

## **B. VOC**

**In**

# **MEDICAL LAB TECHNOLOGY (UGC)**

**Program Outcomes:**

- Perform routine clinical laboratory procedures within acceptable quality control parameters in Hematology, Chemistry, Immunohematology, and Microbiology under the general supervision of a Clinical Laboratory Scientist or Pathologist.
- Demonstrate technical skills, social behavior, and professional awareness incumbent upon a laboratory technician
- Apply systematized problem solving techniques to identify and correct procedural errors, identify instrument malfunctions and seek proper supervisory assistance, and verify the accuracy of laboratory results obtained.
- Operate and maintain laboratory equipment, utilizing appropriate quality control and safety procedures.
- Recognize and participate in activities which will provide current knowledge and upgrading of skills in laboratory medicine.

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**(Effective for Academic Session 2018-2019)**

**Course Relevance:**

The medical sector in India is going through a boom phase. B. Voc in Medical Lab Technology is being one of such important course under the medical sector. With the growing complexity of the course, the scope of this course had expanded over the years. Medical lab technology in India has a whole variety of fields.

The medical treatment starts only after the diagnosis of the disease and diagnose, doctors need various kinds of analysis through tests. On the basis of the outcome of these tests, they treat and give advice for prevention. This is where the crucial role of Medical Laboratory Technology comes in picture.

Medical lab technicians can find employment in hospitals, medical pathology labs, research labs, urologist office, private laboratory, blood donor centers, Healthcare center or clinics and pharmaceuticals. One can also work as a freelancer as well as a Phlebotomist and have great earnings. Medical lab technicians can also find jobs in research facilities, crime laboratories, universities, pharmaceutical companies and military.

Aspirants can get the jobs of CT scan technicians, anesthesia technicians, laboratory technicians, MRI technicians, X - ray technicians, dental machines, Operation theatre technicians, pathology technicians, optical laboratory, physiotherapy technicians, plaster technicians, renal dialysis and radiology technicians.

**TOTAL DURATION OF COURSE: 3 Years**

- ✓ After completion of Year - 1 Diploma is awarded.
- ✓ After completion of Year - 2 Advance Diploma is awarded.
- ✓ After completion of Year - 3 B. VOC Degree is awarded.

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**Year - 1 - Diploma (SEMESTER - I)**

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 101 ENGLISH LANGUAGE AND COMMUNICATIVE SKILLS	Generic	Theory	10	40	-	-	1	1	-
UGEN - 102 COMPUTER FUNDAMENTALS & IT	Generic	Theory	10	40	-	-	1	1	-
UMLTV - 103 LABORATORY SCIENCE & HUMAN BODY	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 104 MICROBIOLOGY - I	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 105 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY	Skill	Theory	10	40	-	-	1	1	-
UGEN – 191 COMPUTER FUNDAMENTALS & IT LAB	Generic	Practical	-	-	10	40	-	-	2
UMLTV - 192 MICROBIOLOGY LAB - I	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 193 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY LAB	Skill	Practical	-	-	10	40	-	-	2
UGEN – 181 ENGLISH LANGUAGE LAB	Generic	Sessional	-	-	-	50	-	-	2
UMLTV - 182 LABORATORY SCIENCE & HUMAN BODY LAB	Skill	Sessional	-	-	-	50	-	-	2
<p><b>All Generic Components common to all B. Voc. courses.</b>  <b>Industrial Training of 3 - 4 weeks of 6 credits in each year followed by report writing and Viva Voce.</b>  <b>These credits will be evaluated in semester 6</b></p>									

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**Year - 1 - Diploma (SEMESTER - II)**

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 201 SOFT SKILL & PERSONALITY DEVELOPMENT	Generic	Theory	10	40	-	-	1	1	-
UGEN - 202 BUSINESS ANALYSIS: ENVIRONMENT, SALES & MARKETING	Generic	Theory	10	40	-	-	1	1	-
UMLTV - 203 ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESS	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 204 MICROBIOLOGY - II	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 205 BIOCHEMISTRY - I	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 291 ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESS LAB	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 292 MICROBIOLOGY LAB - II	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 293 BIOCHEMISTRY LAB - I	Skill	Practical	-	-	10	40	-	-	2
UGEN - 281 SOFT SKILL & PERSONALITY DEVELOPMENT LAB	Generic	Sessional	-	-	-	50	-	-	2
UGEN - 282 PRACTICE SESSION ON BUSINESS ANALYSIS: ENVIRONMENT, SALES & MARKETING	Generic	Sessional	-	-	-	50	-	-	2
<b>All Generic Components common to all B. Voc. courses.</b> <b>Industrial Training of 3 - 4 weeks of 6 credits in each year followed by report writing and Viva Voce.</b> <b>These credits will be evaluated in semester 6</b>									

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**Year - 2 - Advanced Diploma (SEMESTER - III)**

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 301 VALUE EDUCATION & HUMAN RIGHTS	Generic	Theory	10	40	-	-	1	1	-
UGEN - 302 BASIC ACCOUNTING	Generic	Theory	10	40	-	-	1	1	-
UMLTV - 303 MICROBIOLOGY - III	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 304 PATHOLOGY - I	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 305 HEMATOLOGY - I	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 391 MICROBIOLOGY LAB – III	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 392 PATHOLOGY LAB – I	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 393 HEMATOLOGY LAB – I	Skill	Practical	-	-	10	40	-	-	2
UGEN - 381 PRACTICE SESSION ON VALUE EDUCATION & HUMAN RIGHTS	Generic	Sessional	-	-	-	50	-	-	2
UGEN - 382 PRACTICE SESSION ON BASIC ACCOUNTING	Generic	Sessional	-	-	-	50	-	-	2
<p><b>All Generic Components common to all B. Voc. courses.</b>  <b>Industrial Training of 3 - 4 weeks of 6 credits in each year followed by report writing and Viva Voce.</b>  <b>These credits will be evaluated in semester 6</b></p>									

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**Year - 2 - Advanced Diploma (SEMESTER - IV)**

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 401 ENVIRONMENTAL STUDIES	Generic	Theory	10	40	-	-	1	1	-
UGEN - 402 QUALITY MANAGEMENT	Generic	Theory	10	40	-	-	1	1	-
UMLTV - 403 BIOCHEMISTRY - II	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 404 PATHOLOGY - II	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 405 HEMATOLOGY - II	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 491 BIOCHEMISTRY LAB – II	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 492 PATHOLOGY LAB – II	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 493 HEMATOLOGY LAB – II	Skill	Practical	-	-	10	40	-	-	2
UGEN - 481 PRACTICE SESSION ON ENVIRONMENTAL STUDIES	Generic	Sessional	-	-	-	50	-	-	2
UGEN - 482 PRACTICE SESSION ON QUALITY MANAGEMENT	Generic	Sessional	-	-	-	50	-	-	2
<p><b>All Generic Components common to all B. Voc. courses.</b>  <b>Industrial Training of 3 - 4 weeks of 6 credits in each year followed by report writing and Viva Voce.</b>  <b>These credits will be evaluated in semester 6</b></p>									

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**Year - 3 - Degree (SEMESTER - V)**

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 501 INDIAN ECONOMY & SOCIAL CHANGES	Generic	Theory	10	40	-	-	1	1	-
UGEN - 502 RESEARCH METHODOLOGY	Generic	Theory	10	40	-	-	1	1	-
UMLTV - 503 MICROBIOLOGY - IV	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 504 PATHOLOGY - III	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 505 HEMATOLOGY - III	Skill	Theory	10	40	-	-	1	1	-
UMLTV - 591 MICROBIOLOGY LAB – IV	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 592 PATHOLOGY LAB – III	Skill	Practical	-	-	10	40	-	-	2
UMLTV - 593 HEMATOLOGY LAB – III	Skill	Practical	-	-	10	40	-	-	2
UGEN - 581 PRACTICE SESSION ON INDIAN ECONOMY & SOCIAL CHANGES	Generic	Sessional	-	-	-	50	-	-	2
UGEN – 582 PRACTICE SESSION ON RESEARCH METHODOLOGY	Generic	Sessional	-	-	-	50	-	-	2
<p><b>All Generic Components common to all B. Voc. courses.</b>  <b>Industrial Training of 3 - 4 weeks of 6 credits in each year followed by report writing and Viva Voce.</b>  <b>These credits will be evaluated in semester 6</b></p>									

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**Year - 3 - Degree (SEMESTER - VI)**

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 601 GENERAL HUMAN PSYCHOLOGY & HR MANAGEMENT	Generic	Theory	10	40	-	-	1	1	-
UGEN - 602 ENTREPRENEURSHIP DEVELOPMENT PROGRAMME	Generic	Theory	10	40	-	-	1	1	-
UGEN - 681 PRACTICE SESSION ON GENERAL HUMAN PSYCHOLOGY & HR MANAGEMENT	Generic	Sessional	-	-	-	50	-	-	2
UGEN - 682 PRACTICE SESSION ON ENTREPRENEURSHIP DEVELOPMENT PROGRAMME	Generic	Sessional	-	-	-	50	-	-	2
UMLTV - 683 INDUSTRIAL TRAINING	Skill	Sessional	-	-	-	300	-	-	12
<p><b>All Generic Components common to all B. Voc. courses.</b>  <b>Industrial Training of 3 - 4 weeks of 6 credits in each year followed by report writing and Viva Voce.</b>  <b>These credits will be evaluated in semester 6</b></p>									



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**Year - 1 Diploma (SEMESTER - I)**

**Paper Title: UGEN – 101: ENGLISH LANGUAGE AND COMMUNICATIVE SKILLS**

**Objective:** The objective of this paper is to familiarize the students with the importance of Communication and its associated components in the hard core corporate sector.

**UNIT - I**

The Sentence and Its Structure - How to Write Effective Sentences - Phrases - What Are They? - The Noun Clauses - The Adverb Clause - The Relative Clause - How the Clauses Are Conjoined - Word - Classes and Related Topics - Understanding the Verb - Understanding the Auxiliary Verb - Understanding the Adverbs - Understanding the Pronoun - Prepositions.

