GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)
(Deemed to be University)

VISAKHAPATNAM * HYDERABAD * BENGALURU
Accredited by NAAC with A^+ Grade

REGULATIONS AND SYLLABUS
OF
UPMED06: B.Sc. Medical Lab Technology

(w.e.f. 2022-23 admitted batch)

B.Sc. Medical Laboratory Technology
(Effective from 2022-23 admitted batch)

1.0 ADMISSIONS

Admissions into B.Sc. Paramedical (Specialization in Medical Laboratory Technology) program of GITAM (Deemed to be University) are governed by GITAM (Deemed to be University) admission regulations.

ELIGIBILITY CRITERIA

Eligibility:

Qualified in Intermediate or 10+2 equivalent examinations with 60% Aggregate marks in Physics, Chemistry, Biology and English or APOSS (Open school intermediate) with GPA 5.5 or equivalent.

About the course:

Our three-year Bachelor of Science in Medical Laboratory Technology (MLT) programme, called Clinical Laboratory Science, educates students with the knowledge and skills necessary to diagnose, treat, and prevent disease using clinical laboratory tests. Students receive training in recognizing, identifying, and treating various ailments. Additionally, they learn how to gather the necessary data, take samples, test them, and write an appropriate, in-depth report for any investigation. The programme is very career-oriented and provides many options for students who want to pursue it as a professional choice in the future.

Course Administration

The course is delivered in 6 semesters with each semester dealing with prescribed subjects.

- All subjects are mandatory for the student. The student is trained in both theory and practical/clinical aspects of the course. Student is assessed by formative and summative assessment every semester.
- There will be one internal exam before the semester-end exam. Candidates should score a minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.
- A candidate shall be declared to have passed in the concerned subject, if he fulfils the following criteria
    - He / She secured 35% marks in the internal assessment and
    - (a) He / She secured 40% marks in theory and
      (b) 50% marks in practicals & viva and
      (c) 50% marks in theory, practical &viva put together in each subject separately. Course objectives and learning outcomes are specified leading to clarity on what a student would be able to do at the end of the program.

STRUCTURE OF THE PROGRAM

The Program consists of

i. Foundation Course (FC)
ii. Core Courses - Compulsory (C)
iii. Discipline Specific Electives (DSE)
iv. Generic Electives (GE)
v. Internship/ Project/ Training (Detailed Report to be submitted in the prescribed format)

Each academic year consists of two semesters. The curriculum structure of the BSc Paramedical program and the contents for various courses offered are recommended by the Board of Studies concerned and approved by the Academic Council.

MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English. The method of instruction shall comprise classroom lectures, guest lectures, demonstrations, presentations, role-play, group discussions, seminars, class tests, case analysis, situational analysis, practical training etc.

ATTENDANCE REQUIREMENTS

- A candidate must have not less than 75% attendance in theory and 80% in practicals separately.
- Candidates should score a minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.
- There will be one internal exam before the semester-end exam.
- Internal marks will be considered for eligibility for the semester exam but will not be added for the semester exam.

EVALUATION:

CONTINUOUS ASSESSMENT AND EXAMINATIONS

- There will be one internal exam before the semester-end exam.
- Candidates should score a minimum of 35% marks theory and practical internal assessment examination separately to be eligible to appear in the University exam in that subject.
- Internal marks will be considered for eligibility for the semester exam but will not be added for the semester exam.

EXAMINATION DURATION AND PATTERN

a. Anatomy, Physiology, English, Computer basics , Environmental sciences, Clinical laboratory practices, Biochemistry, Microbiology, and Pathology ---

100 marks each

60 marks theory

40 marks (Practical 30 marks+ VIVA 10 Marks)

(English, EVS, Computer basics carries 40 marks each (No Practicals, only Theory).

b. Pattern of question paper

c. 60 marks paper Duration: 2 ½ Hours
1 Q Essay (1x 10m = 10 marks)
2 Q to 5 Q Short notes (total 4 Q, 4 x 5 m = 20 marks)
6 Q to 15 Q very short notes (total 10 Q, 10 x 3m = 30marks)

d. 40 marks paper Duration: 2 hours
1 Q Essay question (1 x10 m = 10 marks)
2 Q to 4 Q - Short notes (3 Q x 5 = 15marks)
5 Q to 9 Q - Very short notes (5 Q x 3 m = 15marks)

Criteria for the following subjects have exam at the college level only:

- Anatomy, Physiology, English, Computer basics , & Environmental sciences- These subjects are included in the semester exam and the candidates shall be declared as passed only when they secure 35% marks in the internal exam.

- Paper Setting:

- Paper setting, paper valuation and practical examination is done by internal examiners from the 1st to 5th semesters.
- In the 6 th semester paper setting will be done by concerned subject experts. Paper valuation and practical examination will be conducted but 2 examiners – one internal and one external examiner.

- Criteria for Examiner:

- Professor or Associate Professor or Assistant Professor with minimum of 4 years of teaching experience after post-graduation.
- Parent Department Subjects semester exams will be conducted from the 3rd semester onwards.
- Subjects for 1st semester exam
  - Anatomy
  - Physiology
  - Biochemistry
  - EVS
  - English
  - Psychology
  - Computers

2nd Semester Exam

Anatomy

Physiology

Clinical laboratory practice

Grace Marks: Maximum 5 marks can be awarded to one subject provided he passed all the other subjects or these 5 marks can be split for maximum 2 subjects. Provided the candidate has passed rest of the subjects.

- Qualifying marks to pass the semester exam.
- A candidate shall be declared to have passed the examination if.

  - He / She secured 35% marks in the internal assessment.
  - Anatomy, Physiology & Biochemistry (a) He / She secured 40% marks in theory. (b) 50% marks in practicals & viva (c) 50% marks in theory, practical &viva put together in each subject separately.
  - For EVS, English, computer - He/ Sheshould secure minimum 50% marks in theory.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	To impart knowledge and skill in accordance with the requirement in basic medical sciences and paramedical specialty as relevant
PEO 2	To impart training required to carry out necessary investigative procedures accurately to facilitate proper diagnosis and prognosis of diseases
PEO 3	To train the student to perform routine as well as special investigative procedures in the concerned paramedical specialty
PEO 4	To impart knowledge and practical training required to operate and maintain all equipment used in the concerned specialization
PEO 5	To impart knowledge about communication skills, basic research skills, professionalism, and ethical aspects required in various health care settings for effective delivery of health care

PROGRAMME OUTCOMES (POs)

PO1	To prepare a cadre of healthcare technologists who can effectively assist senior health professionals in the delivery of quality health services.
PO2	To prepare skilled paramedical human resources for all levels of the healthcare delivery system from primary to tertiary care level.
PO3	To train the students to carry out necessary procedures accurately and to facilitate proper diagnosis and prognosis of diseases.
PO4	To enable to perform routine as well as special investigative procedures in the concerned paramedical specialty.
PO5	To develop knowledge and skill in accordance with the demand in the field of paramedical specialty as applicable.
PO6	To enable to operate and maintain all types of equipment used in the concerned specialization.
PO7	To make capable to support advanced testing activities and Research.
PO8	To enable to work as Supervisor/Trainer/Teacher in the field of Paramedical sciences.
PO9	To enable to communicate and interact effectively with non-clinical and clinical persons in various healthcare environments
PO10	To be able to present oneself in an ethical and professional manner
PO11	To equip the paramedical staff with modern skills and knowledge to bring them at par with other national and international standards
PO12	Students who complete these programs will be able to work in both an individual and team environment

PROGRAM SPECIFIC OUTCOMES (PSOs)

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

PSO1	To know about basic organ systems, with special emphasis on the ocular and visual system, and their inter-relationships to the body as a whole.
PSO2	Understand the structures and processes contributing to the development of refractive error and other optical and perceptual abnormalities of the visual system.

