

Government of Karnataka



PARA MEDICAL BOARD

Revised Syllabus

of

I Year Diploma Courses

(Previously first year certificate courses)

2017

PHYSICS

[TOTAL HOURS=80HOURS]

SECTION A

Q P CODE: 4101

UNIT I: INTRODUCTION TO PHYSICS (UNITS & DIMENSIONS).

(Only Definition & brief information)

3 HOURS

- Definitions of units (SI, CGS, MKS)
- Derived units
- Definitions of Dimensions
- Physical quantities and uses of Dimensions
- General terms used in the physics: Velocity, Acceleration, work, power, Pressure, Frequency, Capacitance, Energy, Temperature, Displacement, Force, Electric Charge, Magnetic Flux, Luminous flux, Electrical resistance.

UNIT II: DYNAMICS

12 HOURS

- Concept of Particle, motion of particle. **(Definition & Brief explanation)**
- Definitions of speed, uniform and variable velocity, Acceleration, centrifugal & centripetal forces. **(Definition & Brief explanation)**
- Law of conservation of momentum and its illustrations **(Statement & Brief explanation)**
- Concept of Friction. **(Definition & Brief explanation)**
- Uniform Circular motion. **(Definition & Brief explanation)**
- Centrifugal & Centripetal forces, illustrations. **(Definition & Brief explanation)**
- Newton's law of gravitation. **(Statement, Examples & Brief explanation)**
- Acceleration due to gravity. **(Brief explanation)**
- Elasticity – Stress, strain, modulus of elasticity. **(Definition & Brief explanation)**
- Work, Power, energy, Kinetic & Potential energy. **(Definition)**

UNIT III: FLUID DYNAMICS & MECHANICS 8 HOURS

- Fluid thrust & pressure. **(Definition, Examples & Brief introduction)**
- Atmospheric pressure. **(Definition, Examples & Brief introduction)**
- Pascal's law. **(statement, Examples & Brief introduction)**
- Archimedes principle. **(Statement, Examples & Brief introduction)**
- Floatation. **(Statement, Examples & Brief introduction)**
- Osmosis, Diffusion, Convection. **(Definition, Examples & Brief introduction)**
- Streamline flow. **(Definition, Examples & Brief introduction)**
- Turbulent flow. **(Definition, Examples & Brief introduction)**
- Bernoulli's Theorem & its applications. **(Statement, Examples & Brief introduction)**

UNIT IV: SURFACE TENSION & VISCOSITY 5 HOURS

- Surface energy, Surface tension. **(Definition, Examples & Brief introduction)**
- Viscosity. **(Definition, Examples & Brief introduction)**
- Cohesion & Adhesion. **(Definition, Examples & Brief introduction)**
- Cohesive & Adhesive forces. **(Definition, Examples & Brief introduction)**
- Angle of contact. **(Definition, Examples & Brief introduction)**
- Capillarity, Capillary action. **(Definition, Examples & Brief introduction)**
- Brief introduction on Medical gases- storage and central pipeline system

UNIT V: HEAT & TEMPERATURE 12 HOURS

- Heat & Temperature. **(Definition, Examples & Brief introduction)**
- Thermometer principle, its types & Uses.
- Expansion of Gases & Gas Laws. **(Statement, Examples & Brief introduction)**
- Isothermal & adiabatic processes. **Definition, Examples & Brief introduction)**
- Mode of heat transfer. **(Brief explanation)**
- Conduction of heat. **(Brief explanation)**
- Thermal conductivity & Applications.

SECTION – B **Q P CODE: 4102**

UNIT VI: GEOMETRICAL OPTICS

12 HOURS

- Composition & Properties of light. **(Brief Introduction)**
- Rectilinear propagation. **(Brief Introduction)**
- Mirror & its types. **(Definition, Examples & Brief explanation)**
- Laws of Reflection. **(Statement, Examples & Brief introduction)**
- Laws of Refraction. **(Statement, Examples & Brief introduction)**
- Refractive index. **(Brief Explanation)**
- Critical angle & total internal reflection, Fibre Optics. **(Definition, Examples & Brief explanation)**
- Lens, types & Uses. **(Definition, Examples & Brief explanation)**
- Image formation. **(Brief Explanation)**
- Real & virtual image. **(Brief Explanation)**
- Refraction through lens. **(Brief Explanation)**
- Dispersion. **(Brief Explanation)**
- Beer & Lamberts Law. **(Statement)**
- Colorimeter & Spectrophotometer. **(Brief Introduction & Applications)**
- Auto-refractometer & lasers **(only Brief introduction)**
- Interference of Light. **(Brief Explanation)**
- Introduction to Microscope.

UNIT VII: WAVES & SOUND

6 HOURS

- Oscillations, Periodic motion. **(Definition, Explanation)**
- Simple harmonic motion **(Definition, types & characteristics)**
- Period, frequency, amplitude. **(Only Definitions)**
- Waves & its Classification. **(Definition, Explanation)**
- Longitudinal & transverse wave formation with examples. **(Definition, Explanation)**
- Origin & properties of sound. **(Definition, Explanation)**
- Ultrasonography. **(Principle, Working & applications: in Brief)**

UNIT VIII: ELECTROSTATICS & CURRENT ELECTRICITY 10 HOURS

- Electrostatics, Charge. **(Definition)**
- Coulombs law. **(Statement)**
- Electric intensity, potential, field. **(Definition)**
- Capacitor- capacitors in series and parallel. **(Definition, Explanation)**
- Current. **(Definition)**
- Potential difference. **(Definition)**
- Ohms law. **(Statement)**
- Resistors connected in series and parallel. **(Definition, Explanation)**
- Voltmeter, ammeter. **(Brief introduction, Uses)**
- Thermistors & uses. **(Brief introduction, Uses)**

UNIT IX: MODERN PHYSICS

12 HOURS

- Introduction to Atomic physics. (electron, nucleus, proton, neutron etc) **(Only Definitions)**
- Cathode rays, properties and uses. **(Definition, Explanation)**
- Photocell, Uses & types. **(Definition, Explanation, uses)**
- Radioactivity. **(Definition, Explanation with types and uses)**
- Alpha, Beta, Gamma Rays & X-rays. **(Definition, Explanation, properties, uses)**
- NMR, CT. **(Brief Introduction)**
- Radioactive Safety measures & Symbols. **(Only Basic symbols)**
- Conductors, semiconductors & Insulators. **(Definitions & Examples)**
- P- Type, N- Type semiconductor, PN junction diode, Forward & reverse bias. **(Brief Explanation)**
- PNP & NPN semiconductors. **(Brief Explanation)**

CHEMISTRY

THEORY - 80 HRS

SECTION-A Q P CODE: 4103

1. Some Basic concepts of Chemistry

Importance of chemistry. Nature of matter, properties of matter & their measurement. Laws of chemical combinations Dalton's Atomic Theory. Names of important elements and their symbol valency, writing the formula of certain compounds, SI units, Drawing the relation between SI and non SI units, Atomic & molecular masses, percentage composition. Writing the dimension for physical quantities like volume pressure force area viscosity surface tension

2 Hours

2. Structure of an atom:

Sub-atomic particles, Atomic models, Bohr's model for Hydrogen atom. Atomic weight, Molecular weight, Equivalent weight of an element - definition, determination of equivalent weight of magnesium by hydrogen displacement method and copper by oxide method.

3Hours

3. **Acids, bases and salts. Examples for each type. Indicators mentioning the colour change at the end point. Acidity, Basicity, equivalent mass calculation, oxidizing and reducing agent examples : Normality, Molarity, Molality, PPM, volumetric analysis, $V_1N_1 = V_2N_2$ - problems**

3Hours

4. **Hydrogen peroxide** -Preparation properties and uses.

1 Hour

5. **Sulphuric acid**-Properties and uses.

1Hour

6. **Nitric acid**-Manufacture, properties and uses.