**UNIT - II**

Spelling and Pronunciation - Pronunciation, The Tense and Related Topics - Presentness and Present Tenses - The Presentness of a Past Action - Interrogatives and Negatives - Negatives - How to Frame Questions - What's What? - Polite Expressions - Some Time Expressions - In Conversation – Letter Writing - Academic Assignments.

**UNIT - III**

Self - Assessment; Identifying Strength & Limitations; Habits, Will - Power and Drives, Developing Self - Esteem and Building Self - Confidence, Significance of Self - Discipline, Understanding Perceptions, Attitudes, and Personality Types, Mind - Set: Growth and Fixed, Values and Beliefs, Motivation and Achieving Excellence; Self - Actualization Need; Goal Setting, Life and Career Planning , Constructive Thinking, Communicating Clearly: Understanding and Overcoming barriers.

**UNIT - IV**

Active Listening, Persuasive Speaking and Presentation Skills, Conducting Meetings, Writing Minutes, Sending Memos and Notices; etiquette: Effective E - mail Communication; Telephone Etiquette, Body Language in Group Discussion and Interview.

**Books Recommended:**

- Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.
- Kulbhushan Kumar, Effective Business Communications, Khanna Publishing House (AICTE Recommended-2018)
- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company, 2013.
- Klaus, Peggy, Jane Rohman & Molly Hamaker. The Hard Truth about Soft Skills. London: HarperCollins E - books, 2007.
- Petes S. J. , Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw - Hill Education, 2011.
- Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada: Wiley & Sons, 2006.

**Paper Title: UGEN – 181 ENGLISH LANGUAGE LAB**

**Planning for Practical session: (Based on UGEN – 101)**

- Conversation classes on contemporary issues
- Writing of corporate CVs
- PPT presentation on selected issues
- Group discussion
- Tips to face the interviews and mock sessions

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**Paper Title: UGEN – 102: COMPUTER FUNDAMENTALS & IT**

**Objectives:** The objective of this course is to familiarize students with Fundamentals of Computer and IT applications. It enables the student to get practical exposure towards MS - Office tools.

**UNIT - I**

**KNOWING COMPUTER:** Introduction, Objectives, Basic Applications of Computer, Components of Computer System: Central Processing Unit, Keyboard, mouse and VDU, Other Input devices, Other Output devices, Computer Memory. Concept of Hardware and Software: Hardware, Software: Application Software, Systems software. Concept of computing, data and information. Bringing computer to life: Connecting keyboard, mouse, monitor and printer to CPU, Checking power supply.

**UNIT - II**

**OPERATING COMPUTER USING GUI BASED OPERATING SYSTEM:** Introduction, Objectives, Basics of Operating System: Operating system, Basics of popular operating system (LINUX, WINDOWS). The User Interface: Task Bar, Icons, Menu, Running an Application. Operating System Simple Setting: Changing System Date And Time, Changing Display Properties, To Add Or Remove A Windows Component, Changing Mouse Properties, Adding and removing Printers. File and Directory Management: Creating and renaming of files and directories, Common utilities.

**UNIT - III**

**INTRODUCTION TO INTERNET, WWW AND WEB BROWSERS:** Introduction, Objectives. Basic of Computer Networks: Local Area Network (LAN), Wide Area Network (WAN). Internet: Concept of Internet, Applications of Internet, Connecting to the Internet, Troubleshooting, World Wide Web (WWW), Web Browsing Software, Popular Web Browsing Software. Search Engines: Popular Search Engines / Search for content, Accessing Web Browser, Using Favorites Folder, Downloading Web Pages, Printing Web Pages. Understanding URL, Surfing the web: Using e - governance website.

**UNIT - IV**

**COMMUNICATIONS AND COLLABORATION:** Introduction, Objectives, Basics of E - mail: What is an Electronic Mail, Email Addressing, Using E - mails: Opening Email account, Mailbox: Inbox and Outbox, Creating and Sending a new E - mail, Replying to an E - mail message, Forwarding an E - mail message, Sorting and Searching emails. Introduction to MS - Office: MS - Word, MS - Excel, MS - Power Point.

**Books Recommended:**

- Computer Fundamentals, R.S. Salaria, Khanna Publishing House (AICTE Recommended Textbook – 2018)
- Handbook of Computer Fundamentals, N.S. Gill, Khanna Publishing House (AICTE Recommended Textbook – 2018)
- Fundamentals of Computers, V. Rajaraman, PHI Publication
- Computer Fundamentals, P. K. Sinha, BPB Publication
- Introduction to Computers with MS - Office 2007, Leon, TMH Publication

**Paper Title: UGEN – 191 COMPUTER FUNDAMENTALS & IT LAB**

**List of Experiments: (Based on UGEN – 102)**

- Different components of Taskbar
- Create Desktop icons
- Create Folder and Files on Desktop
- Run Application such as Notepad, MS Paint
- Change Mouse properties in Windows
- Connecting to the Internet
- Applying browsers software such as chrome, Internet Explorer
- Applying software download
- Create E-mail ID in a mail server
- Sending E-mail and working with Inbox
- Create Bio data in word
- Formatting text in Word
- Create excel database, apply auto sum
- Create presentation file with multiple slides

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- Apply slide transition

**Paper Title: UMLTV - 103: LABORATORY SCIENCE & HUMAN BODY**

**Job Role: Junior Medical Lab Technician**

**Objectives:** The aim of the course is to familiarize the students not only with the human anatomy but also the practical edge to understand the various organs and functions as well.

**UNIT - I**

Basic Understanding of Healthcare Service Providers (primary, secondary & tertiary), Basic Understanding of Hospital Functions, Basic Understanding of Diagnostic Centers and medical laboratory facilities, Understanding of Laboratory at different level (National / State / District).

**UNIT - II**

To develop broad understanding of the Role of MLT, To identify Laboratory maintenance needs to be taken care by MLT, To develop Understanding of Patient Comforts and Safety, To develop understanding of Laboratory Test Results, To exhibit Ethical Behavior.

**UNIT - III**

Basic understanding of organization of body cells, tissues, organs, organ systems, membranes and glands in human body, Understanding basic unit of body - Cell, Understanding different types of tissues, Understanding different types of organ systems, Understanding different types of body fluids, secretions and excretions, Understanding different parts of body, Understanding Endocrine system in human body Understanding cardiovascular system and blood, vessels in human body.

**UNIT - IV**

Understanding musculo - skeletal system in human body, Describe Digestive System in human body, Describe Respiratory system in human body, Describe Urinary System in human body, Describe Nervous System in human body, Describe Sense organs in human body, Describe Reproductive System in human body, Describe Integumentary system and Lymphatic system.

**Books Recommended:**

- Solomon. E. A. , (2008) Introduction to Human Anatomy and Physiology 3rd Ed, Saunders: St Louis.
- Chaurasia, B. D. , & Garg, K. , (2012) Human Anatomy Regional and Applied. CBS Publications: New Delhi
- T. S. Ranganathan - A text book of Human Anatomy
- Fattana, Human anatomy (Description and applied) Saunder's & C P Prism Publishers, Bangalore - 1991

**Paper Title: UMLTV - 182 LABORATORY SCIENCE & HUMAN BODY LAB**

**Planning for Practical session: (Based on UMLTV – 103)**

- PPT on role and importance of a medical lab technologist in the society
- PPT/Audio visual demonstration of a qualified medical technologist working in sophisticated medical lab
- Video demonstration on the mechanism of blood coagulation
- Video demonstration on the mechanism of urine formation
- Video demonstration on the mechanism of respiration
- An audio visual presentation on the “Ethical behavior” of a medical lab technician
- An audio visual presentation on the complication of the medical lab work
- PPT presentation on the life and career of a professionally sound lab technologist
- PPT presentation on the statutory regulations of a good medical lab technologist
- Video demonstration of identification of different equipments of a medical lab
- PPT on the history of a medical lab technologist in India
- Video demonstration on “How to deal with patient” and professional medical history compilation

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**Paper Title: UMLTV - 104: MICROBIOLOGY - I**

**Job Role: Junior Medical Lab Technician**

**Objectives:** The structure of the course comprises the instrumental use, study of microscopes, micro organisms, sterilization and the other related concepts.

**UNIT - I**

Basic principles and usage of Instruments, General Instruments : Distillation plant, Centrifuge machine, Analytical Balance, Hotplate, Magnetic Stirrer, Water Bath, Automatic dispenser and diluters, Deionizer, Microbiological Instruments : pH - meter, Autoclave, Incubator, Hot air oven, Laminar Air flow, Colony counter, Muffle furnace, Refrigerator, Inoculator, McIntosh and Flides anaerobic jar.

**UNIT - II**

Microscopy :Study of compound microscope - magnification, numerical aperture, resolution and components of microscope, Dark ground illumination, care of microscope and common difficulties. Study of phase contrast, interference, fluorescent, polarising and electron microscope. Calibration of ocular micrometer and measurement of microorganisms.

**UNIT - III**

Microbiology & Medicine :Introduction to Medical Microbiology, Discovery of microorganisms. Contribution of Robert Koch, Antonie Van Leeuwenhoek, Louis Pasteur, Bordet, Paul Ehrlich, Alexander Flemming, Elie Metchnikoff, Needham, Tyndall Janssen, Joseph Lister, Karl Landsteiner etc. Scope & relevance and safety measures of Medical Microbiology. Role of medical microbiology in identification and management of various infectious diseases.

**UNIT - IV**

Sterilization and Disinfection : Definition, mode of action and uses of various physical methods of sterilization - heat, UV radiation, ionizing radiation, character affecting sterilization, autoclave control and sterilization indicators. Chemical disinfectants - phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compounds. Use and abuse of disinfectants. Disinfectants, antiseptics, chemotherapeutic agents, chemotherapeutic index, development of chemotherapy, antibiotics and effect of antibiotics on protein and nucleic acid synthesis and cytoplasmic membrane. Future development of chemo - therapy.