PSO3	To know about Mechanisms of action of the various classes of pharmaceutical agents, their interactions and their safe and effective use for the treatment of diseases and conditions affecting the eye and visual system
PSO4	The optics of the eye and ophthalmic lens systems (including spectacles, contact lenses and low vision devices) used to correct refractive errors.
PSO5	To understand about Vision therapy, Low vision aids and other rehabilitative methods used for the management of common visual disorder
PSO6	To practice independently as a primary eye care practitioner and work in eye care services where ever ophthalmologist services not available for the benefit of society.
PSO7	To develop such professionals who will actively participate in community optometry such as national programs for the prevention of blindness and effectively organize and participate in vision screening eye camps to help controlling blindness
PSO8	To be able to become an entrepreneur as an optometrist.

STRUCTURE OF THE PROGRAMME

Semester-wise Structure

SEMESTER-I

S. No	Course Code	Course Title	Course Category
1	ANAT1001	ANATOMY – I	C
2	BCHE1001	BIOCHEMISTRY – I	C
3	PSGY1001	PHYSIOLOGY – I	C
4	LANG1141	ENGLISH	FC
5	CSCI1301	COMPUTER BASICS	FC
6	ENVS1051	ENVIRONMENTAL SCIENCE	FC

SEMESTER-II

S. No.	Course Code	Course Title	Course Category
1	ANAT1011	ANATOMY – II	C
2	PSGY1011	PHYSIOLOGY – II	C
3	PATH1001	CLINIAL LABORATORY PRACTICE	C

SEMESTER-III

S. No	Course Code	Course Title	Course Category
1	PHCG2001	BIOCHEMISTRY - I	C
2	MIBG2001	MICROBIOLOGY - I	C
3	PATH2001	PATHOLOGY - I	C

SEMESTER: IV

S. No	Course Code	Course Title	Course Category
1	PHCG2011	BIOCHEMISTRY- II	C
2	MIBG2011	MICROBIOLOGY - II	C
3	PATH2011	PATHOLOGY - II	C

SEMESTER: V

S. No	Course Code	Course Title	Course Category
1	PHCG2001	BIOCHEMISTRY – III	C
2	MIBG2001	MICROBIOLOGY – III	C
3	PATH2001	PATHOLOGY - III	C

SEMESTER-VI

S. No	Course Code	Course Title	Course Category
1	PHCG2001	BIOCHEMISTRY– IV	C
2	MIBG2001	MICROBIOLOGY – IV	C
3	PATH2001	PATHOLOGY - IV	C

Syllabus:

SEMESTER - I

S. No	Course Code	Course Title	Course Category
1	ANAT1001	ANATOMY - I	**C**
2	PSGY1001	PHYSIOLOGY - I	**C**
3	LANG1141	ENGLISH	**C**
4	CSCI1301	COMPUTER BASICS	**C**
5	ENVS1051	ENVIRONMENTAL SCIENCE	**C**

ANAT1001: Anatomy-I
Semester-I
(with effect from 2022-23 admitted batch)

INTRODUCTION:

Anatomy deals with the structural organization of the human body. Anatomy forms the basis for the practice of medicine. Students need core knowledge of human anatomy as they venture into the clinical domain. The department of anatomy is committed to providing quality education for students by its fully-equipped facilities. Cadaveric dissections & specimens, histology slides, and VARIOUS models provide the ideal environment to learn anatomy during the 1st year of their course.

COURSE OBJECTIVES:

- The objective of this subject is to provide an outline of anatomy to improve the students understanding of the technical and diagnostic procedures used, with special emphasis on applied aspects.

LEARNING OUTCOMES:

After completion of the course at the end of 1st year, the first semester, the student must be able to know the following:

a. Introduction of Anatomy & Cell, Tissues

1. Anatomical terminology

2. Name the cell organelles

3. Types of Cell divisions

4. Classification of bones

5. Parts of long bone

6. Blood supply of long bone.

7. Classification of muscles

8. Cardiac muscle.

b. Introduction to Histology & lungs

1. Classify of Epithelium.

2. Type of Cartilages.

3.. Histology of bone

4. Different Parts of the Pleura.

5. Describe The Surfaces, Borders And The Mediastinal Surface Of The Lungs.

6. Relations of right lung

7. Relations of left lung

8. Bronchopulmary segment of lung

9. Costo diaphragmatic recess

10. Hilum of lung

11. Histology of lung

c. Heart & Blood vessels

1. Describe the external feature of heart with a labelled diagram

2. Mention the openings of right atrium

3. Briefly on Internal features of heart

4. Types of circulation

5. Aorta & its branches

6. Coronary circulation

7. Chambers of the heart &its vessels

8. Papillary muscles

d. Limbs

1. Bones of Upper limb

2. Carpal bones

3. Name the muscles of Upper limb

4. Bones of Lower Limb

5. Tarsal bones

6. Median cubical vein

7. Name of nerves of lower limb

8. Name of the nerves of upper limb

9. Mention the arteries of upper limb

10. Mention the arteries of lower limb

11Name the muscles and nerve of back of thigh

12. Deltoid muscle

13. Gluteus maximum

COURSE OUTCOMES:

- Explains knowledge on the basic anatomy of various regions like limbs, thoracic and abdominal viscera, osteology, neuroanatomy, endocrine system, basic radiology which provides a foundation in completion of the course.
- Explain the anatomy and functions of various Tissues and cells, an organization of a cellular system.
- Understand the functioning of lungs, heart, and blood vessels.

References:

1. BD Chaurasia : Handbook of general anatomy
2. Textbook of Anatomy & Physiology by InduKhurana&Arushi
3. Textbook of Anatomy & Physiology by PR Ashalatha& G Deepa
4. Textbook of Anatomy & Physiology by Ashalatha N Nandedkar, Vijay D Joshi &Sadhana – 3rd edition

PSGY100: PHYSIOLOGY
Semester-I
(with effect from 2022-23 admitted batch)

Introduction

Physiology is the study of functions and mechanisms in a living system. physiology focuses on individual organs, cells, and biomolecules carrying out the chemical and physical functions in a living system. The physiological state is the condition of normal function, while the pathological state refers to abnormal conditions, including human diseases.

Course Objective

- Understand the basic physiological functions of different organs and parts of the human body and important applied aspects

SYLLABUS:

1 - Cell physiology

1. Describe the structure and functions of cell
2. Describe the functions of the cell organelles
3. Describe briefly the types of transport across cell membrane and carrier systems

2 - Blood

1. Describe the normal composition of human blood and its functions
2. Describe the normal plasma proteins & their functions
3. Describe the structure and functions of RBC and hemoglobin
4. Describe the process of Erythropoiesis
5. Describe the Structure, production, & functions of WBCs
6. Describe the structure, production & functions of Platelets
7. Describe the Types of blood groups and their importance,
8. Describe the Mechanism of coagulation

Immunity

9. Define immunity and describe the types of immunity
10. Classify antigen & antibodies
11. Describe T cell immunity & B cell immunity

3 - Digestive system

1. Describe briefly the Physiological anatomy of G.I.T and its functions.
2. Describe briefly the composition and functions of Saliva
3. Describe briefly the physiological anatomy of the stomach and the composition, functions of gastric juice.
4. Describe briefly the functions of pancreas, and the composition & functions of pancreatic juice.
5. Describe briefly the functions of liver and gall bladder and the Composition, and functions of bile juice.