2Hours

7. **Halogens** : comparative study of preparation, properties and uses. Fluorocarbons and their applications. **3Hours**
8. **Co-ordination compounds. Examples and applications of co-ordination compounds in biological reactions.** **2 Hours**
9. **Radioactivity** - Natural radioactivity - properties of alpha, beta and gamma particles. Half life period, Isotopes -applications of Co^{60} , P^{32} , I^{131} , Na^{24} **3Hours**
10. **Caustic soda manufacture, properties and uses. Sodium carbonate(washing soda) preparation,properties and uses.** **3Hours**
11. **Calcium compounds including plaster of paris, Bone composition & Uses.** **1 Hour**
12. **X-Rays production and its applications.** **1Hour**
13. **Colloids** - Differences between colloids and crystalloids. Classification of colloids -methods of preparation of sols, dialysis-Tyndall effect and Brownian movement - applications of colloids in medicine food. Cottrell's electrical precipitator. Role of sodium, potassium, calcium chloride, bicarbonate ions in the fluid. **4 Hours**
14. **Electro chemistry** - Electrolytes and non electrolytes, example for each. Lowry and Bronsted concept of acids and bases. Hydrogen ion concentration, meaning of p^{H} & pOH . p^{H} values of biological fluids and their importance. Buffer solutions-definition, different types of buffers and examples for each. Henderson's equation determination of p^{H} by buffer solution method. Importance of buffer in medicine **5 Hours**
15. **Classification of elements and periodicity in properties.**
 Development of periodic table. Modern and long form periodic table. Periodic trends in atomic radii, Ionic radii, Ionization energy, electron gain, enthalpy, electro negativity, valency & Hydrogen bonding. Anomalous properties of water. **- 06 Hrs.**

- 16. Hydrocarbons** - saturated and un saturated: Alknes -methane, ethane -preparation, properties and uses. Alkene -ethene- preparation, properties and uses. Alkyne-acetylene-preparation, properties and uses. **3Hours**
- 17. Ethyl alcohol** - manufacture from molasses- properties and uses. preparation of bleaching powder, Iodoform, Chloroform, Benzyl alcohol, two chemical properties and uses . **2Hours**
- 18. Phenol** -manufacture from coal tar - properties, anisole, salol, cresols. **2Hours**
- 19. Aldehydes** - Formaldehyde, acetaldehyde, benzaldehyde- preparation, properties and uses. **2Hours**
- 20. Acetone** -preparation & three important properties and uses. **1Hour**
- 21. Properties of carboxylic acids. Acids strength on the basis of p^{ka} values.** **1Hours**
- 22. Diethyl ether** - preparation , properties and uses. Amines, classification. Basicity on the basis of p^{kb} values. **2Hours**
- 23. Carbohydrates:** Classification, open and ring structures of glucose, fructose. Ring structure of Maltose, sucrose and lactose. Partial representation of structure of cellulose, starch , and glycogen. Carbohydrates as a source of energy. **4Hours**
- 24. Proteins: Amino acids** - Classification. Formulae of amino acids such as glycine, alanine, serine, cysteine, aspartic acid, lysine & tyrosine. Peptide bond. Functional properties of proteins such as enzymes, antibodies, transport agents & biochemical messengers (Hormones) **3 Hours**
- 25. Nucleic acids**-DNA and RNA -purine and pyrimidine bases. Biological importance of nucleic acids **2Hours**

26. **Enzymes:** Examples of different types of enzymes, their function in biological reactions. 2Hours

27. **Environmental chemistry:** Pollution of air, water, soil, major atmospheric pollutant, smog, acid rain effect on Ozone layer. Global warming. Strategies to control environmental pollution - 4 Hrs.

28. **Basic principles and technique in organic chemistry:-**

Qualities and quantitative analysis. IPUAC naming. Electronic displacement in co-valent bond. Inductive, electrometric, resonance and hyper conjugation effect. Homolytic and Heterolytic fission of covalent bond. Free radicals, carbonations, carbocations, electrophiles and nucleophiles. -05 Hrs.

29. **Chemical equilibrium.**

Rate of a reaction, rate equation expression factors influencing the rate. The law of mass action. Equilibrium constant. Reversible reaction with example, writing K_c and K_p for the reactions. Ammonia, phosphorus, penta chloride and hydrogen iodide. Discussion of Le Chatelier's principles to the synthesis of sulphur trioxide, problems. - 3Hrs.

30. **Aromatic Hydro carbons, preparation and isolation of Benzene and Toluene. Important properties of Benzene and Toluene. Friedel-Crafts reaction.** - 2 Hrs.

31. **Chemical bonding:** octet rule, co-valent bond, examples. Ionic or electrovalent bond, bond length, sp^1 , sp^2 and sp^3 hybridization. Example for each type. Ethyne, ethane and methane. Writing the structure of NH_3 and water molecule. - 2 Hrs

HOURS

1. Preparation of standard solution (Sodium carbonate or oxalic acid)
2. Estimation of sodium hydroxide using standard hydrochloric acid
3. Estimation of potassium permanganate using standard oxalic acid
4. Estimation of Iodine using standard sodium thiosulphate (hypo)
5. Qualitative tests for carbohydrates
6. Qualitative tests for proteins
7. Qualitative analysis of simple inorganic salts
8. Purification of an organic compound.
9. Determination of melting point of a organic samples and comparing it with the standard value.
10. Determination of boiling point of a organic liquid and explaining the correction to be applied.
11. To find the pH of ferric chloride, sodium carbonate and potassium chloride. Classifying them into acid, neutral and basic salts on the basis of Ph

NOTE : No Practical Examination

BIOLOGY

Theory- 80 hours

Demonstration- 20 hours

SECTION-A

Q P CODE: 4105

I) INTRODUCTION TO BIOLOGY

HOURS-1

Branches of biology- cell biology(cytology), Anatomy, Physiology, Histology, Biochemistry, Developmental biology(Embryology), Genetics, Bio technology, Bio physics.

II) CELL: STRUCTURE & FUNCTIONS

HOURS-3

Definition of cell, types of cell-prokaryotic and eukaryotic, Structure of cell.

Cell components-plasma membrane, cytoplasm, nucleus

Cell organelles (structure and function with diagram)

- Endoplasmic reticulum
- Golgi complex
- Lysosomes
- Peroxisomes
- Mitochondria
- Ribosomes
- Centrosomes

III) CELL CYCLE & CELL DIVISION

HOURS-3

Types of cell division- Mitosis, meiosis

Difference between mitosis and meiosis, its significance

IV) VIRUSES

HOURS-3

- General structure of viruses
- Diseases caused by viruses- Japanese encephalitis, polio, mumps, measles, small pox, AIDS

V) BACTERIA

HOURS-3

- General structure of bacteria
- Types of bacteria based on shape.
- Brief account of bacterial diseases- diphtheria, cholera, gonorrhoea, syphilis, plague, pneumonia, tetanus, typhoid, tuberculosis.

VI) TISSUE

HOURS-5

Structure and functions of basic tissue

- Epithelium
- Connective tissue- Aerolar tissue, adipose tissue, cartilage, bone, blood.
- Muscular tissue
- Nervous tissue

VII) GENETICS

HOURS-8

- Definition of chromosomes
- Structure of chromosomes
- Types of chromosomes based on position of centromere
- Function of chromosomes
- Sex determination
- Autosomes
- Allosomes
- Bar bodies
- Human blood group-(A, B, AB, O) And Rh factor.

VIII) BIOTECHNOLOGY

HOURS-10

- Nucleic acid (Definition)
- Types of nucleic acid
- Function of nucleic acid
- Basics of gene cloning
- Basics of genetic finger printing
- Basics of genetic engineering – advantages & disadvantages

- Recombinant DNA Technology & its applications

Brief Account of

- a. DNA fingerprinting
- b. Gene Therapy
- c. Human Genome project
- d. Monoclonal bodies

IX EMBRYOLOGY

HOURS-4

- a. Brief account of fertilization-Definition
- b. Structure and function of placenta. Types- External & Internal

SECTION B**Q P CODE: 4106**

I) ORGAN AND ORGAN SYSTEM- Definition, structure and their function (with diagram)

Digestive system**HOURS-4**

Mouth

Buccal cavity

Tongue

Oesophagus

Stomach

Intestine

Digestive glands (salivary gland, pancreas, liver)

Circulatory system**HOURS-5**

Structure of heart

Blood vessels (Artery and vein)

Mechanism of working of heart

Blood pressure

Heart beat

Heart sound

Respiratory system**HOURS-5**

Larynx

Pharynx

Lungs

Alveoli

Diaphragm

Mechanism of respiration:

i Breathing(inspiration & expiration)

ii. External respiration(exchange of oxygen & CO₂ between alveoli & blood)

EXCRETORY SYSTEM

HOURS-5

Structure of Kidney, Structure of Nephron. Functions of kidney.