**Books Recommended:**

- Clinical Microbiology; J. Stokes and G. L. Ridgeway; William & Wilkins
- Manual of Practical Medical Microbiology and Parasitology; T. R. Oberhofer Churchill and Livingston
- Introduction in Medical Microbiology; Anant - Narainyan Indian
- Practical Medical - Microbiology; Mackie and MC Cathey
- Laboratory Manual and work book for Microbiology in Health and Disease; Robert Fuerst W. B. Sunderu

**Paper Title: UMLTV - 192 MICROBIOLOGY LAB - I**

**List of Experiments: (Based on UMLTV – 104)**

- Preparation of sterile swabs / sterile tubes and bottles
- Preparation of smear
- Staining: Germ & Ziehl – Neelson staining
- Identification of culture media
- Identification of instruments commonly used in Microbiology laboratory
- Identification of common microbes
- Microscopy:
  - a) Components and setting of the compound Microscope
  - b) Focusing of object
  - c) Use of low & high power objectives of Microscope
  - d) Use of oil immersion lens
  - e) Care and maintenance of the Microscope
- Different types of Microscopy:
  - a) Dark field Microscopy
  - b) Fluorescence Microscopy

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**Paper Title: UMLTV - 105: FUNDAMENTALS OF ANATOMY & PHYSIOLOGY**

**Job Role: Junior Medical Lab Technician**

**Objectives:** The course offers a classic blend of anatomy and physiology, enabling the students to understand the fundamentals as well as the advanced level of the course.

**UNIT - I**

**ANATOMY :**

General Anatomy: Definition of anatomy and its divisions, Terms of location, positions and planes, Cell - structure & function , Tissue –Epithelium ,Connective, Muscular, Nervous , Lymphatic System

**Systemic Basic Features of:**

Cardiovascular system: Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial, artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses, Lymphatic system- cisterna chyli & thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief.

Respiratory system: Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

**UNIT - II**

**Systemic Basic Features of:**

Digestive system: Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas,

Excretory system :Urinary System Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder

Genital (Male & Female) system: Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology), Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology), Mammary gland-gross structure

Nervous system: Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia.

Peritoneum

**UNIT - III**

**PHYSIOLOGY**

Cell : Structure & function

Blood: a)Blood cells , b)Haemoglobin , c)Blood groups , d)Coagulation Factors , e)Anaemia & Immunoglobulins

Cardiovascular system : Heart rate, cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse

Respiratory System : a)Ventilation , b)Functions , c)Lungs Volumes and capacities

Gastrointestinal System : Process of digestion in various parts

Endocrinology : a)List of Endocrine Glands , b)Hormones : Their secretion and functions (in brief) , c) detailed study on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland.

**UNIT - IV**

Excretion system : a)Structure of nephron , b)Urine formation

Central Nervous System : a)Parts , b)Sliding Filament Theory , c)Neuro Muscular Junction , d)Wallerian Degeneration , e)Motor

Nervous system : -Upper motor neuron system , -Lower motor neuron system , f)Sensory nervous system , g)Sympathetic

Nervous system , h)Parasympathetic nervous system

Skin - Function & Structure

Muscular System : Classification of muscles & their functions

Special Senses - Eye & ear (in brief)

**Books Recommended:**

- Fundamentals of Human Anatomy, Dr. N Chakraborty and Dr. D. Chakraborty, New Central Book Agency ,Kolkata
- Gray's Anatomy The Anatomical Basis of Clinical Practice, Henry Gray, Churchill Livingstone
- ESSENTIALS OF HUMAN ANATOMY, A. K. DATTA,CURRENT BOOKS
- Essentials of anatomy, Inderbir Singh, Jaypee Brothers Medical Publishers
- Concise Medical Physiology, Sujit Kumar Chaudhuri , New Central Book Agency (p) Ltd
- Text book of Medical Physiology, Arthur C. Guyton MD & John E. Hall PhD Elsevier
- Review of Medical Physiology, William Francis Ganong , Lange basic science
- Understanding Human Anatomy and Physiology, William Davis, McGraw Hill
- Human Anatomy, (Description and Applied), Fattana Najib, Saunder's & C P Prism Publishers

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- Physiology & Anatomy with Practical Considerations, Ester. M. Grishcimer, J.P. Lippin Cott. Philadelphia

**Paper Title: UMLTV - 193 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY LAB**

**List of Experiments: (Based on UMLTV – 105)**

- Identification of major structures of the body
- Identification of surface anatomy of the major organs of the body
- Identification of the different bones of the body, especially vertebral column (Lumber Vertebra)
- Identification of the major muscles of the body, especially the appendages & thorax
- Identification of the major arteries of the body and their course in the human body
- Identification of the major veins of the body and their course in the human body
- Identification of the major lymphatics of the body and their course in the human body
- Demonstration of dissected parts ( upper extremity / lower extremity, thoracic & abdominal viscera, face and brain)
- Identification of the major nerves of the body and their course in the human body
- Demonstration of skeleton (Articulated and Non articulated)
- Measurement of pulse
- Measurement of blood pressure
- Elicitation of reflex Jerks
- Measurement of body mass index
- Palpation of thyroid, liver & spinous process of the lumber vertebra
- Identification of ribs and demonstration of their counting( 1<sup>st</sup>. to 7<sup>th</sup>. Rib).

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**Year - 1 Diploma (SEMESTER - II)**

**Paper Title: UGEN – 201: SOFT SKILL & PERSONALITY DEVELOPMENT**

**Objective:** On completion of the course, the students will be able to listen to lectures, public announcements, news on TV, radio and engage in telephonic conversation to communicate effectively and accurately in English used as spoken language for various purposes.

**UNIT - I**

**Listening Skills:** Barriers to listening; effective listening skills; feedback skills. Attending telephone calls; note taking. Activities: Listening exercises - Listening to conversation, News and TV reports. Taking notes on a speech / lecture.

**UNIT - II**

**Speaking and Conversational Skills:** Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics. The study of sounds of English, stress and intonation. Situation based Conversation in English.

**UNIT - III**

**Essentials of Spoken English:** Activities, Making conversation and taking turns, Oral description or explanation of a common object, situation or concept, Giving interviews.

**UNIT - IV**

Oral Presentation with / without audio visual aids. Group Discussion . Listening to any recorded or live material and asking oral questions for listening comprehension.

**Books Recommended:**

- Soft skills Training - A workbook to develop skills for employment by Fredrick H. Wentz
- Personality Development and Soft skills , Oxford University Press by Barun K. Mitra

**Paper Title: UGEN - 281 SOFT SKILL & PERSONALITY DEVELOPMENT LAB**

**Planning for Practical session: (Based on UGEN – 201)**

- Classroom technique to improve the soft skills
- Surprise writing on current issues
- General grooming sessions to face the interview
- Group discussions
- Motivational classes to improve communication and confidence power

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**Paper Title: UGEN – 202: BUSINESS ANALYSIS: ENVIRONMENT, SALES & MARKETING**

**Objective:** The course will enable the students to understand, assimilate and apply the various dimensions of business and its associated affairs in the socio economic, socio cultural and socio political ambience.

**UNIT - I**

Business Environment - Introduction, Concept of Business, Levels of the Business Environment, Understanding the Environment, Economic Environment of Business, The Global Economic Environment, Economic Policies, Business and Economic Policies, Socio Cultural Environment, Business and Society, Business and Culture , Indian Business Culture, Culture and Organizational Behavior. Introduction to Political Environment, Political Environment and the Economic system, Types of Political Systems, Indian Constitution and Business, Changing Profile of Indian Economy , Business Risks Posed by the Indian Political System, Economic Systems, Financial Environment: Introduction, An Overview of the Financial System, Components of Financial System, Financial Institutions and their Roles, Financial Institutions in India, Role of Foreign Direct Investment

**UNIT - II**

Introduction to Legal Environment, Laws Impacting Industry in India, Intellectual Property Rights, Major Regulations Pertaining to Business, Regulatory Role of Government, Promotional Role of Government, Participatory Role of Government, Conciliatory and Judicial Role of Government , Impact of India's Industrial Policy on Economic Reforms, New Economic Policy, Globalization. India, WTO and Trading Blocs, Levels of Economic Integration/Trading Blocs, Effects of Economic Integration, Major Regional Trading Blocs, Commodity Agreement, World Trade Organization, WTO and India, Corporate Social Responsibility: Introduction, Meaning and Definition, Need for social responsibility of business, Social responsibility of business towards different groups, Barriers to social responsibility, Social responsibility of business in India, Public, Private, Joint and Cooperative Sectors

**UNIT – III**

Traditional and Modern Concepts of Marketing; Selling vs. Marketing; Marketing mix; Marketing Environment. Market Segmentation & its implication. Concept of Product, Product Planning and Development; Packaging: Role and Functions; Brand name and Trade mark; Product Life Cycle Concept; Distributions Channels and Physical Distribution. Price: Importance of Price in the Marketing Mix; Factors affecting Price of a Product/Service; Discounts and Rebates. Methods of Promotion; Advertising Media; Characteristics of an effective Advertisement

**UNIT – IV**

Salesmanship and Qualities of Salesman; Product knowledge; Customer knowledge: Buying Motives and Selling Points. Scientific Selling; Approach and Presentation: Methods of Approaching a Customer; Presentation Process and Styles; Presentation planning. Objection Handling: Types of objections; Handling customer objections. Closing Sales and Follow up: Methods of closing sale; Executing sales order; Follow-up; Sales Promotion Schemes: Sampling; Coupon; Price Off; Premium Plan; Consumer Contests and Sweeps Takes; POP Displays; Demonstration; Trade Fairs and Exhibitions; Sales Promotion Techniques and Sales Force.