4 - Respiratory system

1. Describe the physiological structure and functions of Respiratory tract.
2. Describe the Mechanics of respiration and its regulation

3. Describe the Fundamentals of oxygen and CO2 transport in blood
4. Describe the lung volumes, spirometry & their importance

5 - Cardiovascular system

1. Describe the gross structure of heart and the normal circulation of blood
2. Describe the cardiac cycle
3. Describe the normal arterial pulse wave and the normal heart rate, and factors increasing and decreasing it.
4. Describe normal Blood pressure and its regulation,
5. Describe the normal Heart sounds
6. Describe the normal ECG and its importance

6 - Muscle & nerve & neurology

1. Describe the physiological structure of muscle tissue and its types
2. Describe the parts of neuron and their functions, and the synapse and its function
3. Describe the action potential, its basis, refractory period, latent period, etc. and neuromuscular transmission
4. Describe briefly the autonomic nervous system and the functions and effects of the sympathetic and parasympathetic nervous systems
5. Describe the physiological anatomy of the brain and functions of different lobes
6. Describe briefly the structure and functions of spinal cord
7. Describe briefly the subdivisions of brain stem and their functions
8. Describe briefly the special senses and their pathways – vision, audition (location & taste)
9. Describe the normal EEG,
10. Describe briefly the CSF formation, circulation, properties, composition and functions

Course Outcomes:

1. Explain the anatomy, physiology and functions of various Tissues and cell, organization of cellular system.
2. Explain Haemopoetic and lymphatic system homeostatic and its altered physiology
3. Explain the anatomy and Physiology of the cardiovascular and respiratory system and its disorders
4. Explain the anatomy and Physiology of digestive, nervous, urinary, and reproductive systems and their disorders
5. Describe the Physiology of muscle contraction and its disorders

References:

1. Text book of physiology for BDS AK Jain 6th edition
2. Text book of physiology for BDS Sembulingam 3rd edition
3. Physiology in nutshell by AK Jain 5th edition
4. Manual of practical physiology for BDS AK Jain 4th edition
5. Handbook of human physiology Vidyaratan 7th edition

LANG1141: ENGLISH
Semester-I
(with effect from 2022-23 admitted batch)

Introduction:

The course is a unified approach to enhance language skills of learners with an aim to hone their social skills and to increase their employability. The course is designed to acquaint the learners with the necessary LSRW (Listening/ Speaking / Reading/ Writing) skills It enables the learners improve their communication skills which are crucial in an academic environment as well as professional and personal lives.

COURSE OBJECTIVES

1. Understand and communicate in simple English, written and verbal
2. Understand and practise the basic principles of English grammar
3. Comprehend and summarise a given English essay/paragraph
4. Understand common English terms used in the medical/ health care field

Syllabus

1. Basic English Grammar 2hrs
2. Grammar - 8 parts of speech. Structure of sentence. Sentence writing. Paragraph writing. 8 hrs Summarizing / precis writing. Reading & comprehension (a small paragraph followed by questions)
3. General English Vocabulary & Use of dictionary 2hrs
4. Common Medical Terminology 2hrs
5. Spoken & Written English 2hrs
6. Listening & Reading skills 2hrs
7. English comprehension & summarizing & inference 2hrs
8. Writing skills - Questions based on prescribed prose/ poetry, letter, Summary, Case history, Medical Report, Documentation, Note taking 8rs
9. Verbal communication - discussion & summarizing. Taking minutes of meeting Writing the minutes. 2hrs

Prescribed Prose -

1. Leo Tolstoy	How much land does a man need?
2. O' Henry	The Last Leaf
3. Frank Stockton	The Lady or the Tiger

Prescribed Poetry –

1. William Shakespeare	The Seven Ages of Man
2. Robert Frost	The Road not Taken
3. John Milton	On his Blindness

COURSE OUTCOMES

By the end of the course, the learners will be able to:

- Think critically, analytically, creatively and communicate confidently in English in social and professional contexts with improved skills of fluency and accuracy.
- Write grammatically correct sentences employing appropriate vocabulary suitable to different contexts
- Comprehend and analyze different academic texts.
- Make notes effectively and handle academic writing tasks such as Paragraph writing and Essay writing.
- Effectively handle formal correspondence like e-mail drafting and letter writing.

Reference Books:

1. Arosteguy, K.O. and Bright, A. and Rinard, B.J. and Poe, M. A Student's Guide to Academic and Professional Writing in Education, UK, Teachers College Press, 2019
2. Raymond Murphy, English Grammar in Use A Self-Study Reference and Practice Book for Intermediate Learners of English: Cambridge University Press;2019
3. Peter Watkins, Teaching and Developing Reading Skills: UK, CUP, 2018
4. DeepthaAchar et al. Basic of Academic Writing. (1and 2) parts New Delhi: Orient BlackSwan. (2012& 2013).
5. Kumar S and Lata P, Communication Skills: New Delhi Oxford University Press, 2015

CSCI1301: BASICS OF COMPUTERS
Semester-I
(with effect from 2022-23 admitted batch)

Introduction:

Computer science spans theoretical disciplines (such as algorithms, theory of computation, and information theory) to practical disciplines (including the design and implementation of hardware and software). It deals with concepts regarding the architecture of a computer, common application software and uses of computers in everyday life.

Course Objectives:

1. To build necessary concepts regarding the architecture of a computer
2. To develop an understanding of the common application software.
3. To understand the uses of computers in everyday life.

SYLLABUS:

Theory –

1. Describe and identify the principal components of a computer
2. Define the various terms used in computer – hardware/software / operating system
3. Describe the functions and uses of computers including in health care
4. Mention the common types of files including Word documents, Spreadsheets (Excel) and Presentations (PowerPoint) and their uses
5. Basic Network connecting
6. Explain the uses of the internet and email
7. Collaborative work using Google suite of applications / Microsoft Office 365 Practical / Demonstration –
8. Demonstrate use of a computer for common purposes
9. Demonstrate methods for Data storage & retrieval and making folders;
10. Perform functions like date/time setting or changing, change display settings, Installing /removing programs etc.
11. Understand and Use MS Word / Word Document program
12. Prepare a properly formatted, spell-checked document in Word Document including insertion of images and tables and take a print-out/mail as an attachment, and convert to pdf (portable document format)
13. Understand and Use MS Excel / Data spreadsheet
14. Prepare a proper Excel document (spreadsheet) with given data and sort out data, insert / delete cells, etc., use formula bar for common functions like calculate mean etc, convert to pictorial format like bar / pie diagram, etc.
15. Prepare and use computer-based presentations like PowerPoint with appropriate fonts and colours including insertion of images, videos etc.
16. Prepare an appropriate file like excel to enter patient data and retrieve it
17. Use the facility of Mail Merge between Excel to a Word document
18. Sending customized email to selected members
19. Prepare a patient report and take a print out
20. Prepare a database of patient info and lab results for storage and later retrieval

21. Communicate by e-mail including opening email account
22. Demonstrate use of search engines / google search etc. for academic information

Learning Outcomes:

At the end of the training program, the student would be able to

1. Classify various components of the computer.
2. Experiment with the various application software of Microsoft Office suite.
3. Make use of collaborative applications over the internet.

Course Outcomes:

At the end of the course student is expected to

1. Know about the concept and architecture of a computer
2. To understand the common application software.
3. To understand and apply the uses of computers in everyday life.

