptation
- f) Visual pathway and effects of lesions in visual pathways
- g) Field of vision, perimetry, binocular vision
- h) Iris and papillary reflexes
- i) Color vision, color blindness and tests for color blindness
- j) Formation and circulation of tears, lacrimal glands

4. Hearing

- a) Functional anatomy of ear, function of external ear
- b) Physiological functions of middle ear
- c) Impedence matching and tympanic reflex
- d) Functional anatomy of internal ear, cochlea, organ of corti.
- e) Auditory pathway and auditory cortex
- f) Frequency analysis, sound localization, defects of hearing
- g) Audiometry, tests for conduction defects, Aphasia

PRACTICALS

I. HAEMATOLOGY EXPERIMENTS

- 1. Collection of blood, study of fresh drop of blood, effects of isotonic, hyper tonic and hypo tonic saline on RBCs
- 2. Enumeration of RBCs (RBS count)
- 3. Estimation of haemoglobin
- 4. Packed cell volume (PCV) and blood indices
- 5. Determination of Erythrocyte sedimentation rate (ESR)
- 6. Enumeration of WBC (Total count)
- 7. Differential WBC count (Differential count)
- 8. Determination of clotting time and bleeding time
- 9. Enumeration of platelets (Platelet count)

II. HUMAN PHYSIOLOGY EXPERIMENTS

1. Recording of blood pressure in human beings and study the effects of exercise on blood pressure
2. Electrocardiography (Demonstrations)
3. Clinical examination of CVS and radial pulse
4. Determination of tidal volume, inspiratory reserve volume, expiratory reserve volume, inspiratory capacity, expiratory volume
(All experiments are to be arranged for demonstration)
5. Stethoscopy, normal body temperature and its physiological variation
6. Pulse, respiration and temperature chart with correlation
7. Clinical examination of respiratory system
8. Plethysmography (Demonstration)
9. Clinical examination of CNS
 - a) Motor functions
 - b) Sensory functions
 - c) Cranial nerves
 - d) Reflexes superficial and deep
10. Determination of vital capacity and maximum ventilator volume with spirometry (Demonstration).

Note - The above 10 human physiology experiments are to be conducted with demonstration as a joint venture by physiologists and the clinical faculty, if necessary.

Recommended Text books for Physiology

1. Text book of Medical physiology - A.C. Guyton
2. Review of Medical physiology - W.F. Ganong
3. Concise text book of Medical physiology - S.K. Choudhary
4. Understanding Medical physiology - Bijlani
5. Essentials of Medical Physiology - Sembulingam

Reference books

1. Best and Taylor's Physiology basis of Medical practice
2. Practical physiology by Ghai
3. Practical physiology by Ranade

BIOCHEMISTRY

THEORY

I. Cell biology

1. Biomolecules & biochemical perspective of a cell
2. Cell structure, cell membrane, subcellular organelles
3. Transport mechanism

II. Biomolecules

1. Carbohydrates:

- a) Definition, classification & biological importance of carbohydrates.
- b) Chemistry of Monosaccharides. Properties of monosaccharides, Isomerism, modified monosaccharides.
- c) Disaccharides
- d) Polysaccharides

2. Lipids:

- a) Definition, classification & biological importance of lipids.
- b) Simple lipids (composition of Triacyl glycerol & Waxes), Compound lipids (composition & function of phospholipids, glycolipids & lipoproteins), Derived lipids (fatty acids, classification & properties of fatty acids, steroids & sterols)
- c) Micelles, Liposomes

3. Proteins:

- a) Definition, classification & biological importance of proteins & Amino acids.
- b) Structural organization and structure-function relationships of proteins. Hemoglobin and myoglobin, molecular mechanism of O₂ transport and storage. Molecular basis of sickle cell anaemia and thalassaemias.
- c) Molecular mechanism of muscle contraction.
- d) Plasma proteins, their functions and clinical significance

4. Enzymes

- a) Definition, Nomenclature, classification,
- b) Kinetics, mechanism of enzymatic catalysis.
- c) Factors influencing enzymatic catalyses, enzyme activators and inhibitors.
- d) Regulation of enzyme activity,
- e) Clinical enzymology, iso-enzymes.