**Books Recommended:**

- Business Environment; By T. R. Jain, Mukesh Trehan, Ranju Trehan, VK Global Publications.
- Business Environment; By Vishwajeet Prasad, Gyan Publishing House.
- Business Environment; By Saleem, Pearson Education India.
- BUSINESS ENVIRONMENT; By VEENA KESHAV PAILWAR, PHI Learning Pvt. Ltd.
- Business Environment, by Suresh Bedi, Excel Books
- BUSINESS ENVIRONMENT: INDIAN AND GLOBAL PERSPECTIVE; FAISAL AHMED, M. ABSAR ALAMM, PHI Learning Pvt. Ltd.
- Principles of Management, Premvir Kapoor, Khanna Publishing House
- PRINCIPLES OF MARKETING; Kotlar Philip and Armstrong Gary, Pearson Education
- MARKETING MANAGEMENT; Ramaswamy, V.S. and S. Namakumari: Macmillian
- SALES MANAGEMENT; Condiff, Still and Govani et.al: Prentice Hall of India
- SALES MANAGEMENT; Text; Cases & Readings: Vaccaro J.P: Prentice Hall of India
- ADVERTISING & SALES PROMOTION; Kazmi & Batra: Excel Books

**Paper Title: UGEN - 282 PRACTICE SESSION ON BUSINESS ANALYSIS: ENVIRONMENT, SALES & MARKETING**

**Planning for Practical session: (Based on UGEN – 202)**

- Study of international organization (WTO, WORLD BANK, IMF, AMA)
- Case studies on the recent Business Environment, Marketing, & Sales Promotion
- PPT presentation on selected issues
- Survey to collect the samples for project work



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**Paper Title: UMLTV - 203: ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESS**

**Job Role: Junior Medical Lab Technician**

**Objectives:** The course is designed to enable the students on the use and application of the advanced laboratory techniques and the process of testing as well.

**UNIT - I**

Broad understanding of different types of samples to be taken in medical laboratory, Sample Handling, Various equipments useful for blood sample collection, broad understanding of correct method of blood sample collection, broad understanding on collection method of samples other than blood samples, broad understanding of correct procedure of sample transportation.

**UNIT - II**

understanding about Laboratory planning, develop understanding about laboratory operations, gain broad understanding of care of laboratory glassware, equipment and instruments, understanding about Specimen Handling, Techniques of Disinfection & Sterilization of rubber goods, laboratory equipment & other instruments

**UNIT - III**

Importance and method of Observing and reporting while dealing with patients during sample and report collection, Method of Observing and reporting while assisting the pathologists and other members of the team, Understanding the importance of verbally informing the person in authority,

**UNIT - IV**

Understanding of chemicals/reagents useful in sample analysis, Understanding of maintaining record of inventory , test results, etc. , Able to inspect the availability of medical supplies or diagnostic kits To develop understanding about laboratory safety

**Books Recommended:**

- Crocker J, Burnett D. The science of laboratory diagnosis, 2nd ed, Chichester: Wiley, 2006
- Turgeon M. L, Linné and Ringsrud's Clinical laboratory science: the basic and routine techniques, 5<sup>th</sup>ed, St. Louis, Mo: Mosby Elsevier, 2007

**Paper Title: UMLTV - 291 ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESS LAB**

**List of Experiments: (Based on UMLTV – 203)**

- Blood collection process
- Use of different instruments used for collection of blood
- Identification of different instruments used for collection of blood
- Identification and use of a Tourniquet
- Identification of body areas for Venepuncture
- SOP on the use of Vacutainers
- Sterilization of areas used for where from blood is collected
- Identification and use of anticoagulants for prevention of clotting of sample blood
- Restoration of a venepunctured wound
- Demonstration of the use of a lab request form
- Demonstration of the morphology of red blood cell
- Demonstration of the minimum safety requirements to be maintained in a lab for purpose of preventing contamination of slides

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**Paper Title: UMLTV - 204: MICROBIOLOGY - II**

**Job Role: Junior Medical Lab Technician**

**Objectives:** The structure of the course comprises the instrumental use, study of microscopes, micro organisms, sterilization and the other related concepts.

**UNIT - I**

Morphology and Structure of Microorganisms, Morphology & fine structure of bacteria, fungi, actinomycete and algae, Organization of cell wall, cell membrane, flagella and capsules in bacteria, Morphogenesis in bacteria, formation of spores and cysts, Animal Viruses : Morphology, cultivation and viral disease cycle, Bacteriophages : Morphology, multiplication, detection and enumeration, Biotransformation of (a) D-Sorbitol to L-Sorbose. (b) Antibiotics, (c) Steroids.

**UNIT - II**

IDENTIFICATION OF BACTERIA: Micrococci, Staphylococci, Streptococci, pneumococci, Corynebacteria, Escherichia, Klebsiella, Enterobacter, Proteus - providencia Salmonella, Shingella, Arizona, Citrobacter, Yersinia, Pseudomonas, Vibrio, Haemophilus, Mycoplasma, Rickettsia, Chlamydia, Tricragents.

**UNIT-III**

Role of Microbiology Laboratory, Basic rules for specimen collection and handling, transportation of specimen and safety regulations

**UNIT-IV**

Laboratory Procedures in Microbiology :Disinfection and sterilization, Laboratory culture, Study of Principle and Working of : Microscopes (all types), Distillation apparatus, Centrifuge, Balance, De-ionizer, pH meter, Autoclave, Incubator, Oven, Colony Counter, Muffle Furnace, Refrigerator

**Books Recommended:**

- Manual of Practical Medical Microbiology and Parasitology; T. R. Oberhofer Churchill and Livingston

**Paper Title: UMLTV - 292 MICROBIOLOGY LAB – II**

**List of Experiments: (Based on UMLTV – 204)**

- Demonstration of different disinfection procedures commonly used in the microbiology lab
- Demonstration of different sterilization procedures commonly used in the microbiology lab
- Demonstration of the working principal and autoclave
- Demonstration of the use of an incubator
- Demonstration of the use of the refrigerator in microbiology lab
- Demonstration of morphological difference between different types of bacteria
- Identification of *Staphylococci*. under a compound microscope
- Identification *Yersnia pestis* under compound microscope
- Demonstration of the technique of properties of the slide
- Identification of *vibrio cholerae*
- Demonstration of the use of a pH meter
- Identification of different distillation apparatus

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**Paper Title: UMLTV - 205: BIOCHEMISTRY - I**

**Job Role: Junior Medical Lab Technician**

**Objectives:** The course is designed to encapsulate the fundamentals of chemistry, the laboratory application and the current scenario of the subject.

**UNIT - I**

Introduction to Medical Lab Technology, Role of Medical Laboratory technologists - ethics, responsibility, safety measures and hazards in clinical biochemistry, first aid (accidents), Units of measurements, S. I. Units, measurement of volume, various volumetric apparatus (cylinders, flasks, pipettes), calibration of volumetric apparatus, Cleaning and caring of general laboratory glassware and equipment, preparation and storage of distilled water, preparation of reagents and standard solutions, storage of chemicals and reagents, use of analytical balance, dry and moist heat radiation, filtration, autoclaving and chemical disinfection for sterilization.

**UNIT - II**

Introduction, aim and scope of Biochemistry. Elementary knowledge of inorganic chemistry: atomic weight, molecular weight, equivalent weight, acid, bases. Elementary knowledge of organic chemistry : Organic compounds, Aliphatic and aromatic compounds, Alcohols, Aldehydes, Ketones, Amines, Esters, Phenol etc.

**UNIT - III**

Viscosity - principles and applications; sedimentation - principles and applications; Radio - isotopes and their use in Biochemistry, mole, molar, molal and normal solutions, pH measurement, buffer solutions, percent solutions, osmosis, dialysis, surface tension. ANALYTICAL BIOCHEMISTRY AND METABOLISM: Colorimetry / Spectrophotometry, Flame photometry , Atomic absorption spectroscopy, electrophoretic determination of Na<sup>+</sup> and k<sup>+</sup>, chromatography

**UNIT - IV**

Introduction, properties and simple metabolism of carbohydrates, proteins and fat, Nucleic acids and Enzymes introduction, general properties. Digestion and absorption, Nutrition (Vitamins, Calories) Radioimmunoassay (RIA) and ELISA. (Hepatitis A, B)

**Books Recommended:**

- Varley's Practical Clinical Biochemistry; A. HGowehlock; Heineman Medical Books Ltd. , London
- Lab Manual in Biochemistry; E. A. Storey; V. G. Makarova; MIR Publishers; 2PerbyRizky1 - 110 GSP Moscow
- Harper's Biochemistry; A. K. Murray Prentice Hall of India Ltd. , New Delhi
- Introduction to Practical Biochemistry; Plummer D. T. Tata McGraw Publishing co, New Delhi

**Paper Title: UMLTV - 293 BIOCHEMISTRY LAB - I**

**List of Experiment: (Based on UMLTV – 205)**

- Introduction – Aim, basis, interpretation, safety in clinical biochemistry laboratory
- Laboratory organization: instruments, glassware, sample collection & specimen labelling
- Routine test & the identification of equipment & supply
- Identification of supplies of a biochemistry lab
- Preparation of different solutions used in the biochemistry lab
- Standardization of methods commonly used in biochemistry lab
- Detection of carbohydrates in a given sample
- Detection of proteins in a given sample
- Interpretation of results obtained from the routine tests
- Study the general properties of enzyme (urease)
- Achromatic time of salivary amylase
- Estimation of glucose in a given sample
- Centrifugation : principle, type and application
- Chromatography: description of paper chromatography and methodology of their application

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**Year - 2 - Advanced Diploma (SEMESTER - III)**

**Paper Title: UGEN – 301: VALUE EDUCATION & HUMAN RIGHTS**

**Objective:** The course aims to provide a sharp insight into the importance of human values, ethics, morality and above all the full growth of personality to ensure some total development of the human mind.

**UNIT – I**

Concept of Human Values, Value Education Towards Personal Development, Aim of education and value education; Evolution of value oriented education; Concept of Human values; types of values; Components of value education. Personal Development, Character Formation Towards Positive Personality, Value Education Towards National and Global Development, National and International Values, Social Values, Professional Values , Religious Values, Aesthetic values.

**UNIT – II**

Impact of Global Development on Ethics and Values, Conflict of cross – cultural influences, mass media, cross – border education, materialistic values, professional challenges and compromise, Modern Challenges of Adolescent Emotions and behavior; Sex and spirituality, Adolescent Emotions.

**UNIT – III**

Theraupatic Measures – Control of the mind through: Simplified physical exercise, Meditation – Objectives, types, effect on body, mind and soul, Yoga – Objectives, Types, Asanas, Activities: Moralisation of Desires, Neutralisation of Anger, Eradication of Worries, Benefits of Blessings

**UNIT – IV**

Human Rights – concepts & evolution, Definitions under Indian and International documents, Broad classification of Human Rights and Relevant Constitutional Provisions, Human Rights of Women and Children, Institutions for Implementation, Violations and Redressal.