References –

1. Introduction to Computers by Peter Norton (McGraw Hill Education)
2. Mastering Excel: A Problem-Solving Approach by James Gips (John Wiley and Sons)
3. SAMs Teach Yourself Computer Basics in 24 hours

ENVS1051: ENVIRONMENTAL SCIENCE
Semester-I
(with effective from 2022-23 admitted batch

Introduction:

The course enables the students to adapt eco-centric thinking and actions rather than human-centric thinking on natural resources, their utilization and conservation. The course also focuses on the importance of ecosystems, biodiversity and their degradation led to pollution. This course helps in finding solutions through application of control measures to combat pollution and legal measures to achieve sustainable development.

Course Objectives:

1. To impart knowledge on environment and ecology.
2. To familiarize learners about different types of pollution and its measures to control.
3. To introduce learners about natural resources.

Syllabus

UNIT-I

INTRODUCTION TO ENVIRONMENT AND ECOLOGY 06 Hours

Definition of environment, ecology and ecosystem. Components of environment. Natural and man-made changes on environment and disasters.

UNIT-II POLLUTION AND ITS ABETMENT 10 Hours

Air pollution-primary air pollutants, origin, control measures, air quality norms. Land pollution, types of land pollution-their sources, control measures. Solid waste disposal measures. Water resources. Types of water pollution, control measures. Water quality standards. Noise pollution, control measures, acceptable noise levels. Radiation-types, sources of radiation, biological effects of radiation.

UNIT-III NATURAL RESOURCES 04 Hours

Conventional and non-conventional energy resources, energy conservation. Role and uses of forests, effects of deforestation. Wildlife conservation. Forest conservation Act.

COURSE OUTCOMES

After the completion of this course student will be able to

- List components of environment
- Recall natural and man-made environment disaster
- Demonstrate air pollution control measures
- Summarize solid waste disposal measures
- Explain radiation and its biological effects
- Identify conventional and non-conventional energy resources

REFERENCES:

1. ErachBharucha. Textbook of environmental studies for undergraduates Courses-Universities Press, India Private Limited. 2019.
2. Kaushik A and Kaushik C.P. Perspectives in Environmental Studies. New Age International Publishers Edition-VI. 2018.
3. McKinney M.L., Schoch R.M., Yonavjak L. Mincy G. Environmental Science: Systems and Solutions. Jones and Bartlett Publishers. 6th Edition. 2017.
4. Botkin D.B. Environmental Science: Earth as a Living Planet. John Wiley and Sons. 5th edition. 2005.
5. Benny Joseph. Textbook of Environmental Studies 3rd edition, McGraw Hill Publishing company limited. 2017.

SEMESTER-II

S.No	Course Code	Course Title	Course Category
1	ANAT1011	ANATOMY - II	C
2	PSGY1011	PHYSIOLOGY - II	C
3	PATH1001	CLINICAL LABORATORY PRACTICE	C

ANAT1011: ANATOMY – II
SEMESTER-II
(with effect from 2022-23)

INTRODUCTION:

Anatomy deals with the structural organization of human body. Anatomy forms the basis for the practice of medicine. Students need core knowledge of human anatomy as they venture into the clinical domain. The department of anatomy is committed to provide quality education for students by its fully-equipped facilities. Cadaveric dissections & specimens, histology slides and VARIOUS models provide the ideal environment to learn anatomy during the 1st year of their course.

COURSE OBJECTIVES:

- The objective of this subject is to provide an outline of anatomy to improve the students understanding the technical and diagnostic procedures used, with special emphasis on limbs, thoracic and abdominal viscera, osteology, neuro anatomy, endocrine system, basic radiology

Syllabus:

LEARNING OUTCOMES:

After completion of the1st year course -at the end of second semester, the student must be able to know the following:

a. Neurology

1.Mention any four cranial nerves

2.Surfaces & Lobes of cerebrum

3.Parts of Hind brain

4.Cranial nerves

5.Parts of brain stem and cranial nerves attached to it

6.Coverings of Brain

7.Broca's area

8.White fibres of cerebrum

b. Gastro Intestinal Tract

1. Describe briefly the location, surfaces, lobes, relations, and blood supply of Liver?

2. Porta hepatis

3.Parts &Blood supply of stomach

4, Differences between Small& Large Intestines

5.Ligaments of Liver

6.Appendicitis

c. Excretory & Reproductive systems

1.Name the components of female reproductive system and Describe uterus and its supports.

2.Internal structure of kidney

3.Visceral Relations of kidney

4.Nephron

5.Coverings of Testis

6.Parts of Fallopian tube

7.Layers of scrotum

8. Spermatic cord

9.Male urethra &its parts

d. Endocrine system & others

1.Name the Endocrine glands and Explain the morphology and blood supply of Thyroid gland.

2.Adenohypophysis

3.Dwarfism

4.Adrenal medulla

5.Diabetes mellitus

6. Blood supply of Thyroid gland

7.Islets of langerhans

8.Goiter

9.Endocrine part of Pancreas

COURSE OUTCOMES:

- This course is aimed to make the student to gain knowledge in basic anatomy of various regions like limbs, thoracic and abdominal viscera, osteology, neuro anatomy, endocrine system, basic radiology which provides foundation in completion of the course.
- Enable to understand about the Gastro Intestinal Tract, location, surfaces, lobes, relations, and blood supply of Liver.
- Enables to understand about the Endocrine glands and explain the morphology and blood supply of Thyroid gland.

References:

1. Anatomy and physiology –Vijaya D Joshi, Ashalatha N Nandedkar, Sadhana S Mendhurwar
2. Anatomy and physiology- InduKhurana and ArushiKhurana
3. Human anatomy &physiology for nursing -Mahindra Kumar Anand&MeenaVerma
4. Understanding human anatomy & physiology- William Davis(McGrawHill)

PSGY1011: PHYSIOLOGY-II

SEMESTER-II

(With effect from 2022-23 admitted batch)

Introduction

Physiology is the study of functions and mechanisms in a living system. physiology focuses on individual organs, cells, and biomolecules carry out the chemical and physical functions in a living system. Physiological *state* is the condition of normal function and this course helps in understanding the functions of endocrine system, renal physiology and reproductive physiology.

Course Objectives:

- To know about functions and physiological anatomy of endocrine system - Thyroid, Adrenal, Parathyroid, Pituitary glands and Pancreas.
- To impart knowledge related to physiological structure of kidney and the nephron and its functions.
- To understand about reproductive system, process and methods of determination of ovulation.
- To know about types of joints, the structure and formation of cartilage and the structure and formation of bone.