NERVOUS SYSTEM

HOURS-5

Structure of neuron

Basic structure and Functions of human brain and spinal cord.

REPRODUCTIVE SYSTEM

Male reproductive system

HOURS-4

Testes, Vas deferens, epididymis, vas deferens, Cowper's gland, seminiferous tubules, seminal vesicle, urethra, structure of sperm

Female reproductive system

HOURS-3

Uterus, Ovary, Fallopian tube, Graafian follicle

SEXUALLY TRANSMITTED DISEASES

HOURS-2

Meaning, causative organisms, mode of infection, symptoms & preventive measures of gonorrhoea, syphilis & AIDS

II) SPECIAL SENSE ORGANS

HOURS-3

Brief account of sense organs and functions.

Structure of Eye.

X GLANDS

HOURS-4

Types of glands- Endocrine and Exocrine

Secretion of exocrine glands and function

Secretion of Endocrine(pituitary, thyroid, adrenal) glands and their function

DEMONSTRATIONS

HOURS-20

Study of microscope

Microscopic study of typical cell

Study of common medical devices(stethoscope, sphygmomanometer, thermometer, oxygen cylinder)

Charts and models of organs an organ system(digestive, respiratory, circulatory, reproductive, excretory, nervous)

Importance of English in paramedical courses

English is the basic language which is a necessity of all the subjects as the students have to take up the examination in English only. It not only helps them in academics but also in their everyday life to communicate and interact with the people around and can have a good vocabulary and command over the language. Hence it is mandatory for every student to know and learn the basics in English so that he/she will understand the other core subjects and be able to write in the Board examination and in turn pass and complete his/her opted course.

ENGLISH SYLLABUS Total Hours of Teaching – 80hrs**UNIT- 1. Basic concepts in English****10hrs**

- | | | |
|-----|--|------|
| 1.1 | Phonetics-Vowel sounds and consonant sounds. | 2hrs |
| 1.2 | Parts of speech-Noun, pronoun, verb, adverb, adjective, preposition, conjunction and interjection. | 3hrs |
| 1.3 | Sentences and their types. | 1hr |
| 1.4 | Genders and their types. | 1hr |
| 1.5 | Opposites. | 1hr |
| 1.6 | Plurals- formation of plurals with rules. | 2hrs |

UNIT- 2. Articles and their types----(03hrs)

- | | | |
|-----|-------------------------------|-----|
| 2.1 | Definite article- THE | 1hr |
| 2.2 | Indefinite Article- a and an. | 1hr |
| 2.3 | Uses of articles. | 1hr |

UNIT- 3. TENSES (04hrs)

- | | | |
|------|---|------|
| 3.1. | Types of tenses. | 1 hr |
| 3.2. | Past tense and their types with example. | 1 hr |
| 3.3. | Present tense and their types with example. | 1 hr |
| 3.4. | Future tense and their types with example. | 1 hr |

UNIT- 4. Active voice and passive voice_ 03hrs

- 4.1. Simple sentences to be transformed from active voice to passive voice and passive voice to active voice.

UNIT- 5. DIRECT AND INDIRECT SPEECH 03 hrs**UNIT- 6. LINKERS AND THEIR USAGE 02hr**

UNIT- 7. PARAGRAPH WRITING (02 hr)

UNIT- 8. REPORT WRITING (02 hr)

UNIT- 9. E-mail. (01 hr)

UNIT-10. ESSAY WRITING (10 hrs)

10.1 Short essay and long essay

Essay topics to be taught are as follows;

- AIDS
- Prevention is better than cure
- Hospital waste management
- First aid
- Dog bite
- Snake bite
- Blood donation
- Eye donation
- Tuberculosis
- Health check up camp
- Role of Technicians in Hospital
- Malaria
- Dengue
- Swine flue(H1N1)
- Polio
- Dental hygiene
- Epidemic diseases.

SECTION-B

Q P CODE: 4108

UNIT- 11. SPOKEN ENGLISH THROUGH LANGUAGE LABORATORY- 12hrs

UNIT- 12.LETTER WRITING AND THEIR TYPES 10 hrs

12.1. Official letters

12.2. Personal letters

12.3. Advertisements

UNIT- 13.CONVERSATION DEPENDING ON THE SPECIALISATION 18 hrs

13.1. Comprehension (Passages must be given) 4hrs

13.2. Creative writing (picture writing Situational preferably
medical based) 4hrs

13.3. Medical Terminology 5 hrs

13.4. Medical encyclopedia 5 hrs

Government of Karnataka



PARA MEDICAL BOARD

Revised Syllabus

of

II & III Year Diploma in Medical

Laboratory Courses

**(Previously first/second year certificate course /
I year DMLT/II DMLT)**

2017

Second Year Diploma in Medical Laboratory Technology

(DMLT II)

SUBJECT: ANATOMY

Section A

Q P Code : 5101

Goal: Is to prepare the students with basic knowledge of structures with a co-relation to functions. At the end of course of six months, the paramedical students should be able to:

1. Identify the structures in the human body in their normal position.
2. Demonstrate the knowledge about each system with functional co-relation.
3. Develop the skills to use the knowledge of structures in the human body in their respective fields of function, with utmost care to the needs of the patients and with regards to the betterment of the health of the patients.
4. Develop and demonstrate the basic skills in microscopy of any given tissue, with an understanding of handling different types of microscopes independently → in the course of Laboratory technology.

Syllabus

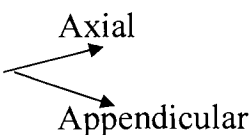
Teaching Hours: 40 hrs

General Anatomy:

I. Introduction to Anatomy:

- a. Definition of Anatomy 11 Marks
b. Anatomical position

- Supine, prone, lithotomy → positions

- c. Different parts of human body: 

→ Head and neck, Thorax and abdomen, pelvis and perineum, upper and lower limbs.

- d. Anatomical planes and sections: Median, sagittal, coronal, transverse, longitudinal, horizontal, oblique.
- e. Anatomical terms:
Anterior, posterior, superior, inferior, medial, lateral, proximal, distal, superficial, deep, ventral, dorsal, cephalic, caudal, interior, exterior, invagination, evagination, ipsilateral, contralateral.
- f. Terms for describing muscles:
Origin, insertion, Belly, tendon, aponeurosis, raphe.
- g. Anatomical movements:

Flexion, extension, adduction, abduction, Medial rotation, lateral rotation, circumduction, pronation, supination, protraction, retraction, elevation, depression.

- II. **Basic tissues:** Definitions of 3 Marks
Epithelium, connective tissue (including cartilage and bone), muscle, nerve.

- III. **Skeletal System:** 10 Marks

Types and number of bones: Identification of each bone with its major features (ex: Femur with its upper end, lower end, shaft, trochanters, condyles, linea aspera etc)

Arthrology and Kinesiology in general:

Each joint to be understood under participating bones and movements.

- IV. **Systemic anatomy:** 10Marks

The student should be able to identify and understand the anatomical components of each system with functional co-relation. (Diagrams, models, specimens from the dissected cadavers and colour photographs, 2D and 3D animation techniques can be used to teach.)

- a. Parts of digestive system and associated glands and structures like liver, gall bladder, pancreas.
- b. Cardiovascular System
→ Location and chambers of heart, systemic circulation, pulmonary circulation. Detailed study of venous circulation.

Surface anatomy of superficial veins.