**Books Recommended:**

- Value education and human rights, By R. P. Shukla, Sarup & Sons
- Professional Ethics and Human Values, Premvir Kapoor, Khanna Publishing House (AICTE Recommended Textbook)
- Value Education And Education For Human Rights, By V.C. Pandey, Gyan Publishing House.
- Education for Values, Environment and Human Rights, By Y. K. Sharma, Published by Deep and Deep Publications.
- Human Rights: Twenty First Century Challenges, edited by V.N. Viswanathan (ed. By), Gyan Publishing House.
- Education for Values, Environment and Human Rights, By J. C. Aggarwal, Shipra Publications, 2005
- Human Rights Education: A Global Perspective, edited by Hemlata Talesra, Nalini Pancholy, Mangi Lal Nagda, Published by Daya Books.

**Paper Title: UGEN - 381 PRACTICE SESSION ON VALUE EDUCATION & HUMAN RIGHTS**

**Planning for Practical session: (Based on UGEN – 301)**

- Motivational classes on values and ethics
- Case studies
- PPT presentation on selected areas

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**Paper Title: UGEN – 302: BASIC ACCOUNTING**

**Objective:** The course will surely help the students to gain a comprehensive knowledge on the various areas of finance such as basic concepts, role of accounts, preparation of charts and an overview of the subject at the both domestic and international levels.

**UNIT – I**

Define the accounting process, Describe the role of accountants, Explain accounting concepts and principles, Discuss the concept of the accounting equation, Use the accounting equation to analyze basic transactions in terms of increases and decreases, Reporting financial information on a balance sheet, Determine how transactions change owner's equity in an accounting equation, Reporting a changed accounting equation on a balance sheet, Analyze transactions using T – accounts and using debits and credits, Use debits and credits to record increase and decreases in accounts, Record journal entries in a 5 – column journal, Define accounting terms related to journalizing transactions, Prove and rule a five – column journal and prove cash

**UNIT – II**

Prepare a chart of accounts and opening accounts, Post separate amounts from a journal to a general ledger, Post column totals from a journal to a general ledger, Make correcting entries, Reconcile a bank statement and record bank service charges, dishonored checks, and petty cash transactions, Describe and prepare the work sheet, Plan and adjust entries on a work sheet, Extend financial statement information on a work sheet, Find and correct errors on a work sheet, Describe the content and purpose of the three basic financial statements and how they are related.

**UNIT – III**

Journalize and post adjusting entries, Journalize and post closing entries and prepare a post – closing trial balance. Reinforcement 1B, Describe the nature of merchandising business, Describe and be able to journalize purchases of merchandise for cash, Describe and be able to journalize purchases of merchandise on account and buying of supplies, Describe and be able to journalize cash payments and other transactions, Journalizing sales (compute sales tax) and cash receipts, Describe the concept of subsidiary ledgers, Journalize and post using accounts payable subsidiary ledgers, Journalize and post using accounts receivable subsidiary ledgers

**UNIT – IV**

Prepare payroll records, Preparing payroll time cards, Calculating employee total earnings, Determining payroll tax withholding, Preparing payroll checks, Record, and journalize the payroll for a merchandising business, Record employer payroll taxes, Reporting, and paying withholding and payroll taxes, Prepare a worksheet for a merchandising business, Analyzing and adjusting the Merchandise Inventory account, Analyzing and adjusting the Supplies account, Analyzing and adjusting the Prepaid Insurance account, Prepare a multiple – step income statement for a merchandising business, Analyzing component percentages of income statements showing net income and net loss, Prepare a distribution of net income and owner's equity statements, Prepare a classified balance sheet

**Books Recommended:**

- Basic Accounting: The step-by-step course in elementary accountancy, By Nishat Azmat, Andy Lymer, Hachette UK.
- Basic Accounting, By Rajni Sofat, PHI Learning Pvt. Ltd.
- BASIC ACCOUNTING, By SOFAT, RAJNI , HIRO, PREETI, PHI Learning Pvt. Ltd.
- Accounting for Beginners, By Kokab Rahman, Createspace Independent Pub, 2013

**Paper Title: UGEN - 382 PRACTICE SESSION ON BASIC ACCOUNTING**

**Planning for Practical session: (Based on UGEN – 302)**

- Assignment on discussed topics
- Case studies analysis

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**Paper Title: UMLTV - 303: MICROBIOLOGY - III**

**Job Role: Assistant Medical Lab Technician**

**Objectives:** The structure of the course comprises the instrumental use, study of microscopes, micro organisms, sterilization and the other related concepts.

**UNIT - I**

**PATHOGENIC FUNGI:** Candida, Cryptococci, Dermatophytes, Sporotrichoums, Histoplasma, Blastomyces, Coccidioides, Para - coccidioides, Dematiaceous fungi, Mycetoma, Actinomyces, Nocardia and common laboratory contaminants. Biochemical tests used for identification of bacteria and fungi. Antimicrobial sensitivity testing and assay methods for body fluids, Antimicrobial susceptibility testing for Mycobacteria. Preparation and standardization of antigens and antisera.

**UNIT - II**

**VIROLOGY:** Different staining techniques used in virology, Use of Embryonated eggs in clinical Virology, Principles of animal cell culture and their use in virology, Use of common laboratory animals in viral diagnosis.

**PARASITOLOGY:** Morphology and life cycle of - Leishmania, haemoflagellates. - Trypanosomes, Laboratory diagnosis of leishmania, trypanosomes; Morphology and life cycle of tissue - Filaria and blood nematodes - Trichinella - Dracunculus

**UNIT - III**

**MEDICAL ENTOMOLOGY:** Basic concept of medical entomology in relation to medical lab technology. Arthropods of medical importance, arthropods borne diseases and their transmission. Principal of arthropods control, Mosquito- Role of this arthropods in disease transmission, disease types and controlling measures. House flies, Role of disease transmission and controlling measures. Flea: Role of disease transmission and control measures and itch mite. Filarial: Causes, symptoms and controlling measures. Taeniasis: Causes, symptoms and controlling measures. Collection, Presentation and identification of different disease causing arthropods.

**UNIT - IV**

Whole mount preparation of slide of different disease causing arthropods for their detailed anatomical studies. Identification of different phases of life cycle of arthropods, protozoa having medical importance for causing disease. Slide identification of micro filarial, Taenia solium, ascaris and different stages of malaria. Examination of stool for OPV (Ova parasite cyst).

**INFECTION CONTROL AND PREVENTION:** Practices to curb infection, Hospital borne infections, Prevention and treatment of needle stick injury, Management of blood and body substance spills in the health care setting

**Books Recommended:**

- Diagnostic techniques in medical parasitology; Fleck and Moody John Wright
- Tropical Medicine and Parasitology; Gold Smith and Heynemann; Appleton and Lange
- Parasites: A guide to Laboratory Procedures and identifications; L. R. Ash and T. C. Orihel Am. Soc. Clinical
- Parasitic Diseases M. Katz Springer - Verlag
- Immuno diagnosis of Parasitic diseases; Walls and Sohanz Academic Press

**Paper Title: UMLTV - 391 MICROBIOLOGY LAB – III**

**List of Experiments:( Based on UMLTV – 303)**

- Identification of different stains used in Virology
- Slide identification of Candida,
- Slide identification of fungi
- Slide identification of Taenia
- Slide identification of trypanosomes

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**Paper Title: UMLTV - 304: PATHOLOGY- I**

**Job Role: Assistant Medical Lab Technician**

**Objectives:** The course aims at covering the fundamental concepts of biology apart from the primary focus on the study of diseases and the possible remedies.

**UNIT - I**

**INTRODUCTION TO HISTOPATHOLOGY:** Brief introduction of histopathology, Elementary knowledge of specimen collection, , Elementary knowledge of tissue processing, Understand about section cutting, Understand about Staining, Elementary knowledge of Decalcification

**UNIT - II**

**INTRODUCTION TO CYTOPATHOLOGY:** Brief introduction of cytology and cytopathology, Elementary knowledge of specimen collection and transportation, precautions to be taken for gynaecological samples, Elementary knowledge of specimen collection, transportation and preservation of non gynaecological samples, Understand about fluid specimen, Describe the Papanicolaou stain, Describe about mounting of cell sample, Describe different dyes used for staining different cytopathological specimen.

**UNIT - III**

Information on pituitary, gonadal axis, pituitary thyroid axis, pituitary adrenocortical axis, feed back system, information on pancreatic hormones. Hormonal disorders in diabetes mellitus and diabetes insipidus, hypertension, goiter, obesity and infertility. Different techniques followed in hormone assay - ELIZA, RIA cross reaction, inter assay and inter assay variation. Spermatogenesis and its hormonal control, semen physiology, sperm count, sperm motility, sperm morphology, fructose estimation of semen, sperm viability tests. Acid phosphatase in semen. PSA (Prostrate Specific Antigen). Estimation of T3, T4, TSH. Estimation HCG, Estimation of LH, Estimation of FSH, Estimation of Cortiso, Estimation of Progesterone, Estimation of Testosterone.

**UNIT - IV**

**FINE NEEDLE ASPIRATION:** Understand the purpose of fine needle aspiration; describe the procedure of fine needle aspiration, Understand about section cutting.

**Books Recommended:**

- Theory and practice of Histological Techniques, Bancroft and Stevens Butreworths London
- Cellular Pathology Techniques; C. F. A. Culling Buttreworths London

**Paper Title: UMLTV - 392 PATHOLOGY LAB – I**

**List of Experiments: (Based on UMLTV – 304)**

- Estimation of T3, T4
- Estimation of LH
- Estimation of FSH
- Measurement of Blood Pressure
- Estimation of TSH

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**Paper Title: UMLTV - 305: HEMATOLOGY - I**

**Job Role: Assistant Medical Lab Technician**

**Objectives:** The course is designed to focus on the various studies of blood and its components with help of intense laboratory work.

**UNIT - I**

History and discovery of blood group system, ABO and Rhesus blood group system, Study of Human blood groups : Basic blood group system : ABO, Sub groups of ABO, Other variants in the ABO blood group system, Study of Rhesus (Rh) blood group system and immune antibodies - Rh antigen, Rh antibody.