5. Food Assimilation & Nutrition

- a) Digestive enzymes, their action on dietary carbohydrates, fats and proteins.
- b) Absorption of glucose, amino acids and lipids.
- c) Gastric, pancreatic and intestinal function tests, liver function tests.

- d) Functions of dietary ingredients, the macro and micronutrients.
- e) Fat soluble and water soluble vitamins
- f) Malnutrition
- g) Iron metabolism and heme synthesis.

6. Metabolic pathways, their regulation and metabolic interrelationships:

General concepts and characteristics of metabolic pathways.

a) Carbohydrate Metabolism:

Major Pathways: Glycolysis, pyruvate oxidation, citric acid cycle, Gluconeogenesis, HMP shunt pathway, Glycogenolysis, Glycogenesis, Glycogen storage Disease.

Minor Pathways: Metabolism of Fructose & Galactose.

Regulation of blood sugar, Glucose tolerance test, Diabetes Mellitus & other disorders of carbohydrate metabolism, **Metabolic adaptation in fed state, fasting and prolonged starvation, Metabolic derangements and adaptations in Diabetes Mellitus.**

b) Lipid Metabolism:

- ✓ Biosynthesis and degradation of fatty acids, phospholipids and triacylglycerols
- ✓ Biosynthesis of cholesterol, chemistry and metabolism of lipoproteins.
- ✓ Hyper lipoproteinemias.
- ✓ Lipid storage disease (Fatty Liver, Obesity & other diseases).
- ✓ Ketone bodies: their synthesis, utilization and conditions leading to ketoacidosis, prostaglandin.
- ✓ TCA cycle and biological oxidation, prostanoids (Prostaglandins).

c) Amino Acid Metabolism

- ✓ General reactions, transamination, its metabolic and diagnostic significance
- ✓ Disposal of amino acid nitrogen and detoxication of urea
- ✓ Metabolic fate of amino acid carbon skeleton.
- ✓ Formation and disposal of ammonia
- ✓ Sulphur containing amino acids
- ✓ In born errors of branched chain and aromatic amino acids
- ✓ Important amino acid derivatives

d) Vitamin

- ✓ Definition & classification of Vitamins
- ✓ Brief account of chemistry, source, RDA, biochemical functions, deficiency diseases, vitamin antagonists and hyper-vitaminosis of each vitamin

e) Mineral Metabolism

- ✓ Classification of minerals
- ✓ Brief account of chemistry, source, RDA, biochemical functions, deficiency diseases of each mineral.

f) Regulation of metabolic pathways

- ✓ Interlinks between these pathways
- ✓ Organ relationship in metabolism

7. Molecular biology

- a) Nucleic acids: DNA and RNA structure
- b) DNA Replication, DNA Transcription, Post-transcriptional processing.
- c) Translation of genetic code
- d) Regulation of gene expression and protein synthesis inhibitors of protein synthesis.
- e) DNA repair mechanisms,
- f) Applied aspects of purine and pyrimidine metabolism
- g) Genetic Engineering: Recombinant DNA technology
- h) DNA and diagnostics
- i) DNA repair mechanisms and related disorders
- j) Telomers, telomerases
- k) Inhibitors of DNA replication, apoptosis

8. Energy metabolism and nutrition

- a) Calorific value of foods
- b) Basal metabolic rate and its importance.
- c) Energy requirement for physical activity
- d) Balanced diet, role of carbohydrates, proteins & lipids
- e) Nutritive value of proteins, Protein energy Malnutrition(PEM)

9. Biochemistry of Blood

- a) Porphyrins, synthesis and degradation of heme; Porphyria, Jaundice
- b) Structure & functions of hemoglobin
- c) Abnormal hemoglobin & hemoglobinopathies
- d) Plasma Proteins
- e) Immunoglobulins
- f) Blood pH & its regulations
- g) Role of kidney & lungs in maintaining pH of blood
- h) Acidosis, Alkalosis