SYLLABUS

1 - Endocrine system

1. Describe the physiological anatomy of Thyroid gland, functions and its applied physiology
2. Describe the physiological anatomy of Adrenal gland, functions and its applied physiology
3. Describe the physiological anatomy of Parathyroid gland, functions and its applied physiology
4. Describe the physiological anatomy of Pancreas, its functions and its applied physiology
5. Describe the physiological anatomy of hypothalamus and the Pituitary gland, their functions and its applied physiology

2 - Excretory system

1. Describe the physiological structure of kidney and the nephron and its functions
2. Describe the GFR and factors affecting GFR
3. Describe the Substances absorbed and secreted from renal tubules
4. Describe the various Renal function tests
5. Describe briefly the Urinary bladder and its functions and the physiology of micturition Skin
6. Describe the Structure and functions of skin

3 - Reproductive system

1. Describe the Physiology of Puberty

2. Describe the process of menstruation, normal menstrual cycle, menarche and menopause.
3. Describe briefly the process of Ovulation and methods of determination of ovulation
4. Describe briefly the normal physiology of pregnancy and mention the diagnostic tests for pregnancy and their physiological basis
5. Describe briefly the functions of placenta and pregnancy diagnostic tests
6. List out the Contraceptive methods in male and female
7. Describe the Spermatogenesis

4 - Bone & Joints

1. Describe the types of joints, the structure and formation of cartilage and the structure and formation of bone.

PRACTICALS

HAEMATOLOGY

1. Estimate Hemoglobin in given blood sample
2. Estimate bleeding time & clotting time
3. Measure ESR of given blood sample
4. Perform RBC count of given blood sample
5. Perform WBC count of given blood sample
6. Perform a differential WBC count of the given sample
7. Calculation of blood indices
8. Determine blood group of a given sample

CARDIOVASCULAR SYSTEM

1. Measure pulse rate, heart rate
2. Measure BP
3. Measure weight and height and calculate Body Mass Index
4. Demonstrate examination of heart – inspec JVP, localize apex beat, look for any abnormal pulsations, percuss cardiac dullness, auscultate heart for normal sounds
5. Record an ECG

RESPIRATORY SYSTEM

1. Measure respiratory rate & temperature
2. Demonstrate examination of respiratory system – inspect the chest for symmetry, movements, localize apical impulse and trachea, measure chest expansion, percuss the chest for lung resonance, liver dullness, auscultate lungs for breath sounds
3. Perform spirometry in a given individual and interpret the values

CENTRAL NERVOUS SYSTEM

1. Demonstrate examination of the cranial nerves
2. Demonstrate examination of the motor system – bulk, tone, power of different groups of muscles, coordination, gait
3. Assist in the recording of an EEG
4. Demonstrate the various sensory and motor reflexes - abdominal, plantar, biceps, triceps, supinator, knee, ankle
5. Demonstrate examination of sensory system – fine touch, pain, vibration

Course Outcomes:

- At the end of this course the student will be able to To understand the physio log anatomy Thyroid, Adrenal, Parathyroid, Pituitary glands and Pancreas and their applied aspects.
- To understand physiological structure and functioning of kidney and the nephron.
- To understand about the physiology of reproductive system and applied aspects
- To know about the types of joints, the structure and formation of cartilage and the structure and formation of bone.

References:

1. Text book of physiology for BDS AK Jain 6th edition
2. Text book of physiology for BDS Sembulingam 3rd edition
3. Physiology in nutshell by AK Jain 5th edition
4. Manual of practical physiology for BDS AK Jain 4th edition
5. Handbook of human physiology Vidyaratan 7th edition

PATH1001:CLINICAL LABORATORY PRACTICE

Semester II

(With effect from 2022-23 admitted batch)

1. Laboratory Services : levels of laboratories – Primary level, Secondary level and tertiary level. Reference laboratories, Research laboratories and specific disease reference laboratories.

2. Infrastructure in the laboratories.

a) Laboratory space : Reception, specimen collection, quality water supply, power supply, work area, specimen / sample / slide storage, cold storage, record room, wash room, biomedical waste room, fire safety, etc.

b) Personnel in the laboratory : Qualifications as per NABL document.

c) Equipment: Listing, cleaning, maintenance, SOP, verification of performance : Internal quality control.

d) Reagents and materials: Purchase, maintenance, storage, use

3. Specimen Collection, storage and Transport : General guidelines of collection, labeling, handling, transportation storage of specimens. Care in handling specimens. Accession list, Worksheet, Reporting test results, Specimen rejection record, Recording of Laboratory data, Maintenance of records.

4. Standard operating Procedure : Definition, format, text of SOP, types of SOP

5. Safety in Laboratories : General safety measures, biosafety precautions, levels of biosafety laboratories: BSL1, BSL2, BSL3, BSL4.

6. Ethical considerations : Non – maleficence, beneficence, risk minimization,institutional arrangement, ethical review, transmission of ethical values, voluntariness, compliance.

7. Quality assurance : Internal and external quality assessment.

8. Bio waste management.

9. Accidents and emergencies in the laboratory.

Practicals:-

1. Writing SOP of equipment maintenance, practical procedures done in the laboratory
2. Internal / External quality control
3. Sample collection, labeling, storage, transportation
4. Biowaste management
5. Biosafety

References: -

1. ICMR (2008) guidelines for good clinical laboratory practices.
2. Hospital waste Management: Chapter 13. Park's Text Book of Preventive and Social Medicine;18th Ed.
3. NIH : DAIDS guidelines for Good Clinical Laboratory Practice Standards; 2011.
4. WHO : Good Clinical Laboratory Practice (GCLP), 2009. 28

SEMESTER-III

S. No	Course Code	Course Title	Course Category
1	PHCG2001	BIOCHEMISTRY - I	C
2	MIBG2001	MICROBIOLOGY - I	C
3	PATH2001	PATHOLOGY - I	C

MIBG2001 – MICROBIOLOGY:
SEMESTER-III

(with effect from 2022-23 admitted batch)

Introduction:

The goal of teaching Microbiology is to provide understanding of the natural history of infection and diseases in order to deal with the Etiology, pathogenesis, Pathogenecity, laboratory diagnosis, treatment control and prevention of these infections and infectious diseases.

COURSE OBJECTIVES:

1. Plan and interpret Laboratory investigations for diagnosis of infectious diseases and correlate the clinical manifestations with the etiological agent.
2. Perform simple laboratory test which help to arrive at rapid diagnosis.
3. Understand methods of disinfection and sterilization and their application to control and prevention of hospital acquired infections.

SYLLABUS:

I. General Bacteriology:

1. History of Microbiology.
2. Classification of Microorganisms
3. Microscopes.
4. Structure of Bacterial cells.
5. Staining methods.
6. Growth & Nutrition of bacteria.
7. Culture media and culture methods–Aerobic, Anaerobic
8. Biochemical Tests for identification.
9. Bacterial Metabolism.
10. Theory and practical aspects of sterilization, disinfection.
11. Bacterial genetics.
12. Molecular methods of Diagnosis: NAT.
13. Anti-microbial agents and resistance.
14. Antibiotic sensitivity tests.
15. Hospital waste management.
16. Quality control in Microbiology.
17. Laboratory safety.
18. Infection, source, Transmission.
19. Virulence factors and toxins.

II. Immunology:

1. Immunity: Types.
2. Innate Immunity.
3. Antigens and Antibodies.
4. Antigen–Anti body reaction: Agglutination, precipitation, CFT.
5. Specialized Techniques: RIA,ELISA, Immunofluorescence, Dot–Blot & Rapidassays.
6. Humoral Immune response and CMI.
7. Monoclonal antibody and hybridoma techniques.
8. Hyper sensitivity reactions.
9. Autoimmunity, tumour immunity, transplantation.
10. Immunodeficiency: Primary, Secondary, AIDS. Biochemical Tests for identification.
11. Bacterial Metabolism.
12. Theory and practical aspects of sterilization, disinfection.
13. Bacterial genetics.
14. Molecular methods of Diagnosis: NAT.
15. Antimicrobial agents and resistance.
16. Antibiotic sensitivity tests.
17. Hospital waste management.
18. Quality control in Microbiology.
19. Laboratory safety.
20. Infection, source, Transmission.
21. Virulence factors and toxins.