**UNIT - II**

Routine hematological test like hematocrit, TC, DC, of leucocytes, total count of erythrocytes, determination of erythrocytes indices, PCB, MCB, MCH, MCHC, Reticulocyte count, platelet count, ESR. Preparation of packed - cells and various fractions of blood for transfusion purposes,

**UNIT - III**

Hemoglobin, pigments and their measurement, Abnormal hemoglobin's and their means of identification and estimation, LE cell phenomenon, and various methods of its demonstration, Haemostatic mechanism and theories of blood coagulation. Routine hemoglobin test and the use of hemoglobinometer.

**UNIT - IV**

Physiochemical properties of coagulation factors, Screening coagulation procedures, Quantitative assay of coagulation factors.

**Books Recommended:**

- Blood: Principles and Practice of Hematology, Volume 1, edited by Robert I. Handin, Samuel E. Lux, Thomas P. Stossel, Lippincott Williams & Wilkins.
- Hematology for the Medical Student, edited by Alvin H. Schmaier, Lilli M. Petruzzelli, Lippincott Williams & Wilkins
- Hematology: Clinical Principles and Applications, By Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Elsevier Health Sciences.
- Lanzkowsky's Manual of Pediatric Hematology and Oncology, edited by Philip Lanzkowsky, Jeffrey M. Lipton, Jonathan D. Fish, Academic Press.
- Hematology, edited by William Samson Beck, MIT Press.
- Wintrobe's Clinical Hematology, Volume 1, edited by John P. Greer, Lippincott Williams & Wilkins
- Desk Reference for Hematology, Second Edition, edited by N.K. Shinton, CRC Press.
- Hematology, An Issue of Veterinary Clinics of North America: Exotic Animal, By Terry Campbell, Elsevier Health Sciences.

**Paper Title: UMLTV - 393 HEMATOLOGY LAB – I**

**List of Experiments: (Based on UMLTV – 305)**

- Identification of Sahli's Haemoglobinometer
- Measurement of the level of hemoglobin in blood
- Performing quantitative assay on coagulation factors of blood
- Analysis of Hematocrit
- Total count of erythrocytes
- Differential count of leucocytes



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**B.Voc. in Medical Lab Technology (UGC)**  
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**Year - 2 - Advanced Diploma (SEMESTER - IV)**

**Paper Title: UGEN – 401: ENVIRONMENTAL STUDIES**

**Objective:** Keeping in view the modern status of environment, the course primarily aims at providing various awareness programs required for the welfare of the environment apart from the emphasis on the general and conventional issues surrounding the environment.

**UNIT - I**

Multidisciplinary nature of environmental studies - Definition, scope and importance, need for public Awareness, Natural Resources: Renewable and non - renewable resources, Natural resources and associated problems, Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles, Ecosystems: Concept, Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.

**UNIT - II**

Biodiversity and its conservation , Bio - geographically classification of India, Value of biodiversity, Biodiversity at global, National and local levels. India as a mega diversity Nation, Hot - spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man - wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In - situ and Ex - situ conservation of biodiversity.

**UNIT - III**

Environmental Pollution: Definition , Cause, effects and control measures of : Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides . Social Issues and the Environment: From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and Rehabilitation of people; its problems and concerns. Case Studies.

**UNIT - IV**

Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment. Population growth, variation among nations. Population explosion - Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and Human health. Case Studies.

**Books Recommended:**

- M.P. Poonia & S.C. Sharma, Environmental Studies, Khanna Publishing House
- Mike Hulme, Climates and Cultures.
- Mark Garrett, Encyclopaedia of Transportation Social Science and Policy.
- Steel, Science An A - to - Z Guide to Issues and Controversies.
- John A Matthews, Encyclopaedia of Environmental Change.
- O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House

**Paper Title: UGEN - 481 PRACTICE SESSION ON ENVIRONMENTAL STUDIES**

**Planning for Practical session: (Based on UGEN – 401)**

- Case studies
- Tree plantation program
- PPT presentation on selected areas
- Poster making

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**Paper Title: UGEN – 402: QUALITY MANAGEMENT**

**Objective:** This course will help the students to digest the basic features of the subject apart from a handful of theories, laws, hypothesis included in the course, before the students stamp their feet on the corporate sector.

**UNIT - I**

Introduction to Quality Management, Evolution of Quality Management, Concepts of Product and Service Quality Dimensions of Quality, Deming's, Juran's, Crosby's Quality Philosophy, Quality Cost

**UNIT - II**

Introduction to Process Quality, Graphical and statistical techniques for Process Quality Improvement Graphical tools for data representation, 7 QC tools

**UNIT - III**

Sampling, sampling distribution, and hypothesis Testing Regression, Control charts, Process capability analysis, Measurement system analysis, Analysis of Variance (ANOVA), Design and Analysis of Experiment (DOE), Acceptance sampling plan, TQM, Leadership, Lean and JIT Quality Philosophy, Benchmarking, Process failure mode and effect analysis(PFMEA), Service Quality, Six sigma for Process Improvement, ISO 9001 and QS 9000  
Quality Audit, Quality Circles

**UNIT - IV**

Quality Improvement, Quality Function Deployment, Robust Design and Taguchi Method, Design Failure Mode & Effect Analysis, Product Reliability Analysis, Six Sigma in Product Development

**Books Recommended:**

- D. C. Montgomery, Introduction to Statistical Quality Control, John Wiley & Sons, 3<sup>rd</sup> Edition.
- M.P. Poonia & S.C. Sharma, Total Quality Management, Khanna Publishing House (AICTE Recommended Textbook)
- Mitra A. , Fundamentals of Quality Control and Improvement, PHI, 2nd Ed. , 1998.
- J Evans and W Linsay, The Management and Control of Quality, 6<sup>th</sup> Edition, Thomson, 2005
- Besterfield, D H et al. , Total Quality Management, 3rd Edition, Pearson Education, 2008.
- D. C. Montgomery, Design and Analysis of Experiments, John Wiley & Sons, 6<sup>th</sup> Edition, 2004
- D. C. Montgomery and G C Runger, Applied Statistics and Probability for Engineers, John Wiley & Sons, 4th Edition.

**Paper Title: UGEN - 482 PRACTICE SESSION ON QUALITY MANAGEMENT**

**Planning for Practical session: (Based on UGEN – 402)**

- Case studies
- PPT presentation on TQM practices
- Survey and sample collection for project

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**Paper Title: UMLTV - 403: BIOCHEMISTRY - II**

**Job Role: Assistant Medical Lab Technician**

**Objectives:** The course is designed to encapsulate the fundamentals of chemistry, the laboratory application and the current scenario of the subject.

**UNIT - I**

Photometry: Definition, Laws of Photometry, Absorbance, Transmittance, Absorption maxima, Types of Photometry: Colorimetry, Fluorometry, Choice of appropriate filter. Measurement of solution

**UNIT - II**

Water and mineral metabolism: Distribution of fluids in the body, ECF, ICF, water metabolism, dehydration, mineral metabolism, macro nutrients and trace elements. Water electrolyte balance. Liver functions and their assessment: based on carbohydrate metabolism, Protein metabolism, lipid metabolism, measurement of serum enzyme levels, bile pigment metabolism, jaundice, and its types and their biochemical findings, Renal function tests: various tests - GFR clearance.

**UNIT - III**

Vitamins, Fats and water soluble vitamins, sources, requirement, deficiency disorders, and bio chemical functions. Cardiac profile - in brief hypertension, angina, Myocardial Infarction, Pattern of cardiac enzymes in heart diseases. Different methods of cholesterol estimation - principal, advantage, disadvantage of different methods.

**UNIT - IV**

PERSONNEL HYGIENE: Understanding of the concept of Healthy Living, Understanding & procedures of Hand Hygiene, Techniques of Grooming in microbiology lab, Equipping with Techniques of Use of PPU, Vaccination against common infectious diseases

SAFETY & FIRST AID: Understanding and precautions to ensure Patient's Safety, Basic understanding and precautions to ensure sample preservation while Transporting, Common emergency conditions and what to do in medical emergencies, Basics of first aid, Understanding and precautions to ensure self safety

**Books Recommended:**

- Bacteria: A Very Short Introduction, By Sebastian G.B. Amyes, OUP Oxford.
- Bacteria, edited by Leslie Rowland Hill, L. R. Hill, B. E. Kirsop, Cambridge University Press
- Identification of Pathogenic Fungi, By Colin K. Campbell, Elizabeth M. Johnson, John Wiley & Sons
- Pathogenic Fungi: Structural Biology and Taxonomy, edited by Gioconda San-Blas, Richard A. Calderone, Horizon Scientific Press.
- Principles of Molecular Virology, By Alan J. Cann, Academic Press
- Virology: Principles and Applications, By John Carter, Venetia Saunders, Venetia A. Saunders, John Wiley & Sons
- Parasitology: An Integrated Approach, By Alan Gunn, Sarah Jane Pitt, John Wiley & Sons
- An Introduction to Parasitology, By Bernard E. Matthews, Cambridge University Press

**Paper Title: UMLTV - 491 BIOCHEMISTRY LAB – II**

**List of Experiments: (Based on UMLTV – 403)**

- Identification of Common first aid tool
- Familiarization to the hygienic methods of hand washing
- Vaccination against tetanus

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**Paper Title: UMLTV - 404: PATHOLOGY - II**

**Job Role: Assistant Medical Lab Technician**

**Objectives:** The course aims at covering the fundamental concepts of biology apart from the primary focus on the study of diseases and the possible remedies.

**UNIT - I**

Elementary knowledge of tissue fixatives, General Principle: Reception, recording and labeling of histology specimens. Fixation and various fixatives - Mode of action and indication preparation. Processing of histological tissues for paraffin - embedding, Embedding and embedding media, Vacuum embedding.

**UNIT - II**

Equipment used in Histopathology : Tissue Processor, Microtome - various types, their working principle and maintenance, Microtome knives and knife - sharpening, Automatic slide strainer, Freezing microtome, Cryostat Section cutting, cutting faults and remedies, Decalcification - Methods, advantages and disadvantages, various types - their mechanisms of action.