10. Clinical Biochemistry

- ✓ Tools of biochemistry
- ✓ Liver function tests
- ✓ Renal function tests

11.Environmental Biochemistry

- ✓ Xenobiotics, interaction with biomolecules, effects, metabolism, detoxication,
- ✓ Biochemical characteristics of cancer
- ✓ Environmental pollutants and carcinogenesis

PRACTICALS

SECTION - I

1. Indicators
2. Reactions of monosaccharides - Glucose and fructose
3. Reactions of disaccharides - Lactose, Maltose and Sucrose
4. Reactions of polysaccharides - Starch and dextrin
5. Reactions of Proteins - albumin, casein, gelatin
6. Coagulation and Precipitation and reactions of Proteins.
7. Reactions of Non Protein Nitrogen (NPN) - Urea, Uric acid and creatinine.
8. Analysis of Milk
9. Normal Constituents of urine
10. Analysis of abnormal urine.

SECTION -II

- I. Determination of
 - a. Blood Sugar
 - b. Blood urea
 - c. Total serum protein
 - d. Total serum calcium
 - e. Total serum cholesterol
 - f. Total serum bilirubin
- II. Determination of
 - g. Sugar in CSF
 - h. Proteins in CSF
 - i. Chlorides in CSF
- III. Determination of albumin and urea in urine
- IV. Determination of SGOT and SGPT
- V. Demonstration of principles of
 - a) Calorimetry and calorimeter
 - b) Paper chromatography
 - c) Electrophoresis
 - d) Glucose Tolerance Test (GTT)
 - e) Flame photometry

Note:

Section - I of practicals shall be conducted by students in biochemistry laboratory.

Section - II of practicals shall be conducted by teaching staff as a part of demonstration / seminar in the laboratory.

Recommended Text books For Biochemistry

- 1) Text book of Biochemistry-By Ramkrishna, Prasanna and Rajan
- 2) Biochemistry for medical students - By Debajyothi Das.
- 3) Text book of Biochemistry-By Rama Rao.
- 4) Text Book of Biochemistry-By Sathyanarayan.

Reference Book -

- 1) Harper's review of physiological chemistry - By Harper
- 2) Text Book of Biochemistry - By Lubert Stryer
- 3) Biochemistry - By Albert Lehninger.
- 4) Text book of Biochemistry - By West & Todd
- 5) Laboratory manual of Biochemistry - By Pattabhiraman & Acharya
- 6) Laboratory manual of Biochemistry - By Rajgopal & Ramkrishanan

MPMSU-BNYS SYLLABUS

PHILOSOPHY OF NATURE CURE

PAPER –I

1. The evolution of human body
2. Philosophy of body, mind, soul, life and spiritual body
3. (a) Fundamentals of Ayurveda, Naturopathy, Yoga, Modern medicine, Homeopathy, Siddha and Unani
(b) Comparative study of Naturopathy with other systems of medicine.
4. History and Fundamental (Basic) principle of Naturopathy.
5. Philosophy of Indian Naturopaths
 - (a) Vegiraj Krishnamraju
 - (b) Vinoba bhawe
 - (c) Mahatma Gandhi
 - (d) S.J. Singh
 - (e) Dr. J.M. Jussawala
 - (f) Dr. Vittal Das Modi
 - (g) Dr. B. Venkat Rao
 - (h) Dr. Dinsha K. Mehta
 - (i) Dr. Kulranjan Mukherjee
 - (j) Bhojraj Chhabaria
 - (k) Sant Hirdaram Sahib ji
 - (l) Dr. K. Laxman Sharma
 - (m) Dr. Hira Lal
 - (n) Dr. Janki Sharan Verma
 - (o) Krishna Swaroop 'Shrotriya'
6. Philosophy of foreign Naturopaths
 - (a) Aescclapius
 - (b) Hippocrates
 - (c) School of salerno
 - (d) Parascelsus
 - (e) Vincent Priessnitz
 - (f) Sebastein kneipp
 - (g) Arnold Rickli
 - (h) Louis Kuhne
 - (i) Adolf Just
 - (j) John H. Tilden
 - (k) Sigmund Freud
 - (l) Henry Lindlahr
 - (m) Herbert M. Shelton
 - (n) J.H. Kellog
 - (o) Benedict Lust
 - (p) Bernard Jenson
 - (q) John Wesley
 - (r) Edwin Babbit
 - (s) Dr. Hereward Carrington
7. Laws of Nature
 - (a) Pancha Maha Bhutas
 - (b) Shareera Dharmas- Ahara, Nidra, Bhaya, Maithuna
 - (c) Inflammation and its different stages
 - (d) Natural rejuvenations
 - (e) Violation of Laws of nature resulting in diseases
8. Catechism of Nature Cure
 - a) Constructive Principle
 - b) Destructive Principle
 - c) Health
 - d) Disease
 - e) Acute disease
 - f) Chronic disease
 - g) Healing crisis
 - h) Disease crisis
 - i) Cure
 - j) Normal/Natural
9. Swasthya Vrittam:
 - (a) Dinacharya
 - (b) Ratricharya
 - (c) Ritucharya
 - (d) Vegadharanam