- c. Respiratory system, its parts and respiratory passages, Trachea, lungs and their location, parts and differences between right and left lung.
- d. Urinary system- parts and urinary passages → Kidney, ureter, urinary bladder and urethra.
- e. Nervous system → parts, meninges, C.S.F and lumbar puncture.
- f. Reproductive system → parts of male and female reproductive systems → in particular, Testis, prostate and seminal vesicle and structure of spermatozoon, uterus, ovary, Fallopian tube, cervix, vagina.
- g. Lymphatic system → parts and functional co-relation regarding Thymus, lymph nodes, spleen and Tonsils.
- h. Endocrine system → Location, parts and functions of each endocrine gland.

Histology

10 Marks

1. Study of microscope including different types and using and handling of microscopes. The study of microscopes should include a thorough knowledge of both mechanical and optical parts. Usage of the microscope should include.
 - i. Taking care of microscope like cleaning and maintaining both mechanical & optical parts.
 - ii. Light adjustment with a thorough knowledge about the laws of physics applicable to optics – using low power, high power, and oil immersion objective lenses and also dark ground examination (advantages and disadvantages of each type of oil has to be learnt).
 - iii. A thorough knowledge about avoiding artefacts (dirts) in the microscope and the slides.
 - iv. Detailed study of magnification with knowledge about ocular and objective lenses, the focal length etc. A thorough description about practical problems during handling the microscope and histological techniques (Ex: Loose mirror, loose eye piece, dried oil, etc).
2. Basic procedure of staining with Haematoxylin and eosin → The preparation of dyes, the process of staining with rationale, starting from tissue procurement to staining completely (Tissue processing, fixation, dehydration, clearing, embedding, using the microtome, staining using Haematoxylin and Eosin) and getting the slide ready for examination by the experts. It is desirable to know about improper staining.

3 Marks

3. Biomedical waste management in Anatomy Laboratory- Do's and Dont's.

3 marks

Lab Technology: Practicals

50 Marks

The students should maintain practical records and submit the same to the HOD of Anatomy for scrutiny.

Gross Anatomy: Basic tissues to be demonstrated for identification. **25 Marks**

- Limbs: i) Upper limb
- ii) Lower limb

Identification of superficial and deep structures and surface anatomy of superficial vessels.

Thorax: Heart, Trachea and lungs, Mediastinum.

Abdomen: i) Location and identification of individual organs in GIT and its associated structures like liver and gall bladder, pancreas.

ii) Urinary system → Identification of parts and functional co-relation.

iii) Reproductive system → Identification of parts with functional co-relation.

Head and neck: i) Surface features in face and neck, oral cavity, Tongue, pharynx, nasal cavity → their location and importance.

ii) CNS → Meninges and parts of CNS → Identification with functional co-relation.

Histology: i) Introduction to Histology

25 Marks

ii) Microscope and its parts, types of microscopes.

iii) Using microscope → hands on training.

iv) Tissue processing, fixation, dehydration, clearing, embedding, using the microtome, staining using Haematoxylin and Eosin.

v) Practical problems with the handling of microscope and the staining process like artifacts, shrinkage, precipitate, Folds, Pinched tissue, Nick in knife, Autolysis, under and over staining.

REFERENCE BOOKS:

1. Singh (Inderbir) Text book of Histology J.P. Brothers, New Delhi
2. Difore Atlas of normal Histology Ed. 6 Lea & Febiger - 1989
3. Anatomy & Physiology for Nurses

Reference Books:

- | | | |
|---|----|-----------------------------|
| 1. Human Anatomy | -- | Chaurasia Vol. I, II & III |
| 2. Human Anatomy | -- | A.K. Dutta Vol. I, II & III |
| 3. Cunningham's Manual of Practical Anatomy | -- | Vol. I, II & III |

Second Year Diploma in Medical Laboratory Technology

(DMLT II)

SUB: PHYSIOLOGY

Section B

Q P Code : 5102

GENERAL PHYSIOLOGY (Duration of Teaching - 3 Hrs)

Introduction:-

03 Marks

Physiology - Homeostasis

Cell:-

Structure of a Cell, An overview of Intracellular Organelles, Cell Junctions, Stem Cells, Cell Aging & Death

Transport across cell membranes:-

Mechanisms of Transport across Cell Membrane

Body Fluids:-

An overview of Compartments of Body Fluid.

BLOOD (Duration of Teaching - 7 Hrs)

09 Marks

Composition & Functions of Blood

Plasma:-

Composition and Functions of Plasma Proteins

Cellular Components of Blood:-

(RBC, WBC, PLATELETS) Morphology, Physiological Values, Functions, Overview of Haemopoiesis, Life Span & Applied Aspects

Hemoglobin:-

Definition of Hemoglobin, Functions, Physiological Values, Fate of Hemoglobin, Applied Aspects

ESR, PCV, Blood Indices & Anemia, Polycythemia.

Blood Groups:-

ABO Blood Grouping, Rh Typing, Landsteiner's Law, Cross Matching, Storage of Blood, Indications and Contraindications of Blood Transfusion.

➤ **Hemostasis:-**

Clotting Factors, Types of Clotting mechanisms, Anticoagulants, Applied Aspects, Bleeding time, Clotting time, Prothrombin time

NERVE PHYSIOLOGY (Duration of Teaching – 3 Hrs) 03 Marks

Nerve:-

Structure, Types of Neuralgia Cells, Functions Of Nerves

Receptors:-

Definition, Types of Sensory Receptors.

Reflex:-

Arc, Action & Reflexes.

Autonomic Nervous System:-

Organization and Functions

Synapse & Neuromuscular Junction

MUSCULOSKELETAL SYSTEM (Duration of Teaching - 2 Hrs) 03 Marks

Types of Muscle, Muscle Spindle, Physiology of Muscle Contraction. **Applied Aspects**

GASTROINTESTINAL PHYSIOLOGY (Duration of Teaching – 4 hrs)05 Marks

Structural Overview: of Gastrointestinal Tract

Movements of GIT

Salivary Glands- Its Secretions and Functions,

Hepatobiliary System - Secretions and Its Functions

Pancreatic - Secretions and Its Functions

Intestinal- Secretions and functions

Applied Aspects In GIT.

Defecation

THE CARDIOVASCULAR SYSTEM (Duration of Teaching - 3 Hrs) 05 Marks

Overview of structure of Heart, Conducting System Of Heart, Systemic And Pulmonary Circulation, Over View -Heart Rate, Stroke Volume, Cardiac Output, Heart Sounds, Pulse, BP & Definition of ECG and Recording of ECG.

RESPIRATORY SYSTEM (Duration of Teaching - 3 Hrs) 03 Marks

An Overview of respiratory system: air way anatomy, muscles of ventilation, Functions of respiratory system, ventilation: exchange & transport of respiratory gases, compliance, surfactant.

Applied aspects:-

Artificial respiration, hypoxia, Definition of Apnea, Dyspnea, and Tachypnea.

RENAL SYSTEM (Duration of Teaching - 3 Hrs) 05 Marks

Overview of Anatomy of kidneys, renal blood flow, structure of Nephrons.

Renal and non renal functions of kidney

General principles of formation of urine, GFR, estimation of GFR

Normal constituents of Urine.

Renal function tests (RFT).

ENDOCRINE SYSTEM (Duration of Teaching - 3 Hrs) 03 Marks

Over view of endocrine system; hypothalamic hormones, Functions and applied aspects, hormonal regulation by positive and negative feedback mechanism of Anterior & Posterior Pituitary Hormones, Thyroid Hormones, Parathyroid Hormones, Pancreatic Hormones, Adrenal Cortical Hormones.

REPRODUCTIVE SYSTEM (Duration of Teaching - 3 Hrs) 05 Marks

Over view:-

Male and Female Reproductive System Functions of Male and Female Gonads, Menstrual Cycle

Oogenesis and Spermatogenesis, Fertilization, Implantation and Parturition,

Male Reproductive Hormones It Functions & Cryptorchidism

Female Reproductive Hormones and Its Functions,

Pregnancy Tests and Contraceptive Methods in Male and Females, Lactation.

► **SKIN (Duration of Teaching - 2 Hrs)**

03 Marks

Functions of skin

Vitamin D synthesis

Temperature regulation

CNS & SPECIAL SENSES (Duration of Teaching - 4 Hrs) 03 Marks

Functional Organization of Brain, Spinal Cord & Its Functions, Cranial and Spinal Nerves.