**UNIT - III**

Major techniques used in Histopathology ;Routine staining procedures, mounting and mounting media, Dye chemistry, theory and practice of staining, Solvent mordents, accelerators and accentuators, Use of controls in various staining procedures.

**UNIT - IV**

Preparation of Haematoxylin and Eosine, Methods of preparation, staining technique for rapid diagnosis, Histo - chemical staining, Cyto - chemical staining.

**Books Recommended:**

- Histopathology, edited by Guy Orchard, Brian Nation, OUP Oxford
- Atlas of Histopathology, By Ivan Damjanov, Wife Goes On
- Recent Advances in Histopathology: 24, By Adrienne M Flanagan, JP Medical Ltd.
- Histopathology Techniques and Its Management, By Ramadas Nayak, JP Medical Ltd.

**Paper Title: UMLTV - 492 PATHOLOGY LAB – II**

**List of Experiments: (Based on UMLTV – 404)**

- Preparation of Haematoxylin and Eosine
- Use of Microtome
- Fixation of an epithelial tissue tissue
- Paraffin embedding of tissues

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**Paper Title: UMLTV - 405: HEMATOLOGY - II**

**Job Role: Assistant Medical Lab Technician**

**Objectives:** The course is designed to focus on the various studies of blood and its components with help of intense laboratory work.

**UNIT - I**

Definition and classification of anemia, Laboratory investigation for megaloblastic anemia, Laboratory investigation for iron deficiency anemia, Laboratory investigation for haemolytic anemia including classification and causes, Leukemia: definition and classification, Cytochemical staining procedures in various haemopoietic disorders, Laboratory test for assessing bleeding disorders.

**UNIT - II**

Laboratory investigation for disseminated intravascular coagulation (DIC), Mechanism of fibrinolysis: tests for fibrinolysis, Platelet function tests and their interpretation, Techniques available for cytogenetic studies, Use of Radioisotopes in hematology, Safety measures for handling Radioisotopes.

**UNIT - III**

Understand Serum immunoglobulin, SEROLOGICAL TESTS: Collection and preparation of specimen used in serological laboratory. Principal of serodiagnostic tests, Precipitation, Flocculation, Agglutination, Neutralization and Coagulation. Serological test for syphilis and VDRL, CRP, RPR, Widal test *Salmonella typhi*, ASO, LFT, Rosewaller, Brucella agglutination, cold agglutination, , TPHA, FTA - ABS. Serodiagnosis tests for AIDS, Rubella, Toxoplasmosis, Leishmaniasis, Trypanosomiasis, TORCH panel test, Immunological test for pregnancy (Direct & In-Direct). Intradermal hyper sensitivity tests-Mantoux tests.

**UNIT - IV**

Compatibility tests in blood transfusion, complications and hazard of blood transfusion, Laboratory investigations of transfusion reactions and mismatched transfusion. TTI (Transfusion Transmitted Infection). Study of pre - transfusion testing - Antibody screen, Major cross - match, Study of compatible blood groups, Screening of donors, Cross - matching of blood - samples - Coomb's test, Preparation and storage of plasma, Methods of storage of blood, Preparation of bone - marrow smears. Bone marrow aspiration composition and function, staining of bone marrow smears and preparation of histological section. Understanding of different aspects of working in blood bank.

**Books Recommended:**

- Blood: Principles and Practice of Hematology, Volume 1, edited by Robert I. Handin, Samuel E. Lux, Thomas P. Stossel, Lippincott Williams & Wilkins.
- Hematology for the Medical Student, edited by Alvin H. Schmaier, Lilli M. Petruzzelli, Lippincott Williams & Wilkins
- Hematology: Clinical Principles and Applications, By Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Elsevier Health Sciences.
- Lanzkowsky's Manual of Pediatric Hematology and Oncology, edited by Philip Lanzkowsky, Jeffrey M. Lipton, Jonathan D. Fish, Academic Press.
- Hematology, edited by William Samson Beck, MIT Press.
- Wintrobe's Clinical Hematology, Volume 1, edited by John P. Greer, Lippincott Williams & Wilkins
- Desk Reference for Hematology, Second Edition, edited by N.K. Shinton, CRC Press.
- Hematology, An Issue of Veterinary Clinics of North America: Exotic Animal , By Terry Campbell, Elsevier Health Sciences.

**Paper Title: UMLTV - 493 HEMATOLOGY LAB – II**

**List of Experiments: (Based on UMLTV – 405)**

- Determination of Blood groups
- VDRL,
- CRP
- Widal test
- Serodiagnosis tests for AIDS

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**Paper Title: UGEN – 501: INDIAN ECONOMY & SOCIAL CHANGES**

**Objective:** The subject aims to cover a broad canvas of the Indian economy from independence to the present era including the possible social changes witnessed over the period of time.

**UNIT - I**

Indian Economy on the eve of Independence, British rule and its impact on Indian Economy, Emergence and development of Planning exercise in India - historical debates, plan models and shift in focus over time

**UNIT - II**

Output (National Income) and Employment Structure of Indian Economy; Composition and relative rates of growth of agriculture, industry and services sectors; Sub - sectoral analysis. Trends and patterns in structure of population over time - growth rate, gender, rural - urban, literacy, regional; Structure and trends of Poverty and Inequality (interpersonal and regional);

**UNIT - III**

Inflation - trends, structure and causes; Unemployment - trends, structure and types. Trends in Agricultural Production and Productivity; Land Reforms - Genesis, Progress and current status; Green Revolution - Measures and its effects. Trends and Patterns of Industrial Sector; Changes in the structure of Indian Industry; Small Scale Industries - Growth, Structure and its contribution in national economy; Public Sector - Growth, Structure, Historical role, Evolution and Dilution. Trends in Exports and Imports; Composition and Direction of Foreign Trade; Balance of Payments - Current Status

**UNIT - IV**

Introduction to different theories of social change, Social conditions and religious thought.

**Books Recommended:**

- R Dutta and K P M Sundaram: Indian Economy, S Chand
- A. N. Agarwal: Indian Economy, Problems of Development and Planning, New Age.
- Mishra and Puri: Indian Economy, Himalaya.
- Planning Commission: Eleventh Five Year Plan, Vol I, II and III, Academic Foundation.
- Government of India: Economic Survey (latest issue)

**Paper Title: UGEN - 581 PRACTICE SESSION ON INDIAN ECONOMY & SOCIAL CHANGES**

**Planning for Practical session: (based on UGEN – 501)**

- Data collection on Indian economy system
- PPT presentation on the current economic scenario
- Case studies on recent economic issues
- Graphical presentation to connect between economy and society

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**(Effective for Academic Session 2018-2019)**

**Paper Title: UGEN – 502: RESEARCH METHODOLOGY**

**Objective:** The course aims to teach the students to read, understand and explore something new from the conventional material before they climb up the ladder for more progressive research works.

**UNIT - I**

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method - Understanding the language of research - Concept, Construct, Definition, Variable. Research Process (10%)

**UNIT - II**

Problem Identification & Formulation - Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis - Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance (10%)

**UNIT - III**

Research Design: Concept and Importance in Research - Features of a good research design - Exploratory Research Design - concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

**UNIT - IV**

Qualitative and Quantitative Research: Qualitative research - Quantitative research - Concept of measurement, causality, generalization, replication. Merging the two approaches.

**Books Recommended:**

- Research methodology by P. K. Manoharam
- Research methodology by Dr. C. Rajindra Kumar
- Research methodology methods and techniques by C. R. Kothari

**Paper Title: UGEN - 582 PRACTICE SESSION ON RESEARCH METHODOLOGY**

**Planning for Practical session: (Based on UGEN – 502)**

- Case studies
- Model paper presentation on assigned topics
- Survey and sample collection for project preparation

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**Paper Title: UMLTV - 503: MICROBIOLOGY - IV**

**Job Role: Medical Lab Technician**

**Objectives:** The structure of the course comprises the instrumental use, study of microscopes, micro organisms, sterilization and the other related concepts.

**UNIT - I**

Preservation of microbes and Lyophilisation methods, Total and viable counts of bacteria, Testing of disinfectants - Rideal - Walker, Chick - Martin and In - use tests, Preparation and standardization of vaccines and immunization schedule.

**UNIT - II**

Bacteriological examination of water, milk, food and air, Nosocomial infections and sterility testing of I/V fluids and processing of various samples for hospital infections, Toxin - Antitoxin assays and pathogenicity tests, Epidemiological markers of microorganisms - Serotyping, Bacteriophage and Bacteriocine typing methods.

**UNIT - III**

Lab, Diagnosis of common bacterial infection viz: Pyogenic infections, Respiratory tract infections, Meningitis, Diphtheria, whooping cough, Gas gangrene, Food - poisoning, Enteric fever, Acute diarrhoeal diseases, Cholera Urinary tract infection, Tuberculosis, Leprosy, Plague, Anthrax, Typhus fever, Syphilis, Gonorrhoea and other STD's, SEROLOGICAL TESTS: Widal, ASO, LFT, CRP, Rosewaller, Brucella agglutination, cold agglutination, VDRL, TPHA, FTA - ABS.

**UNIT - IV**

Lab diagnosis of fungal infections viz: Superficial Dermatophyte fungal infections, Candidiasis, Cryptococcosis, pulmonary infections, Mycetoma, other deep mycotic infections, subcutaneous fungal infections - Spozotrichosis, Chromoblastomycosis, Eye and Ear fungi infections, Serological tests for fungal infections and skin tests, Advanced techniques in microbiology - ELISA ( for malaria and dengue antigen, tuberculosis - IgG / IgM, HIV), RIA, CCIEP, Co - agglutination, GLC, HPLC etc. , Rapid diagnostic methods and Automation in Microbiology.

**Books Recommended:**

- Advanced Techniques in Diagnostic Microbiology, edited by Yi-Wei Tang, Charles W. Stratton, Springer Science & Business Media
- Laboratory Methods in Microbiology, By W. F. Harrigan, Margaret E. McCance, Academic Press
- Advanced Techniques in Soil Microbiology, edited by Ajit Varma, Ralf Oelmüller, Springer Science & Business Media
- Food Microbiology: Fundamentals and Frontiers, edited by Michael P. Doyle, Robert L. Buchanan, American Society for Microbiology Press

**Paper Title: UMLTV - 591 MICROBIOLOGY LAB – IV**

**List of Experiments: (Based on UMLTV – 503)**

- Serology of Fungal Infetion
- Identification of Candia albicans
- ELISA test for dengue antigen,
- ELISA test for malaria



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**Paper Title: UMLTV - 504: PATHOLOGY - III**

**Job Role: Medical Lab Technician**

**Objectives:** The course aims at covering the fundamental concepts of biology apart from the primary focus on the study of diseases and the possible remedies.