10. Unity of disease and unity of cure
11. Foreign matter and toxins accumulation in the body and its importance in elimination through different ways of channels.(Toxemia/ Foreign matter Theory)
12. How to acquire natural immunity in diseases
13. Difference between functional and organic diseases
14. Concept of vitality and vital economy
15. How nature cures: the natural healing mechanism
16. Hygiene and importance of physical and mental hygiene in health and disease
16. The philosophy of 'health'
 - (a) Health standards
 - (b) Positive habits
 - (c) Nine doctors at your command
 - (d) Health destroyers (tea, coffee, salt, sugar, tobacco chewing, smoking, alcohol, non-veg, excess fat and oil, negative thinking and attitude)
 - (e) The secret of health- storing energy and enzymes
17. Body's protective mechanism
 - (a) Digestion: First line of defense against disease
 - (b) Liver: Second line of defense against disease
 - (c) Endocrine glands: Third line of defense against disease
18. (a)Super nutrition from sprouts
 - (b)Food is the magic healer
 - (c)Hippocrates diet
 - (d)Salt eating
 - (e)Stimulant dilution
 - (f)Wheat grass miracle

PAPER-II

1. Properties of Water, Mud, Air, and Sunlight.
2. Health is positive and disease is negative
3. Role of diet in nature cure(eliminative, soothing, constructive) and yoga(satvik, tamasic, rajasic)
4. Outlines on:
 - (a) Regular habits for health
 - (b) Rest and relaxation
 - (c) Live food-natural raw diet
 - (d) Exercise
5. The diagnostic procedure in naturopathy and their diagnostic values:
 - (a) Facial diagnosis- the science of facial expression
 - (b) Iris diagnosis
 - (c) Chromo-diagnosis
 - (d) Spinal analysis
6. Arogya rakshsaka panchatantra and their importance in restoration, maintenance of health and prevention of disease
7. Treatment modalities in nature cure:
 - (a) Mud therapy
 1. Mud packs
 2. Mud bath
 - (b) Chromotherapy- colour treatment
 - Heat, light, ultraviolet and infrared rays
 - chromothermoleum
 - (c) Heliotherapy
 - Sunbath
 - Athapasnana (banana leaf bath)
 - (d) Air therapy
 - Airbath
 - Ozone bath
 - (e) Magnetotherapy
 - (f) Massage therapy
 - (g) Aroma therapy
 - (h) Chiropractice
 - (i) Osteopathy
 - (j) Physiotherapy
 - (k) Fasting therapy
 - (l) Nutrition and dietetics
 - (m) Acupuncture and acupressure

(n) Hydrotherapy

-Baths

- Hip bath
- Foot bath
- Spinal bath
- Spinal spray
- Arm bath
- Contrast arm and foot bath
- Steam bath
- Sauna bath
- Full immersion bath
- Sitz bath
- Circular jet bath
- Under water massage
- Whirlpool bath