COURSE OUTCOMES:

- Knowledge about the association of Micro-organisms in Disease and HealthRequirement and the common pathogens of Medical importance
- Know about the commonly used Microbiology Laboratory equipment and thecleaning of glassware
- Know about Collection, Transportation and processing of clinical samples forMicrobiological Investigations
- Knowledge about Sterilization and Disinfection practices
  - Development of skills of Media pouring
  - Slide and Smear preparation
  - Performing Staining techniques in Microbiology (Simple staining, Gram's staining,AFB staining)

References:

1. Ananthanarayan and Paniker's Textbook of Microbiology – 10th edition
2. Textbook of Microbiology C P Baveja

PATH2001 – PATHOLOGY:
SEMESTER-III
(With effect from 2022-23 admitted batch)

Introduction:

The goal of teaching Pathology is to provide comprehensive knowledge of the causes and mechanisms of the duties in order to enable to achieve complete understanding of the natural history and clinical manifestation of the diseases.

COURSE OBJECTIVES:

1. To describe the rationale and principles of technical procedures of diagnostic laboratory tests.
2. To know about basic diagnostic tests and correlate with clinical and morphological features of diseases.
3. To learn about commonly used bedside tests on blood, urine and other relevant samples.

SYLLABUS:

THEORY:

HAEMATOLOGY

1. Haemopoiesis, stem cells, formed elements and their functions
2. Normal constituents of blood, their structure and functions
3. Blood collection
4. Anticoagulants used in Hematology
5. Normal values in Hematology
6. Basic Hematological Techniques
7. RBC counts
8. Hemoglobin estimation
9. Packed cell volume
10. Calculation of Red cell indices
11. WBC counts - Total and differential
12. Absolute eosinophil count
13. Platelet count
14. Erythrocyte sedimentationrate.
15. Preparation of blood films
16. Stains used in Hematology
17. Morphology of redcells and its significance
18. Morphology of leucocytes and its significance
19. Morphology of platelets and its significance
20. Preparation of buffy coatsmears

21. Reticulocyte count
22. Bone marrow
    a. Aspiration – technique, preparation and staining of films
    b. Bone marrow biopsy

23. Laboratory methods used in the investigation of deficiencyanaemias
    a. Iron study profile
    b. B12 and Folate assay
    c. Schilling test

24. Laboratory methods used in investigation of hemolytic anemias
    a. Osmotic fragility
    b. Sickling test
    c. Estimation of Hb-F, Hb A2

25. Organization and quality control in hematology laboratory
26. Preparation of glassware

CLINICAL PATHOLOGY

a. Urine examination –Collection and preservation, Physical, Chemical and Microscopic examination
b. Examination of faeces for occult blood
c. Examination of body fluids - cell counts
d. Semen analysis
e. Sputum examination

Instrumentation

1. Light microscope – parts and its uses
2. Hematology equipment's – ESR tube, PCV tube, Modified neubeur chamber etc,.
3. Bone marrow aspiration and biopsy needles
4. Automation in hematology - Cell counters
5. Hb electrophoresis
6. HPLC
7. Automated urine analyzer
8. Computer assisted semen analysis

PRACTICAL

CLINICALPATHOLOGY

- Complete Urine Analysis
- Body Fluids and miscellaneous samples

- Cerebrospinal Fluid in Health & Disease Semen analysis
- Stool examination for Occult blood

HAEMATOLOGY

- Peripheral blood smear – principle, preparation of smear, staining and examination
- Thin and thick smear preparation and staining
- Reticulocyte count
- ESR
- Sickling test
- Bone marrow smears - staining and examination

PHCG2001; BIOCHEMISTRY: SEMESTER-III

(With effect from 2022-23 admitted batch)

UNITS	THEORY TOPICS
UNIT - 1	Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards, Atomic structure, Valency, Acids, Bases and salts
UNIT – 2	Concepts of Acid base reaction and Hydrogen ion Concentration
UNIT – 3	Principles of photometry and spectrophotometry, laws of absorption, wave length, turbidimetry, calibration, transmittance, absorption, standard, blank, Beer's law
UNIT - 4	Carbohydrate chemistry - Define carbohydrates, classify carbohydrates with examples, explain glycosidic bond, Illustrate structure, composition, sources, properties and functions of monosaccharides, disaccharides, oligosaccharides, and polysaccharides, Explain glycosaminoglycan (mucopolysaccharides), Reactions of Carbohydrates.
UNIT - 5	Chemistry of Amino-acids – Define and classify amino acids, Define peptides and explain peptide bonds, list the biologically important peptides.
UNIT – 6	Vitamins –Define vitamins and classify them according to solubility, List the sources, Coenzyme forms, functions, Recommended Dietary Allowance (RDA), Describe about digestion, absorption and transport, deficiency and toxicity of individual vitamins
UNIT - 7	Carbohydrate Metabolism– Illustrate glycolysis-aerobic, anaerobic, citric acid cycle, substrate level phosphorylation. Elaborate glycogen metabolism - glycogenesis, glycogenolysis, metabolic disorders of glycogen, gluconeogenesis, Cori cycle Summarize hormonal regulation of blood glucose, glycosuria, diabetes mellitus, Glucose Tolerance test, Normal and Diabetic patterns

UNITS	PRACTICAL TOPICS
UNIT – 1	Introduction to lab apparatus, Chemical balance, Principles and practice, maintenance of laboratory, glassware and apparatus.
UNIT - 2	Preparation of normal solutions, molar solutions, % solutions, reagents, standards and dilution techniques.
UNIT – 3	Identification of carbohydrates (glucose, fructose & sucrose)
UNIT – 4	Reactions of Non Protein Nitrogenous substance

SEMESTER-IV

S. No	Course Code	Course Title	Course Category
1	PHCG2011	BIOCHEMISTRY – II	C
2	MIBG2001	MICROBIOLOGY - II	C
3	PATH2001	PATHOLOGY - II	C

MIBG2011 – MICROBIOLOGY:

SEMESTER-IV

(with effect from 2022-23 admitted batch)

INTRODUCTION:

The goal of teaching Microbiology is to provide an understanding of the natural history of infection and diseases in order to deal with the Etiology, pathogenesis, Pathogenicity, laboratory diagnosis, treatment control and prevention of these infections and infectious diseases.

COURSE OBJECTIVES:

1. Plan and interpret Laboratory investigations for diagnosis of infectious diseases and correlate the clinical manifestations with the etiological agent.

2. Perform simple laboratory test which help to arrive at rapid diagnosis.

3. Understand methods of disinfection and sterilization and their application to control and prevention of hospital acquired infections.

SYLLABUS:

I. Systematic Bacteriology:

1. Gram positive cocci :Staphylococcus, streptococcus, Enterococcus.
2. Gram Negative cocci: Neisseria, Moraxella.
3. Gram positive bacilli: Corynebacterium, Nocardia, Actinomyces, Bacillus, Listeria.
4. Gram Negative Bacilli: Entero bacteriaceae: E.coli,klelesiella,enterobacter,proteus pseuduomonas, vibrios,camphylobracter,brucella,haemophilus,bordetella,pasterella,francisella.
5. Anaerobic Bacteria: Clostridium, Gram negative bacilli.
6. Mycobacterium.
7. Spirochactes: Treponema,Borrelia,Leptospira.
8. Chalmydia, Mycoplasma,Rickettsia.

II. Bacterial Infections and Diagnosis:

1. Urinary Tract infection.
2. Respiratory tract infection.
3. Diarrhoeal diseases.
4. CNS Infections.
5. Wound Soft tissue and bone infections.
6. Blood stream infection..
7. Sexually transmitted infections.
8. Hospital acquired infections

PATH2011 – PATHOLOGY:

SEMESTER-IV

(with effect from 2022-23 admitted batch)

INTRODUCTION:

The goal of teaching Pathology is to provide comprehensive knowledge of the causes and mechanisms of the duties in order to enable to achieve complete understanding of the natural history and clinical manifestation of the diseases.