CSF Composition and Functions.

Vision: -

Structure and Functions of Eye Ball, Errors of Refraction and Correction.

Hearing:-

Structure and Function of Ear. Audiometry.

Taste: -

Taste Buds, Primary Taste sensation

Smell:

Olfactory pathway

Total theory teaching hours: 40 hrs

REFERENCE BOOKS:

1. Fundamentals of Physiology - A text book for Nursing students by R.L. Bijalani -- Jay Pee Brothers Publications
Human Physiology and Biochemistry by Prof. A.J.Jain, Arya Publications

THEORY EXAMINATION – 100 MARKS

ANATOMY. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PHYSIOLOGY. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

➤ **PRACTICALS (Duration of Teaching - 20 Hrs)**

50 Marks

Microscope:-

Handling of microscope, parts of microscopes and maintenance

Collection of blood samples and anticoagulants and preparation

Study of drop of blood

Estimation of hemoglobin percentage

Determination of RBC, WBC, PLATELET, AEC count.

Differential leucocytes count

ESR, PCV (Demonstrate)

Blood grouping and RH typing

Recording of Pulse and BP.

Total practical teaching hours: 20 hrs

II DMLT
Subject: BIOCHEMISTRY
SECTION-A Q P Code : 5103

| TOPICS | MARKS |
|--|-------|
| <p>Basic of Laboratory Equipment and Basic Chemistry</p> <p>Unit I : General information of Laboratory</p> <ul style="list-style-type: none"> • General knowledge about laboratory basic information and skills. Laboratory safety, Laboratory laws and regulations, Laboratory quality, Laboratory mathematics. <p>Unit II : Specimen Collection</p> <ul style="list-style-type: none"> • General approach to Patient identification, Phlebotomy and specimen collection, Storage, transport and disposal. • Anticoagulants- E.D.T.A, Dipotassium salts of EDTA, Double oxalate, single oxalate, sodium citrate, Sodium Fluoride, heparin. <p>Unit III : Introduction to Laboratory Apparatus</p> <ul style="list-style-type: none"> • Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.), Calibration of glass pipettes, Burettes, Beakers, Petri dishes, depression plates. • Flasks –different types- Volumetric, round bottomed, Erlenmeyer conical etc. • Funnels – different types, use. • Bottles: Reagent bottles – graduated and common, Wash bottles – different types, Specimen bottles etc. • Measuring cylinders, • Porcelain dish, Tubes – Test tubes, centrifuge tubes, test tube draining rack • Tripod stand, Wire gauze, Bunsen burner. • Cuvettes, types, significance of cuvettes in colorimeter, cuvettes for visible and UV range, Cuvette holders | 50 |

- Racks – Bottle, Test tube, Pipette,
- Desiccators, Stop watch, timers, scissors, Dispensers – reagent and sample.
- *Any other apparatus which is important and may have been missed should also be covered*

Unit IV : Maintenance of Lab Glassware and Apparatus

- Glass and plastic ware in Laboratory, use of glass: significance of boro-silicate glassware and cleaning of glassware, different cleaning solutions of glassware and cleaning of plasticware, different cleaning solutions.

Unit V : Instruments (Theory and demonstration & Diagrams to be drawn)

- Water bath: Use, care and maintenance,
- Oven & Incubators: Use, care and maintenance.
- Water Distillation plant and water deionizers. Use, care and maintenance,
- Refrigerators, cold box, deep freezers – Use, care and maintenance.
- Reflux condenser: Use, care and maintenance.
- Centrifuges.
Definition, Principle, Svedberg unit, centrifugal force, centrifugal field, rpm. Different types of centrifuges, Use care and maintenance of a centrifuge.
- Laboratory balances. Manual balances: Single pan, double pan, direct read out electrical balances. Use care and maintenance. Guideline to be followed and precautions to be taken while weighing. Weighing different types of chemicals, liquids. Hygroscopic compounds etc.
- Colorimeter and spectrophotometer.
Parts, diagram. Use, care and maintenance.
- pH meter and electrodes, Use, care and maintenance.
Guidelines to be followed and precautions to be taken while using pH meter.

Unit VI : Solutions and Dilutions

| | |
|--|--|
| <ul style="list-style-type: none"> • Preparation of solution: Normal solution, Buffer solution, Percent solution, Molar solution. • Diluting solutions: e.g. Preparation of 0.1N NaCl from 1N NaCl from 2N HCl etc., preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques. Calculating the dilution of a solution, body fluid reagent etc., Saturated and supersaturated solutions. • Standard solutions: Technique for preparation of standard solutions e.g. Glucose, urea, etc., • Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl₂, potassium carbonate, sodium hydroxide etc.,) • Conventional and SI Units: Preparation of standards using conventional and SI units. <p>Methods of measuring liquids, weighting solids.</p> | |
|--|--|

SECTION-B

Q P Code : 5104

| | |
|--|-----------|
| <p>Basic Clinical Biochemistry Unit VII :</p> <ul style="list-style-type: none"> • Acids, bases, salts and indicators: Acids and Bases – Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowry – Bronsted theory of acids and bases classification of acids and bases. Difference between bases and alkali, acidity and basicity, monoprotic and polyprotic acids and bases. Concepts of acid base reaction, hydrogen ion concentration, Ionisation of water, buffer, pH value of a solution, preparation of buffer solutions using pH meter. • Salts – Definition, classification, water of crystallization – definition and different types, deliquescent and hygroscopic salts. • Acid-base indicators: (Theory and Practical) Definition, concept, mechanism of dissociation of an indicator, colour change of an indicator in acidic and | <p>50</p> |
|--|-----------|

basic conditions, use of standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators, and their pH range, suitable pH indicators used in different titrations, universal indicators.

Unit VIII : Basic Biochemistry

- Carbohydrates:
 - Classification, Definition & properties of monosaccharides, disaccharides, and polysaccharides.
- Proteins:
 - Proteins – Definition, classification, properties.
 - **Amino acids** - Definition, classification, essential & non essential amino acids. Reactions of amino acids.
 - Plasma proteins – Definition, classification and reference values.
- Lipids
 - Definition, classification and properties of lipids and lipoproteins.
- Nucleic acid chemistry
 - Definitions of DNA, RNA, purines and pyrimidines, nucleosides and nucleotides.
- Enzymes- Definition, classification and factors affecting enzyme activity. Isoenzymes – Definition, classification and significance.
- Vitamins and Minerals: in brief about reference values in blood.
- Normal and Abnormal Constituents of Urine.

Unit VI : Clinical Laboratory records.

Requisition forms, patient data registers, electronic records, Report forms, reference forms, equipment maintenance registers/ log books, Reagent stock books, quality control records, Laboratory statistics

THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICALS II YEAR DMLT

40 Hours

PRACTICALS BIOCHEMISTRY

- Preparation of standard solutions.
- Preparation of Molar solutions
- Preparation of Normal solutions
- Preparation of Percent solutions
- Preparation of De ionized, distilled and double distilled water
- Reactions of carbohydrates Monosaccharide, Disaccharides and polysaccharide.
 - Glucose & Fructose, Lactose, Starch
- Reactions of Proteins
- Color reactions and precipitation reactions of albumin and casein.
- Analysis of normal and abnormal Urine
- Demonstration of Glucometer with strips.

