B. VOC

In

MEDICAL LAB TECHNOLOGY (UGC)

Program Learning Outcomes:

PLO1: Perform routine clinical laboratory procedures within acceptable quality control parameters in Hematology, Biochemistry, Immunohematology, and Microbiology under the general supervision of a Clinical Laboratory Scientist or Pathologist.
PLO2: Demonstrate technical skills, social behavior, and professional awareness incumbent upon a laboratorytechnician
PLO3: Apply systematized problem solving techniques to identify and correct procedural errors, identify instrument malfunctions and seek proper supervisory assistance, and verify the accuracy of laboratoryresults obtained.
PLO4: Operate and maintain laboratory equipment, utilizing appropriate quality control and safety procedures.
PLO5: Recognize and participate in activities which will provide current knowledge and upgrading of skills in laboratory medicine.
PLO6: Demonstrate a strong understanding of human anatomy, physiology, biochemistry, and microbiology.
PLO7**:** Master a wide range of laboratory techniques, including sample collection, preparation, and analysis.
PLO8: Acquire knowledge of various clinical pathology tests, such as hematology, clinical chemistry, and immunology.
PLO9: Develop proficiency in microbiological techniques, including culture, staining, and identification of microorganisms and gain knowledge of blood group systems, blood component therapy, and transfusion reactions.

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.

Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 1 - Diploma (SEMESTER - I)

Corresponding NSQF Level 5

Course	Component	Theory / Practical / Sessional	Internal (Theory/Skill)	External (Theory/Skill)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 101 ENGLISH LANGUAGE AND COMMUNICATIVE SKILLS	Generic	Theory	30	70	-	-	3	1	-
UMLTV – 101 MICROBIOLOGY - I	Skill	Theory	30	70	-	-	3	1	-
UMLTV – 102 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY	Skill	Theory	30	70	-	-	3	1	-
UMLTV – 191 MICROBIOLOGY LAB - I	Skill	Practical	-	-	40	60	-	-	3
UMLTV - 192 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY LAB	Skill	Practical	-	-	40	60	-	-	3
UGEN – 181 ENGLISH LANGUAGE LAB	Generic	Sessional	-	-	-	100	-	-	2
UGEN – 182 COMPUTER FUNDAMENTALS & IT	Generic	Sessional	-	-	-	100	-	-	4
UMLTV - 181 LABORATORY SCIENCE & HUMAN BODY	Skill	Sessional	-	-	-	100	-	-	4

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B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 1 - Diploma (SEMESTER - II)

Corresponding NSQF Level 5

Course	Component	Theory / Practical / Sessional	Internal (Theory/Skill)	External (Theory/Skill)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UMLTV - 201 ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESS	Skill	Theory	30	70	-	-	3	1	-
UMLTV – 202 MICROBIOLOGY - II	Skill	Theory	30	70	-	-	3	1	-
UMLTV – 203 BIOCHEMISTRY - I	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 291 ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESSLAB	Skill	Practical	-	-	40	60	-	-	**2**
UMLTV - 292 MICROBIOLOGY LAB - II	Skill	Practical	-	-	40	60	-	-	2
UMLTV - 293 BIOCHEMISTRY LAB - I	Skill	Practical	-	-	40	60	-	-	2
UGEN - 281 SOFT SKILL & PERSONALITY DEVELOPMENT	Generic	Sessional	-	-	-	100	-	-	4
UGEN - 282 BUSINESS ANALYSIS: ENVIRONMENT, SALES & MARKETING	Generic	Sessional	-	-	-	100	-	-	4
UMLTV - 281 ON JOB TRAINING	Skill	Sessional	-	-	-	100	-	-	6

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B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 2 - Advanced Diploma (SEMESTER - III)

Corresponding NSQF Level 6

Course	Component	Theory / Practical / Sessional	Internal (Theory/Skill)	External (Theory/Skill)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UMLTV – 301 MICROBIOLOGY - III	Skill	Theory	30	70	-	-	3	1	-
UMLTV – 302 PATHOLOGY - I	Skill	Theory	30	70	-	-	3	1	-
UMLTV – 303 HEMATOLOGY - I	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 391 MICROBIOLOGY LAB – III	Skill	Practical	-	-	40	60	-	-	**2**
UMLTV - 392 PATHOLOGY LAB – I	Skill	Practical	-	-	40	60	-	-	2
UMLTV - 393 HEMATOLOGY LAB – I	Skill	Practical	-	-	40	60	-	-	4
UGEN - 381 VALUE EDUCATION & HUMAN RIGHTS	Generic	Sessional	-	-	-	100	-	-	4
UGEN - 382 BASIC ACCOUNTING	Generic	Sessional	-	-	-	100	-	-	4

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B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 2 - Advanced Diploma (SEMESTER - IV)