COURSE OBJECTIVES:

1. To describe the rationale and principles of technical procedures of diagnostic laboratory tests.
2. To know about diseases of Haematology, GI tract respiratory system, cardiovascular system and endocrinology.

SYLLABUS: **THEORY**

HISTOPATHOLOGY

1. Introduction to Histopathology:
2. Structure and functions of normal cell
3. Reception of specimens
4. Various fixatives – Mode of action, Indications, Preparation.
5. Grossing techniques
6. Steps of tissue processing and embedding.

CYTOLOGY

Exfoliative cytology and Interventional cytology

i) Exfoliative Cytology:

- Processing of samples in the Laboratory
- Female Genital tract- Anatomy, structure and Physiology of female genital tract and Ovarian hormones, Techniques of collection of sample.

Pap Smears:

- Lateral Vaginal wall smears
- Vaginal 'pool' or 'vault' smears
- Cervical smears
- Combined (fast)smears
- Triple smears (cervical-vaginal-endocervicalsmears)
- Endocervical and endometrialsmears.

- Respiratory Tract

  - Selection of material and making smears
  - Bronchial Aspiration (Washings)
  - Bronchial Brushing

- Urinary Tract:
  - Collection and preparation of samples
  - Urinary sediment Cytology
  - Bladder Irrigation (Washings) Cytology
  - Prostatic massage – Cytology

- Body Fluids:
  - Effusions in body cavities and
  - Fluids of small volume.
  - Effusions – Ascitic, pleural, pericardial, synovial
  - Cerebrospinal Fluid(CSF) - Normal CSF, CSF in diseases

- Fixation and Fixatives in Cytology:
  - Routine Fixatives
  - Coating Fixatives
  - Special purpose fixatives
- Preservation on fluid samples

- Staining of smears:
  - Papanicolaou's stain – principle, preparation of reagents and procedure
  - H & E stain - principle, preparation of reagents and procedure
  - Romanowsky stains - Leishman's, May Grunwald-Giemsa (MGG) and Wright'sstains.

- Interventional Cytology:
  - Fine Needle Cytology
  - Imprint cytology
  - Crush smear cytology
  - Biopsy sediment cytology

Instrumentation

- Balances, water bath
- Hot air oven
- Tissue weighingmachines
- TissueProcessor
- Microtomes,Knives
- Knifesharpener
- Pap smear kit
- Instruments forgrossing

PRACTICAL

HISTOPATHOLOGY:

- Tissue Processing
- Embedding,
- Block preparation
- Use and care of Microtome and Microtome knives
- H & E staining

CYTOLOGY:

- Wet film preparation and Fixation,
- Staining (H&E, Pap, MGG and Shorr) of vaginal smears, cervical smears and sputum.
- FNAC (Fine Needle Aspiration Cytology) - preparation of smears and staining.

Reference Books in Pathology:

Sl. No	Pathology books	Authors name	Publisher name
1	Histopathology Techniques	C.F.A. Culling	Butter Worth
2	Lab Techniques WHO Manual Bio-Safety	W.H.O.	W.H.O
3	Exfoliative Cytology Hand Book	English M.c.Lure	Lippincott
4	Clinical Diagnosis in lab methods	Todd & Sanford	Book Saunders
5	Hand book of pathology	Harsh Mohan	Anshan
6	Practical Hematology	Lewis & Davis	Churchill living stone
7	Histological Techniques	Bancroft	Churchill living stone

BIOCHEMISTRY:

SEMESTER-IV

(with effect from 2022-23 admitted batch)

UNITS	THEORY TOPICS
UNIT - 1	Chemistry of Lipids – Fatty acids, Triglycerides, Cholesterol, Phospholipids.
UNIT – 2	Chemistry of Nucleic Acids - Show nucleotide composition and list functions of free nucleotides in body, Compare between DNA & RNA, explain structure and functions of DNA & RNA (tRNA, rRNA, mRNA)
UNIT – 3	Structure and functions of heme
UNIT – 4	Hemoglobin catabolism
UNIT - 5	NPN substances – Urea, Uric acid &Creatinine significance and tests
UNIT - 6	Lipid Metabolism – Beta Oxidation, Ketogenesis&Ketolysis, Cholesterol synthesis, Serum Lipoprotein pattern – Normal and alteration in disease
UNIT – 7	Flame Photometry, atomic absorption Spectrophotometry
UNITS	**PRACTICAL TOPICS**
UNIT – 1	Reactions of Abnormal Constituents of Urine sample
UNIT – 2	Estimation of Blood Glucose
UNIT – 3	Estimation of Blood Urea
UNIT - 4	Glucose strip tests

SEMESTER: V

S. No	Course Code	Course Title	Course Category
1	PHCG2001	BIOCHEMISTRY – III	C
2	MIBG2001	MICROBIOLOGY – III	C
3	PATH2001	PATHOLOGY - III	C

PATH2001 – PATHOLOGY:
SEMESTER-V
(With effect from 2022-23 admitted batch)

THEORY

HISTOPATHOLOGY

1. Sectioncutting.
2. Mode of preparation and theory of Haematoxylin & Eosinstaining
3. Various aspects of mounting and staining theslides
4. Decalcification and variousmethods
5. Use of PolarizingMicroscope, Phase contrast Microscope and FluorescentMicroscope.

IMMUNOHISTOCHEMISTRY

- Introduction.
- Overview of Immunohistochemistry.
- Applications of Immunohistochemistry.

IMMUNOCYTOCHEMISTRY

- Introduction.
- Basic concepts ofImmunochemistry
- Immunocytochemical methods (immunoperoxidase and immunoalkaline phosphataseetc).

SPECIALSTAINS

1. Mucicarmine
2. P.A.S.
3. Reticulin stain
4. Oil Red"O"
5. AlcianBlue
6. CongoRed
7. Verhoeff's stain
8. Mallory's Phosphotungstic Acid Hematoxylin stain(PTAH)
9. Van Gieson stain
10. Masson's Trichrome stain
11. AFB Staining – for tissue sections of Tuberculosis and Leprosy

CYTOLOGICAL EXERCISE

Sex chromatin – Buccal smear examination

ADVANCED TECHNOLOGIES

- Flow cytometry
- Cytogenetics – Karyotyping, FISH
- PCR

INSTRUMENTATION

- Rotary microtome
- Grossing station
- Antigen retrieval
- Flow cytometry

- FISH
- RT PCR

PRACTICAL

HISTOPATHOLOGY

- Demonstration of Tissue Section cutting
- H & E staining
- Immunohistochemistry staining – Demonstration

CYTOLOGICAL EXERCISE

- Buccal smear staining and examination

SPECIAL STAINS

- PAS
- Masson trichrome
- Alcian blue
- Congo red
- Reticulin stain

AFB stain

MIBG2011 – MICROBIOLOGY:

SEMESTER-V

(with effect from 2022-23 admitted batch)