PRACTICAL EXAMINATION- 100 MARKS:

| | | | |
|---|---------|---|------------------|
| 1. Spotters | - 10 No | - | 20 marks |
| 2. Preparation of normal, standard/molar percent solutions | | | 10 marks |
| 3. Reactions of carbohydrates Monosaccharide, Disaccharides and polysaccharide. Glucose & Fructose, Lactose, Starch | | | 20 marks |
| 4. Analysis of normal and abnormal Urine | | | 20 marks |
| 5. Color reactions and precipitation reactions of albumin and casein. | | | 10 marks |
| 6. Records | - | | 10 marks |
| 7. Viva voce | - | | 10 marks |
| Total | - | | 100 marks |

REFERENCE BOOKS:

Text Books:

1. Text book of Biochemistry for Dental Students– Pattabhiraman
2. Text book of Biochemistry for Dental Students, Harbans Lal
3. Text book of Chemistry prescribed for II P.U.C. (students may need the basic knowledge of chemistry)

Practical Books:

1. Practical manual of Biochemistry – Rajagopal
2. Practical manual of Biochemistry – Shivananda Nayak
3. Practical manual of Biochemistry - Pattabhiraman

II DMLT

Subject: PATHOLOGY

SECTION-A

Q P Code : 5105

| TOPICS | MARKS |
|---|-------|
| <p>I. Urine analysis / Examination –</p> <ol style="list-style-type: none">1. Urine Formation2. Collection3. Composition4. Preservation5. Physical Exam6. Chemical Exam7. Microscopic Exam8. Dipstick Method9. Principal10. Types of Dipstick11. Interpretation12. Quality Control | 50 |
| <p>II. Stool Examination -</p> <ul style="list-style-type: none">• Composition• Collection• Physical Exam• Chemical• Microscope for ova Cyst• Occult blood <p>III. Hematology</p> <ul style="list-style-type: none">• Introduction to clinical hematology• Instruments & Equipment used in hematology Lab• Anticoagulants – definition, anticoagulants used in different tests, Mechanism of action, Preparation, advantages, disadvantages. Use of Anticoagulants in different tests• Collection of Blood sample - Different methods of collection of Blood sample vacutainers• Cut off time for conducting various tests and storage of different samples.• Preparation of various diluting fluids (RBC, WBC, Platelet, AEC, Reticulocyte) stains & buffers used in hematology lab• Stains: Romanowsky stains: Leishman & Giemsa in | |

3. Preparation Blood Smears

- Selection of slide - including preparation of new slides & old or used slides for making blood smears preparation of spreader slide

- * Good & bad smear ideal smears

Removal of mucks, Destaining & Restaining.

4. Staining of Peripheral Blood smear – Leishman stain

- * Care & maintenance of equipment used in Lab

5. Identification of Optimum decalcification-

6. Preparation of cytology smear & fixation of cytology smears-

7. Staining of cytopathology Smears

PRACTICAL EXAMINATION-100 MARKS

I DMLT

[3 hrs duration]

| | | |
|---|------------|-----------|
| 1. Spotters | - 10 No. - | 20 marks |
| 2. Urine Exam | - | 20 marks |
| 3. Hb exam Sahli's / Drapkins/ Automation | | 10 marks |
| 4. Peripheral Blood smear preparation & stain | - | 20 marks |
| 5. RBC / WBC / AEC count | - | 10 marks |
| 6. Records | - | 10 marks |
| 7. Viva voce | - | 10 marks |
| Total | | 100 marks |

* Records - Students should maintain this as work done

Take the signature of practical-incharge on a record- Demonstrator or Tutor and counter signed by Concerned H.O.D.

* Theory Valuation should be done by teacher teaching particular subjects with minimum of 3 years teaching experience.

REFERENCE BOOKS:

1. Medical laboratory Science - Theory and Practicals by J. OCHEI, A. KOLHATKAR Tata McGraw Hill Publishing Company Ltd.
2. Practical Haematology - SIR JOHN V. DACE, S.M. LEWIS, ELBS
3. Clinical Diagnosis Management by laboratory methods. Latest (19th) Edition. (Toff Sanford D Anderson) John Bernard Henry, W.B. Saunder Company, Prism Book Pvt. Ltd.
4. Theory and Practice of Histological Technique by John D Bancraft, Alan Stevens, Churchill livingstone Publishers.
5. Hand book of Medical laboratory technology, 2nd edition by Robert H Carman, Christian Medical Association of India (publishers)
6. Ramnik sood, Text book of laboratory medicine. Text book of laboratory medicine by V.H. Talib

Subject: Microbiology
SECTION-A **Q P Code : 5107**

| TOPICS | MARKS |
|---|-------|
| 1. Introduction to microbiology including history of microbiology | 10 |
| 2. Microscopy & different types of microscope | 10 |
| 3. General bacteriology | |
| a. Morphology & Physiology of bacteria | 30 |
| b. Classification of bacteria | |
| c. Common staining techniques in bacteriology | |
| d. Sterilization & disinfection | |
| e. Culture media & culture methods | |
| f. Basic concepts in identification of bacteria | |
| SECTION- B Q P Code : 5108 | |
| 1) Washing & packing of materials used in microbiology | 10 |
| 2) Preparation of stains & buffers | 10 |
| 3) Immunity, Antigen, Antibodies | 10 |
| 4) Antigen & antibody reactions | 5 |
| 5) Hypersensitivity | 5 |
| 6) Infection prevention and control | 10 |

II DMLT MICROBIOLOGY PRACTICALS

50 hours

- Microscopy – types of microscopes, focusing, care & handling of microscopes
- Usage of sterilization equipments
- Media preparation & pouring
- Washing & packing
- Preparation of smears & stains
- Simple stain, Gram stain
- Inoculation techniques

THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

1 Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICALS EXAMINATION – 100 MARKS

| | | |
|---------------------------------------|---|------------|
| 1. Spotters | - | 20 |
| 2. Media preparation | - | 20 |
| 3. Packing & sterilization techniques | - | 25 |
| 4. Gram stain | - | 20 |
| 5. Record | - | 10 |
| Total | | 100 |

REFERENCE BOOKS:

1. Bacteriology by Ananthanarayanan
2. Bacteriology by Rajesh Bhatia
3. Parasitology by Chatterjee
4. Parasitology by Jayaram and Panicker
5. Hand book of laboratory technology by Scott
6. Hand book of laboratory technology, C.M.C. Vellore - 2 copies.

| Paper | SUBJECT | SECTION | Question paper Code | MAX. MARKS |
|--------------|------------------------|----------------|----------------------------|-------------------|
| Paper 1 | Anatomy | Section A | 5101 | 50 |
| | Physiology | Section B | 5102 | 50 |
| | Anatomy Practical | | | 50 |
| | Physiology Practical | | | 50 |
| Paper 2 | Biochemistry | Section A | 5103 | 50 |
| | | Section B | 5104 | 50 |
| | Biochemistry Practical | | | 100 |
| Paper 3 | Pathology | Section A | 5105 | 50 |
| | | Section B | 5106 | 50 |
| | Pathology Practical | | | 100 |
| Paper 4 | Microbiology | Section A | 5107 | 50 |
| | | Section B | 5108 | 50 |
| | Microbiology Practical | | | 100 |

III YEAR DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

III-DMLT

| SUB: BIOCHEMISTRY SECTION -A Q P Code : 6101 | MARKS |
|---|--------------|
| <p>Unit I. Photometry</p> <p>Definition, laws of photometry, absorbance, transmittance, absorption maxima, instruments, parts of photometer, types of photometry–colorimetry, spectrophotometry, flame photometry, fluorimetry, choice of appropriate filter, measurements of solution, calculation of formula, applications.</p> <p>Unit II. Liver Functions & their Assessment</p> <p>Tests for 1) Carbohydrate metabolism 2) Protein metabolism 3) Lipid metabolism 4) Measurements of serum enzyme levels, Bile pigment metabolism, Jaundice, its types and their biochemical findings.</p> <p>Unit III. Different methods of Glucose Estimation-</p> <p>Principle advantage and disadvantage of different methods</p> <p>Unit IV. Renal Function Tests-</p> <p>Various Tests, GFR & Clearance Tests</p> <p>Unit V. Cardiac Profile -</p> <p>In brief Hypertension, Angina, Myocardial Infarction, Pattern of Cardiac Enzymes in heart diseases</p> <p>Different methods of Cholesterol Estimation- Principle, advantage and disadvantage of different methods. Lipid profile.</p> <p>Unit VI. Electrophoresis</p> <p>Principle, Types & Applications.</p> <p>Unit VII. Immunodiffusion Techniques, Radioimmunoassay & ELISA. Principles & Applications.</p> | 50 |

| SECTION –B | Q P Code : 6102 | MARKS |
|--|------------------|-------|
| <p>Unit VII. Automation of Laboratory Services, Organization and Management</p> <p>Automation in clinical chemistry: Principle & Applications</p> <p>Instrumentation, types of analysers, benefits of automation.</p> <p>Unit VII. Electrolytes, Blood Gases and pH</p> <p>pH Regulation,</p> <p>Disturbance in acid Base Balance, Metabolic acidosis & alkalosis, Respiratory acidosis & alkalosis.</p> <p>Basic Principles and estimation of Blood Gases and pH,</p> <p>Basic principles and estimation of Electrolytes</p> <p>Unit VIII. Quality control: Internal & External</p> <p>Principles of quality Assurance and Standards for clinical chemistry</p> <p>Pre-analytical factors, analytical and post-analytical factors important in clinical chemistry</p> <p>Accuracy, Precision, Specificity, Sensitivity.</p> <p>Limits of error allowable in laboratory, Percentage error.</p> <p>Reference values and Interpretations,</p> | <p>50</p> | |