-Packs

- Full wet sheet pack
- Gastro-hepatic pack
- Kidney pack
- Chest pack
- Arm and leg pack
- Abdominal pack

(o) Douches

(p) Fomentation

(q) Compresses

(r) Enema

(s) Colon Hydrotherapy

8. Crisis and their management

9. Sleep- Repose

10. Vaccination and inoculation, their ill effects on human mind and body.

11. Old age problems and natural rejuvenation

12. Family planning by natural therapeutics.

PRACTICALS

1. Students should be introduced to various treatment procedures used in Naturopathy.
2. Students should have knowledge of giving various treatments.
3. Visiting to various nature cure clinics/hospitals.
4. Demonstration of:-
 - a) Natural Diet (Live food).
 - b) Satvic boiled diet.
 - c) Way of serving & various special diets.

Text Books—

1. Philosophy of Nature Cure - By Henry Lindlahr.
2. Practice of Nature Cure - By Henry Lindlahr
3. Human culture and Cure - By Dr. E.D. Babbit.
4. Practical Nature Cure - By Dr. K. Laxman Sharma.
5. History and Philosophy of Nature Cure - By S.J. Singh
6. My Nature Cure - By M.K. Gandhi
7. Natural health care - A to Z - By Belinda Gran
8. Introduction to Natural Hygiene - By Herbert M. Shelton
9. A Complete Hand book of Nature Cure - By H.K. Bakhru
10. Nature Cure - a way of life - By S.R. Jindal
11. The cure of advance cancer by Diet Therapy - Dr. Max Gerson M.D.
12. Toxemia - J.H. Tilden
13. (i) Dainandin rogo ki Prakartik Chikitsa - Dr. Kulranjan Mukherjee
- (ii) Purane rogo ki Grah Chikitsa - Dr. Kulranjan Mukherjee
- (iii) Stri rogo ki Grah Chikitsa - Dr. Kulranjan Mukherjee
- (iv) Shishu rogo ki Grah Chikitsa - Dr. Kulranjan Mukherjee
- (v) Abhinav Prakartik Chikitsa - Dr. Kulranjan Mukherjee
- (vi) Khadya ki nayi Vidhi - Dr. Kulranjan Mukherjee
14. (i) Swasthya ke liye Bhojan - Dr. Bhojraj Chhabaria
- (ii) Bina dava Tandurusti - Dr. Bhojraj Chhabaria
- (iii) Swasthya avam Sudaulata - Dr. Bhojraj Chhabaria
15. How to get well - Dr. Paavo Airola
- The Encyclopedia of health &
16. Physical Culture - Dr. Bernarr Macfadden
17. My water cure - Father Sebastian Kneipp
18. The New Science of Healing - Louis Kuhne
19. Return to Nature - Adolf Just
20. Diet Reform Simplified - Dr. Stanley Lief
21. Rational Fasting - Dr. Arnold Ehret
22. The Human Culture and Cure - Edwin Babbit
23. Rogo ki Achook Chikitsa - Dr. Janaki Sharan Verma
24. The Greatest Health Discovery - American Natural Hygiene Society
25. The History of Natural Hygiene - Hereward Carrington &
- & Principles of Natural Hygiene - Herbert M. Shelton
26. Health For All - H.M. Shelton