**UNIT - I**

Preservation of microbes and Lyophilisation methods, Total and viable counts of bacteria, Testing of disinfectants - Rideal - Walker, Chick - Martin and In - use tests, Preparation and standardization of vaccines and immunization schedule.

**UNIT - II**

Bacteriological examination of water, milk, food and air, Nosocomial infections and sterility testing of I/V fluids and processing of various samples for hospital infections, Toxin - Antitoxin assays and pathogenicity tests, Epidemiological markers of microorganisms - Serotyping, Bacteriophage and Bacteriocine typing methods.

**UNIT - III**

Lab, Diagnosis of common bacterial infection viz: Pyogenic infections, Respiratory tract infections, Meningitis, Diphtheria, whooping cough, Gas gangrene, Food - poisoning, Enteric fever, Acute diarrhoea, diseases, Cholera Urinary tract infection, Tuberculosis, Leprosy, Plague, Anthrax, Typhus fever, Syphilis, Gonorrhoea and other STD's,

**UNIT - IV**

Lab diagnosis of fungal infections viz: Superficial Dermatophyte fungal infections, Candidiasis, Cryptococcosis, pulmonary infections, Mycetoma, other deep mycotic infections, subcutaneous fungal infections - Sporotrichosis, Chromoblastomycosis, Eye and Ear fungi infections, Serological tests for fungal infections and skin tests, Advanced techniques in microbiology - ELISA, RIA, CIEP, Co-agglutination GLC, HPLC etc. , Rapid diagnostic methods and Automation. in Microbiology.

**Books Recommended:**

- Medical Laboratory Science : Theory And Practice, By Ochei Et Al, Tata McGraw-Hill Education
- The Chemistry and Bacteriology of Public Health, By Cuthbert Lindsay Dunn, Butterworth & Company.
- Bartram's Encyclopedia of Herbal Medicine, By Thomas Bartram, Hachette UK
- Diagnosis: A Symptom-based Approach in Internal Medicine, By Madgaonkar CS, Jaypee Brothers Medical Publishers Pvt. Ltd.
- Clinical Anatomy by Regions, By Richard S. Snell, Lippincott Williams & Wilkins

**Paper Title: UMLTV - 592 PATHOLOGY LAB – III**

**List of Experiments: (Based on UMLTV – 504)**

- Bacteriological examination of water, milk, food and air
- Identification of *Vibrio Cholerae*
- Identification of *Mycobacterium tuberculosis*
- Identification of *Mycobacterium leprae*
- Identification of *Syphilis Spirochate*
- Identification of *Yersnia Pestis*

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**Paper Title: UMLTV - 505: HEMATOLOGY - III**

**Job Role: Medical Lab Technician**

**Objectives:** The course is designed to focus on the various studies of blood and its components with help of intense laboratory work.

**UNIT - I**

Definition and classification of anaemias, Laboratory investigation for megaloblastic anaemia, Laboratory investigation for iron deficiency anaemia, Laboratory investigation for haemolytic anaemia including classification and causes.

**UNIT - II**

Leukemia: definition and classification, Cytochemical staining procedures in various haemopoietic disorders, Laboratory test for assessing bleeding disorders, Laboratory investigation for disseminated intravascular coagulation (DIC).

**UNIT - III**

Mechanism of fibrinolysis: tests for fibrinolysis, Platelet function tests and their interpretation, Techniques available for cytogenetic studies.

**UNIT - IV**

Use of Radioisotopes in haematology, Safety measures for handling Radioisotopes.

**Books Recommended:**

- Recombinant Human Erythropoietin (rhEPO) in Clinical Oncology, edited by Mohammad Resa Nowrouzian, Springer Science & Business Media
- A Cancer Source Book for Nurses, By American Cancer Society, Jones & Bartlett Learning.
- Hemostasis and Thrombosis: Practical Guidelines in Clinical Management, edited by Hussain I. Saba, Harold R. Roberts, John Wiley & Sons
- Radionuclide Tracer Techniques in Haematology, By C. S. Bowring, Butterworth & Co (Publishers) Ltd 1981

**Paper Title: UMLTV - 593 HEMATOLOGY LAB – III**

**List of Experiments: (Based on UMLTV – 505)**

- Estimation of Haemoglobin
- Identification of Megaloblasts
- Identification of stains used in haemopoietic disorders
- Use of stains to detect haemopoietic disorders
- Measurement of Bleeding time
- Measurement of Clotting time

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**Year - 3 - Degree (SEMESTER - VI)**

**Paper Title: UGEN – 601: GENERAL HUMAN PSYCHOLOGY & HR MANAGEMENT**

**Objective:** The classic blend of psychology and human resource will help to deal with the individuals in the corporate sector. The study of proper human mind is to be emphasized before the role of human resource management comes to play.

**UNIT - I**

Introduction to psychology, Nature of psychology; Basic concepts: Person, States of Consciousness: Sleep and Wakefulness and altered States of Consciousness, Behavior and Experience, II Evolution of the discipline of psychology; Psychology and other disciplines; Linkages across psychological processes

**UNIT - II**

Methods of psychology, The bases of human behavior, Evolutionary perspective on human behavior; Biological and cultural roots; Nervous system and endocrine system: Structure and relationship of with behavior and experience; Brain and behavior, Socialization, Enculturation and Acculturation; Globalization; Diversity and pluralism in the Indian context.

**UNIT - III**

Evolution and growth of human resource management (with special reference to Scientific management and Human relations approaches). Role of HR in strategic management. Nature, objectives, scope, and functions of HR management, Challenges of HR (the changing profile of the workforce - knowledge workers, employment opportunities in BPOs, IT and service industries, Flexi options), Workforce diversity (causes, paradox, resolution of diversity by management).

**UNIT - IV**

Concepts of line - staff in the structure of human resource department and the role of human resource manager, Manpower planning, Job analysis, Job evaluation.

**Books Recommended:**

- General Psychology by S. Dandapani, Neelkamal Publication (2016)
- General Psychology by R. K. Gupta
- Aswathappa K. (2002) Human Resource and Personnel Management, Tata McGraw - Hill, New Delhi.
- Bhattacharyya Kumar Deepak (2006) Human Resource Managing, Excel Books, New Delhi.
- Cascio F. W. (2003) Managing Human Resources, Productivity, Quality of Life, Profits, Tata Mc - Graw - Hill, New York.

**Paper Title: UGEN - 681 PRACTICE SESSION ON GENERAL HUMAN PSYCHOLOGY & HR MANAGEMENT**

**Planning for Practical session: (Based on UGEN – 601)**

- How to conduct counseling sessions
- Case studies
- PPT presentation on recent HR practices

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**Paper Title: UGEN – 602: ENTREPRENEURSHIP DEVELOPMENT PROGRAMME**

**Objective:** The course aim to give a shape to understand the validity of various entrepreneurship development programs in the field of economics and its related concepts.

**UNIT - I**

To make the students understand about entrepreneurs and different classifications. Entrepreneur and entrepreneurship - Definition; traits and features; classification; Entrepreneurs; Women entrepreneurs; Role of entrepreneur in Entrepreneurs in India, Create an awareness about EDP. Entrepreneurial development programme concept; Need for training; phases of EDP; curriculum & contents of Training Programme; Support systems, Target Groups; Institutions conducting EDPs in India and Kerala.

**UNIT - II**

General awareness about identification of project financing new enterprises; Promotion of a venture; opportunity Analysis Project identification and selection; External environmental analysis economic, social, technological and competitive factors; Legal requirements for establishment of a new unit; loans; Over run finance; Bridge finance; Venture capital; Providing finance in Approaching financing institutions for loans.

**UNIT - III**

To identify different Discuss opportunities in small business; Small business Enterprise - Identifying the Business opportunity in various sectors - formalities for setting up of a small business enterprise - Institutions supporting small business enterprise - EDII (Entrepreneurship Development Institute of India), SLDO (Small Industries Development Organization NSIC (National small Industries Corporation Ltd. (CNSIC) NIESBUD (National Institute for Entrepreneurship and small Business Development) Sickness in small business enterprise causes and remedies.

**UNIT - IV**

To understand about a project report relating to a small business; Project formulation - Meaning of a project report significance contents formulation planning commissions guidelines for formulating a project report - specimen of a project report, problems of entrepreneurs case studies of entrepreneurs.

**Books Recommended:**

- Cliffton, Davis S. and Fylyie, David E. , Project Feasibility Analysis, John Wiley, New York, 1977.
- Desai A. N., Entrepreneur and Environment, Ashish, New Delhi, 1990.
- Drucker, Peter, Innovation and Entrepreneurship, Heinemann, London, 1985
- Jain Rajiv, Planning a Small Scale Industry: A guide to Entrepreneurs, S. S. Books, Delhi, 1984
- Kumar S. A. , Entrepreneurship in Small Industry, Discovery, New Delhi, 1990
- McClelland, D. C. and Winter, W. G. , Motivating Economic Achievement, Free Press, New York, 1969

**Paper Title: UGEN - 682 PRACTICE SESSION ON ENTREPRENEURSHIP DEVELOPMENT PROGRAMME**

**Planning for Practical session: (Based on UGEN – 602)**

- PPT presentation
- Case studies on Men/Women entrepreneurs
- Seminar on successful entrepreneurs
- Preparation of project work

**Paper Title: UMLTV – 683: INDUSTRIAL TRAINING**

**Job Role: Medical Lab Technician**

Industrial Training of 3 - 4 weeks of 6 credits in each year followed by Report Writing and Viva - voce. These trainings are to be carried out during summer vacations. These training may be done from industries/Skill knowledge providers (SKPs)/Sector Skill Councils (SSCs)/Training centers/Institutes. These credits will be evaluated in Semester VI.