PRACTICALS III YEAR DMLT (50 Hours)

1. Blood urea estimation
2. Serum creatinine estimation
3. Serum uric acid estimation
4. Serum total protein & A:G ratio
7. Serum glucose estimation
8. Total cholesterol estimation
9. HDL cholesterol (direct) estimation.
10. LDL cholesterol (direct) estimation
11. Triglyceride estimation
12. Estimation Serum of Direct & Total Bilirubin.
13. Estimation of serum Phosphate

14. Serum amylase estimation
15. Serum GOT (AST) estimation
16. Serum GPT (ALT) estimation
17. Alkaline phosphatase estimation
18. Acid phosphatase estimation
19. Serum sodium estimation
20. Serum potassium estimation
21. Serum chloride estimation
22. Estimation of serum calcium
22. Estimation of CK-NAC & CK MB
23. Analysis of CSF
24. Lactate dehydrogenase

THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICAL EXAMINATION-100 MARKS

| | | | |
|--|----------|---|------------------|
| 1. Spotters | - 10 No | - | 20 marks |
| 2. Estimation of blood urea/creatinine/uric acid | | | 10 marks |
| 3. Estimation of cholesterol/ HDL/LDL/Triglyceride | | | 20 marks |
| And calculation | | | |
| 4. Liver function tests- Any 2 | | | 10 marks |
| 5. Electrolytes estimation/ chart | | | 10 marks |
| 6. CSF analysis | | | 10 marks |
| 7. Records | - | | 10 marks |
| 8. Viva voce | - | | 10 marks |
| <hr/> | | | |
| Total | - | | 100 marks |

REFERENCE BOOKS:

iii) Biochemistry:

Text Books:

1. Text book of Biochemistry for Dental Students– Pattabhiraman
2. Text book of Biochemistry for Dental Students, Harbans Lal
3. Text book of Chemistry prescribed for II P.U.C. (students may need the basic knowledge of chemistry)

Practical Books:

1. Practical manual of Biochemistry – Rajagopal
2. Practical manual of Biochemistry – Shivananda Nayak
3. Practical manual of Biochemistry - Pattabhiraman

III DMLT
Subject: PATHOLOGY
SECTION-A Q P Code : 6103

| TOPICS | MARKS |
|---|-------|
| <p>I. Hematology</p> <ul style="list-style-type: none"> ● Differential Luecocyte count - DC ● Bone marrow examination - <ul style="list-style-type: none"> a. Introduction , b. Different sites of bone marrow aspiration, c. Different Types of Bone marrow needles. d. Types of bone marrow —1. Aspiration 2. Bone Marrow Biopsy e. Materials Required for bone marrow exam – Slides, Watch glass, Anticoagulant for collecting Bone marrow particles f. Preparation of Bone Marrow smear for Examination g. Staining of Bone marrow slides (Leishman, Giemsa, Perls stain) h. Importance of Bone marrow exam ● Osmotic fragility test: Definition, Preparation, Procedure and Importance ● Blood coagulation – <ul style="list-style-type: none"> a. Introduction to normal haemostatic mechanism or coagulation mechanism b. Investigation of bleeding disorders : <ul style="list-style-type: none"> a. Bleeding time – BT b. Clotting time – CT 3. Clot retraction time – CRT 4. Prothrombin time - PT 5. Activated partial Thromboplastin time – APTT ● BT, CT, CRT, PT, APTT – must know - normal values & importance ● Thrombin Time – TT (Optional) ● Automation in Coagulation Tests. ● FDP & fibrinogen estimation – Desirable to know ● Foetal Hb - Desirable to know ● Introduction & importance of calibration & validation of clinical laboratory instruments in pathology ● Introduction to laboratory information system(LIS) & Hospital information system(HIS) | 50 |

SECTION-B

Q P Code : 6104

| TOPICS | MARKS |
|--|-------|
| <p data-bbox="221 311 401 345">Blood Bank</p> <ul data-bbox="263 351 1119 1895" style="list-style-type: none"><li data-bbox="263 351 1119 466">• Introduction – Blood bank & blood group, Organization of blood bank- Infrastrucutre : Building, Equipments, Human resources.<li data-bbox="263 473 911 508">Use of various Registers and their importance. <li data-bbox="263 548 1056 625">• Blood grouping ABO & Rh, other Systems of Blood grouping (Mention)<li data-bbox="263 632 1031 668">• Forward & Reverse grouping and their Importance<li data-bbox="263 674 1009 710">• Cross matching – major / minor and Impoprtance<li data-bbox="263 716 1088 752">• Methods – Saline, Albumin, Coombs cross – matching<li data-bbox="263 758 1075 836">• Coombs test –Principle, Procedure and Importance of direct indirect Coomb’s Test.<li data-bbox="263 842 774 878">• Selection of Donor, Counselling<li data-bbox="263 884 675 920">• Screening tests for donor<li data-bbox="263 926 754 962">• Collection & Storage of Blood<li data-bbox="263 968 1119 1046">• Infrastructure for Components : Space area, Equipments, manpower.<li data-bbox="263 1052 1020 1130">• Separation & uses of various Blood components (Packed cells, Fresh Frozen Plasma(FFP), Cryoppt <li data-bbox="263 1174 1119 1251">• Transfusion reaction – definition, importance and role of technician in transfusion reaction.<li data-bbox="263 1258 1067 1336">• Quality control, Quality assurance & SOP (Standard Operating procedure.<li data-bbox="263 1342 1067 1420">• Disposal of unused and expired Blood and Blood components, with special importance of disinfection<li data-bbox="263 1426 863 1462">• Inventory Management in Blood Bank <p data-bbox="257 1468 566 1504">6. Histopathology</p> <ul data-bbox="257 1510 1067 1895" style="list-style-type: none"><li data-bbox="257 1510 1067 1588">• Tissue processing – Completion of Fixation, Dehydration, Clearing, Impregnation in molten wax.<li data-bbox="257 1594 890 1705">• Instruments used for tissue processing -<ul style="list-style-type: none"><li data-bbox="319 1630 577 1665">a. Manual method<li data-bbox="319 1672 733 1707">b. Automated (Histokinette) <li data-bbox="257 1743 733 1853">• Embedding & Section cutting -<ul style="list-style-type: none"><li data-bbox="282 1778 435 1813">a. Manual<li data-bbox="282 1820 482 1855">b. Automated<li data-bbox="257 1862 890 1897">• Errors in section cutting & their correction | 50 |

| | |
|--|--|
| <ul style="list-style-type: none"> • Different types of haemotoxylins, Preparation of Harris Haematoxyllin and Eosin – routine H & E • Staining technique including staining technique for rapid diagnosis – Frozen section • Special stains – Introduction Names and their Importance • Microwave tissue processing – Introduction, Principle, Procedure in brief and importance • Quality check or Quality control in Histopathology <p>7. Mounting of museum specimens : Various Mounting solutions used in mounting, Different types of mounting jars used.</p> <p>Biological Hospital waste disposal & universal Precautions</p> | |
|--|--|