27. Integrated Healing Arts
28. Prakratik Chikitsa Sagar

- Dr. J.M. Jussawala
- Dr. Gaurishankar Mishra

Reference Books

1. My Nature Cure or Practical Naturopathy - By S.J. Singh
2. The Science of facial expression - By Louis Kuhne
3. The Story of my experiment with truth - BY M.K. Gandhi
4. Ayurveda for health and long life - By Dr. R.K. Garde
5. Everybody's guide to Nature Cure - BY Harry Benjamin
6. Prayer - By M.K. Gandhi
7. Diet and Diet Reforms - By M.K. Gandhi
8. Panchatantra - By Venkat Rao
9. A. Nature Cure B. Healing from within - By J.M. Jussawala
10. Miracle of fasting - By Dr. Paavo Airola
11. Raw eating - By Aterhov & By Hira Lal
12. Vitality fasting & Nutrition - By Hereward Carrington
13. Death Deferred - By Hereward Carrington
14. Natural Nutrition of Man - By Hereward Carrington
15. Mucousless diet healing System - By Arnold Ehret
16. Natural Hygiene - Pristine way of life - By Herbert M. Shelton
17. Better Sight without glasses - By Harry Benjamin
18. Swasthavritta vijyana - By R.H. Singh
19. Fundamentals of Ayurveda - By K.N. Udupa
20. Arogya Prakasha - By Ramnarayana Vaidya
21. Chikitsa Tatva Dipika - By Vaidya Mahaveer Prasad Pandey
22. Padarth Vijnanam - By Ram Prakash Pathak
23. Gem of Siddha Medicine - By Dr. Ram Murthy
24. Living life to Live it Longer - By Herbert M. Shelton
25. Eating for Health with Emphasis on Economy - By L. Ramachandran
26. Hand Book of Naturopathy - By Sukhbir Singh
27. Healing Through Natural Foods - By H. K. Bakhru
28. The Human Body: Nature's Amazing Creation - By Dr. M.M. Bhamgara

PRINCIPLES & PRACTICE OF YOGA

THEORY

- I. Yoga:**
 - Definitions of Yoga
 - Origin of Yoga
 - History of Yoga
- II. Outline in brief on Branches of Yoga:** Raja yoga, Hatha Yoga, Jnana Yoga, Karma Yoga, Bhakti Yoga, Mantra Yoga, Kundalini Yoga, Laya Yoga.
- III. Introduction to Ashtanga Yoga:** Yama, Niyama, Asana, Pranayama, Pratyahara, Dharna, Dhyana, Samadhi
- IV. Loosening exercises, Sukshma Vyayama, Surya Namaskara**
- V. Yogasanas:**
 - Introduction, Definition and their importance.
 - Methods, rules, regulations and limitations.
 - Yogasanas and Kundalini
 - Yogasanas and the mind-body connection
 - Yogasanas and Exercises
- VI. Classification of Yogasanas:**
 - Beginners Group
 - Intermediate Group
 - Advanced Group
 - Dynamic and Static Yogasanas
- VII. Breathing Techniques:** Natural breathing, Abdominal breathing, Thoracic breathing, Clavicular breathing, Yogic breathing
- VIII. Introduction to Pranayama**
 - Introduction, Prana and Definition of Pranayama
 - Rules and Regulations of Pranayama
 - Prana and Lifestyle
 - Breath, health and Pranayama
 - Breathing and lifespan
 - Pranayama and spiritual aspiration
- IX. Types of Pranayama:** Suryabhedana, Ujjayi, Bhastrika, Bhramari, Murcha, Plavini, Sheetkari, Sheetal, Sadanta
- X. Eye Exercises and Introduction to Chakras.**

PRACTICALS

1. Asanas
2. Kriyas
3. pranayama
4. Dharana
5. Dhyana-Meditation
6. Practicals with records.

Reference Books-

1. Sukshma Vyayama- Swami Dharendra Brahmachari
2. Basis and definitions of Yoga-Vivekananda Kendra
3. RajaYoga-Swami Vivekananda.
4. Asanas-Swami Kuvalyananda.
5. Glimpses of Divine Light- S.K. Das.
6. The Gospel of Buddha-Parul Caruso
7. The Gospel of Sri Ramakrishna-Mahendranatha Gupta
8. Complete works of sri Aurobindo-Sri Aurobindo
9. Asanas, Pranayama, Mudras & Bandhas - Swami Satyananda Saraswati,
10. Yoga in Daily life - Dr. A.U. Rahman
11. Yoga- The science of Holistic living-VKS yoga
Pranayama Yogasana Vigyan-Swami Dharendra Brahmachari