I. Virology:

1. General Properties& Classification of Viruses
2. Replication of Virus
3. Lab:Diagnosis of Viralinfections–Tissueculture, Cellculture
   Electronmicroscopy, Fluorescenttests
   Serology,PCR
4. Bacteriophage, phagetyping
5. Viralvaccines, antiviralagents
6. Characteristics, modeofinfection, spread, diseases and labdiagnosis of:
   a. Herpesviruses:HSV,VZV,EBV,CMV
   b. Adenovirus
   c. Papillomavirus
   d. Respiratoryvirus:Influenza,PIF,RSV,Rhinovirus,Mumps,Measles,Rubella
   e. Poliovirus
   f. Rabiesvirus
   g. Importantamboviruses:Dengue,JEV,KFD,Chickunguniya
   h. HIV
   i. HepatitisViruses

II. Mycology:

1. Fungi–Characteristic, Classification, Lab Diagnosis
2. Cryptococcus
3. Dermatophytes
4. Subcutaneous Mycoses: Sporothrix, Mycetoma, Rhinosporidium
5. Dimorphic Fungi
6. Apergillus, Mycetoma

BIOCHEMISTRY:

SEMESTER-V

(with effect from 2022-23 admitted batch)

UNITS	THEORY TOPICS
UNIT - 1	Enzymes - Definition, Classification, Co-enzymes, Co-factors, inhibitors effecting enzyme activity, units of measurement, Iso-enzymes, normal values of different serum enzymes and their variation in diseases.
UNIT – 2	Plasma Proteins – Plasma protein concentration & Biochemical changes in disease, fractionation techniques, interpretation. Immunoglobulins - Structure and functions
UNIT – 3	ProteinChemistry -Classification, structureand functions of proteins.
UNIT – 4	Protein Metabolism - Define Catabolism of amino acids- transamination, deamination, Illustrate fate of ammonia, transport of ammonia, Urea cycleOutline the specialized products formed from amino acids
UNIT - 5	Sample Collection, Preservation and Preparation of Protein free filtrate
UNIT - 6	Automation - Auto-Analyser
UNITS	**PRACTICAL TOPICS**
UNIT – 1	Estimation of Total Serum protein
UNIT – 2	Estimation of Albumin and A/G ratio
UNIT – 3	Estimation of Protein in CSF
UNIT - 4	Estimation of Serum Creatinine and Creatinine clearance

SEMESTER-VI

S. No	Course Code	Course Title	Course Category
1	PHCG2001	BIOCHEMISTRY – IV	C
2	MIBG2001	MICROBIOLOGY – IV	C
3	PATH2001	PATHOLOGY -IV	C

PATH2001 – PATHOLOGY:
SEMESTER-VI
(With effect from 2022-23 admitted batch)

THEORY

BLOOD BANKING

1. ABO Blood GroupSystem.
2. Rh typing and weaker variants in Rhsystem.
3. Subgroups and weaker variants of A and B: BombayPhenotype.
4. Coomb's test – Direct and Indirect
5. Blood grouping and compatibility test (cross matching) in bloodbank.
6. Collection and processing ofdonor blood.
7. Preservation of blood, blood components and its application in blood banking.
8. Screening tests for blood transfusion
9. HLA Antigens and their significance in Bloodtransfusion.
10. Blood transfusion reactions
11. Investigations of transfusion reactions.
12. Blood BankAdministration.

BLEEDING DISORDERS

1. Mechanism of coagulation
2. Collection and anticoagulants used in coagulation studies.
3. Bleeding time and clotting time.
4. Platelet count.
5. Platelet function tests.
6. Prothrombin time (PT)
7. Activated partial thromboplastin time (APTT)
8. Thrombin time
9. Other coagulation studies

FROZEN SECTIONS ANDCRYOSTAT

Frozen Sections:

a) FreezingMicrotome.
b) Frozen Section Technique.

Cryostat:

a) Types
b) Operation ofCryostat
c) Cryostat CutSections and staining.

MUSEUM TECHNIQUES

- Preparation of specimens for mounting,
- Methods of mounting,
- Preparation of mounting solutions and colour maintenance

INSTRUMENTATION

- FreezingMicrotome.
- Cryostat.

- Automation in blood banking
- Application of Computers inPathology.

PRACTICAL

BLOOD BANKING

- Blood grouping
- Cross matching
- Screening tests for blood transfusion – HIV, HbsAg, Malaria, syphilis, HCV

BLEEDING DISORDERS

- Bleedingtime (BT)
- Clotting time (CT)
- PT and APPT demonstration – Manual and automated

MOUNTING OF MUSEUMSPECIMENS

- Routine mounting of specimens
- Mounting in glass jars
- Special methods of mounting

Reference books

1) Clinical Diagnosis & Laboratory methods by Todd &Sanford.
2) Histopathology Techniques by Culling.
3) Histopathology Techniques by Bancroft.
4) Aspiration Biopsy cytology by TildeKline.
5) Cytology by Koss.
6) Practical Haematology by Davis &Lewis.
7) 50 Diagnostic special stains for Surgical Pathology by Erwin Haaf.
8) Text Book of Pathology by Harsh Mohan
9) Lab Techniques WHO Manual.
10) Exfoliative Cytology

MICROBIOLOGY:

SEMESTER-VI

(with effect from 2022-23 admitted batch)

Parasitology:

1. Types of parasites, classification of protozoa and Helminths.
2. Collection, preservation and processing of stool specimen.
3. Examination of bloodparasites: Methods.
4. Basic structure, Life history, formsseen in clinical specimen and Lab diagnosis of
   a. Protozoa: Entamoeba, Giardia, Trichomoras, B.Coli,Trypanosomes, Leishmania, Plasmodium,Toxoplasma,Isospora, Cryptosporidium, Microsporidium.
   b. Helminths: Ascaris, Hookworms, strongyloides, Trichinella, Enterobius, Trichuries,Filarialworms,Guineaworm, Taenia,Echinococcus, Hymenolepis, schistosona, Diphyllobothrium ,paragonimus.
5. Roles of Arthropds in disease transmission.
6. Mosquito Borne Diseases, morphology of anopheles,culex,aedes mosquitoes.

ReferenceBooks:

1) Textbook of Microbiology–Ananthanarayan&Panikar
2) Textbook of Microbiology–Prof.C.P.Baveja
3) Textbook of MedicalParasitology–CKJayaramPanikar
4) TextBook of PracticalMicrobiology–Dr.S.C.Parija

BIOCHEMISTRY:

SEMESTER-VI

(with effect from 2022-23 admitted batch)

UNITS	THEORY TOPICS
UNIT – 1	Mineral Metabolism – Define minerals and list the sources for mineral and their Recommended Dietary Allowance, Describe digestion, absorption, transport, excretion of various minerals, List the functions and disorders of individual minerals – Calcium, phosphate, iron, magnesium, fluoride, selenium, Sodium, Potassium, Chloride & Copper
UNIT – 2	Acid –Base Balance - Define acids, base and pH, Define buffers and describe buffer systems of the body (bicarbonate buffer system), Elaborate about the role of lungs and kidneys in acid-base balance, Acid base disorders.
UNIT – 3	Organ function tests – RFT, LFT, TFT
UNIT – 4	Electrophoresis and chromatography techniques
UNIT – 5	Calculi formation
UNIT - 6	Accuracy, Precision and Quality control
UNITS	**PRACTICAL TOPICS**
UNIT – 1	Estimation of Total Cholesterol & Triglycerides
UNIT – 2	Estimation of Calcium
UNIT – 3	Estimation of Uric acid
UNIT - 4	Determination of SGOT, SGPT, ALP,LDH, Amylase
UNIT – 5	Demonstration - Estimation of Total Bilirubin, Estimation of T3, T4, TSH, B12 & Foliate Assay, Serum Iron and Iron binding capacity
UNIT – 6	Auto analyser – Test processing