PAPER SETTING AS PER THE TOPICS
SECTION-A

| SL NO | | TOPICS | NO OF QUESTION | MARKS | TOTAL |
|--------------------|--------------------------------|---|----------------|-------|-----------|
| 1 | SHORT NOTES (5x4) | DIFFERENTIAL LEUCOCYTE COUNT | 1 | 1x5=5 | 20 |
| 2 | | BONE MARROW EXAMINATION | 1 | 1x5=5 | |
| 3 | | BLOOD COAGULATION | 1 | 1x5=5 | |
| 4 | | OSMOTIC FRAGILITY | 1 | 1x5=5 | |
| 5 | SHORT ANSWERS (10x3) | DIFFERENTIAL LEUCOCYTE COUNT | 2 | 2x3=6 | 30 |
| 6 | | BONE MARROW EXAMINATION | 2 | 2x3=6 | |
| 7 | | BLOOD COAGULATION | 3 | 3x3=9 | |
| 8 | | OSMOTIC FRAGILITY | 1 | 1x3=3 | |
| 9 | | IMPORTANCE OF CALIBRATION & VALIDATION OF CLINICAL LABORATORY INSTRUMENTS | 1 | 1x3=3 | |
| 10 | | LABORATORY INFORMATION SYSTEM(LIS) & HOSPITAL INFORMATION SYSTEM(HIS) | 1 | 1x3=3 | |
| GRAND TOTAL | | | | | 50 |

SECTION-B

| SL NO | | TOPICS | NO OF QUESTION | MARKS | TOTAL |
|--------------------|----------------------|--|----------------|--------|-----------|
| 1 | SHORT NOTES | BLOOD BANK | 2 | 2X5=10 | 20 |
| 2 | | HISTOPATHOLOGY INCLUDING SPECIAL STAINS | 2 | 2X5=10 | |
| 3 | | BIOLOGICAL HOSPITAL WASTE DISPOSAL & UNIVERSAL PRECAUTIONS | 1 | 1X5=5 | |
| 4 | SHORT ANSWERS | BLOOD BANK | 2 | 2X3=6 | 30 |
| 5 | | HISTOPATHOLOGY INCLUDING SPECIAL STAINS | 3 | 3X3=9 | |
| 6 | | MICROWAVE TISSUE PROCESSING | 1 | 1X3=3 | |
| 7 | | QUALITY CHECK & QUALITY CONTROL IN HISTOPATHOLOGY | 1 | 1X3=3 | |
| 8 | | MOUNTING OF MUSEUM SPECIMENS | 1 | 1X3=3 | |
| 9 | | BIOLOGICAL HOSPITAL WASTE DISPOSAL & UNIVERSAL PRECAUTIONS | 1 | 1X3=3 | |
| GRAND TOTAL | | | | | 50 |

III year DMLT PATHOLOGY Practical's (Approximately 240hrs)

1. Differential WBC count (DC)
2. Staining of Bone marrow smears
3. Preparation of red cell suspension
4. Osmotic fragility test
5. Sickling Test
6. Determination of ABO blood grouping & Rh typing - methods
 - Slide method
 - Tube method
 - Micro titer plate method & gel method
7. Cross – matching – Major cross Match
 - Minor cross match
8. Coomb's test - Direct, Indirect
9. Tissue processing
10. Blocking - Observation & Demonstration
11. Section cutting
12. Staining by H & E stain
13. Frozen section Cutting & staining - Demonstration
(Desirable to know)

14. Semen analysis
 15. Sputum Examination
 16. CSF Examination
 17. Other body fluids pleural Peritoneal
 18. Bleeding Time & Clotting Time
 19. Clot retraction Time Observation
 21. Prothrombin time(PT)
 22. Activated partial thromboplastin Time(APTT)
 23. Mounting of museum specimens
- Proposed: Pathology 3 days in a week Includes Lecture, Lecturer Demonstration, Practical & Hospital Posting

THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:

5marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICAL EXAMINATION: 100 MARKS [3hrs duration]

Pattern:

| | | | |
|-----------------------|---------|---|-----------|
| 1. Spotters | - 10 No | - | 20 marks |
| 2. Blood group | | | 10 marks |
| 3. PAP smear staining | | | 20 marks |
| 4. H & E staining | | - | 20 marks |
| 5. WBC – DC | | - | 10 marks |
| 6. Records | | - | 10 marks |
| 7. Viva voce | | - | 10 marks |
| <hr/> | | | |
| Total | | - | 100 marks |

* Take the signature of practical-incharge on a record- Demonstrator or Tutor and counter signed by Concerned H.O.D.

* Theory Valuation should be done by teacher teaching particular subjects with minimum of 3 years teaching experience.

* Practicals examination training can be taught by objective structured practical examination pattern(OSPE)

REFERENCE BOOKS:

1. Medical laboratory Science - Theory and Practicals by J. OCHEI, A. KOLHATKAR Tata McGraw Hill Publishing Company Ltd.
2. Practical Haematology - SIR JOHN V. DACE, S.M. LEWIS, ELBS
3. Clinical Diagnosis Management by laboratory methods. Latest (19th) Edition. (Toff Sanford D Anderson) John Bernard Henry, W.B. Saunder Company, Prism Book Pvt. Ltd.
4. Theory and Practice of Histological Technique by John D Bancraft, Alan Stevens, Churchill livingstone Publishers.
5. Hand book of Medical laboratory technology, 2nd edition by Robert H Carman, Christian Medical Association of India (publishers)
6. Ramnik sood, Text book of laboratory medicine.
7. Text book of laboratory medicine by V.H. Talib

III DMLT

Subject: MICROBIOLOGY

SECTION-A

Q P Code : 6105

| Topics | MARKS |
|---|-------|
| I. Systematic Bacteriology Gram positive cocci – Staphylococci, Streptococci, Pneumococci Gram negative cocci – Neisseria meningitides & Gonococci Gram positive bacilli – C. diphtheria Cl. tetani Gram negative bacilli – Enterobacteriaceae, V. cholerae, Pseudomonas, Mycobacteria | 15 |
| II. Isolation & identification of micro organisms from various clinical samples a).Collection and transport of various samples b).Preservation of samples c). Processing of various samples | 25 |
| III. Quality and Biomedical waste disposal Management System. 1.Quality control measures 2. Universal precautions 3. Bio Medical Waste disposal and Management | 10 |
| SECTION- B Q P Code : 6106 | |
| IV. Mycology – General features, lab Diagnosis of fungal infection (KOH mount, LPCB & SDA); Candida, Cryptococci, Aspergillus | 10 |
| V.Virology – General features, HIV, HBV HCV, | 5 |
| VI.Parasitology – Protozoology – Entamoeba histolytica, Trichomonas, Giardia, Malaria, | 5 |
| VII. Helminthology – Nematodes – Ascaris, Ankylostoma, Trichuris trichura, Enterobious, Vermicularis & Cestodes – Taenia & Echinococcus | 5 |
| VIII.Serology – Widal , Typhidot., VDRL, ASLO, RA, CRP, Brucella Agg test, ELISA , Antibioqram, Preparation of antibiotic discs, Antibiotic Resistance, Automation in Serology and Cultures | 25 |

III YEAR DMLT MICROBIOLOGY PRACTICALS

50 hrs

Albert's stain
Gram's stain
Z-N stain
Negative stain
Leishman's stain
JSB
Lactophenol cotton blue mount
Wet mounts & KOH mount

Serology, Widal, VDRL, RA, CRP, ASO, latex agglutination ELISA
Stool examination
Clinical sample with culture sensitivity

THEORY EXAMINATION -100 MARKS

Section A : 50 Marks

I. Short Notes:

1. 5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

2. 3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B : 50 Marks

I. Short Notes:

5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:

3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICALS EXAM – 100 Marks

| | | |
|---|---|----|
| 1. Spotters | - | 20 |
| 2. Serology | - | 20 |
| 3. Stool examination | - | 20 |
| 4. Z-N stain | - | 20 |
| 5. Clinical sample with culture sensitivity (Charts can be used) | - | 10 |
| 6. Record | - | 10 |

100 Marks

REFERENCE BOOKS:

1. Bacteriology by Ananthanarayanan
2. Bacteriology by Rajesh Bhatia
3. Parasitology by Chatterjee
4. Parasitology by Jayaram and Panicker
5. Hand book of laboratory technology by Scott
6. Hand book of laboratory technology, C.M.C. Vellore - 2 copies.