Corresponding NSQF Level 6

Course	Component	Theory / Practical / Sessional	Internal (Theory/Skill)	External (Theory/Skill)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UMLTV - 401 BIOCHEMISTRY - II	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 402 PATHOLOGY - II	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 403 HEMATOLOGY - II	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 491 BIOCHEMISTRY LAB – II	Skill	Practical	-	-	40	60	-	-	**2**
UMLTV - 492 PATHOLOGY LAB – II	Skill	Practical	-	-	40	60	-	-	2
UMLTV - 493 HEMATOLOGY LAB – II	Skill	Practical	-	-	40	60	-	-	2
UGEN - 481 ENVIRONMENTAL STUDIES	Generic	Sessional	-	-	-	100	-	-	4
UGEN - 482 QUALITY MANAGEMENT	Generic	Sessional	-	-	-	100	-	-	4
UMLTV – 481 ON JOB TRAINING	Skill	Sessional	-	-	-	100	-	-	6

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B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 3 - Degree (SEMESTER - V)

Corresponding NSQF Level 7

Course	Component	Theory / Practical / Sessional	Internal (Theory/Skill)	External (Theory/Skill)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UMLTV - 501 MICROBIOLOGY - IV	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 502 PATHOLOGY - III	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 503 HEMATOLOHY - III	Skill	Theory	30	70	-	-	3	1	-
UMLTV - 591 MICROBIOLOGY LAB – IV	Skill	Practical	-	-	40	60	-	-	4
UMLTV - 592 PATHOLOGY LAB – III	Skill	Practical	-	-	40	60	-	-	3
UMLTV - 593 HEMATOLOHY LAB – III	Skill	Practical	-	-	40	60	-	-	3
UGEN - 581 INDIAN ECONOMY & SOCIAL CHANGES	Generic	Sessional	-	-	-	100	-	-	4
UGEN - 582 RESEARCH METHODOLOGY	Generic	Sessional	-	-	-	100	-	-	4

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B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 3 - Degree (SEMESTER - VI)

Corresponding NSQF Level 7

Course	Component	Theory / Practical / Sessional	Internal (Theory)	External (Theory)	Internal (Practical)	External (Practical / Sessional)	Credit		
							L	T	P
UGEN - 681 GENERAL HUMAN PSYCHOLOGY & HR MANAGEMENT	Generic	Sessional	-	-	-	100	-	-	4
UGEN - 682 ENTREPRENEURSHIP DEVELOPMENT PROGRAMME	Generic	Sessional	-	-	-	100	-	-	4
UMLTV – 681 INDUSTRIAL TRAINING	Skill	Sessional	-	-	-	100	-	-	14
UMLTV - 691 MAJOR PROJECT	Skill	Practical	-	-	40	60	-	-	8

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

Course Objectives:

- Enhance students' ability to express ideas clearly, concisely, and coherently in both oral and written forms.
- Expand students' vocabulary, grammar, and pronunciation to facilitate effective communication.
- Encourage students to analyze information, evaluate arguments, and form independent judgments.
- Develop students' awareness and appreciation of different cultures through language study.

Course Outcomes:

CO1: Demonstrate proficiency in oral and written communication across various contexts, including academic, professional, and interpersonal settings.
CO2: Utilize critical thinking and problem-solving skills to analyze and interpret information, and to construct clear and coherent arguments.
CO3: Exhibit a strong command of English grammar, vocabulary, and pronunciation, enabling accurate and appropriate language use.
CO4: Demonstrate understanding and appreciation of diverse cultures, and effectively interact with people from different backgrounds.

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

Paper Title: UMLTV - 101: MICROBIOLOGY - I

Job Role: Junior Medical Lab Technician

Course Objectives:

- Introduce Fundamental Microbiological Concepts Objective: To provide students with a foundational understanding of microbiology, including the basic principles of microbial life, microbial classification, and the role of microorganisms in various environments.
- Explore Microbial Structure and Function Objective: To enable students to learn about the structure, function, and physiology of different types of microorganisms, including bacteria, viruses, fungi, and protozoa, and how these characteristics affect their behavior and interaction with their environment.
- Understand Microbial Growth and Control Objective: To educate students on the principles of microbial growth, including factors affecting growth, methods for controlling microbial populations, and techniques used for sterilization and disinfection in laboratory and clinical settings.
- Apply Microbiological Techniques Objective: To provide students with practical knowledge of microbiological techniques, including methods for culturing, staining, and identifying microorganisms, and their application in research, clinical diagnostics, and industrial processes.

Course Outcomes:

CO1: Demonstrate Understanding of Microbiological Concepts Outcome: Students will be able to demonstrate a solid understanding of fundamental microbiological concepts, including the classification and roles of microorganisms in different environments.

CO2: Identify Microbial Structures and Functions Outcome: Students will be proficient in identifying and describing the structure and function of various microorganisms, including bacteria, viruses, fungi, and protozoa, and understanding their physiological processes.

CO3: Apply Knowledge of Microbial Growth and Control Outcome: Students will be able to apply their knowledge of microbial growth and control methods, effectively utilizing techniques for microbial management, sterilization, and disinfection.

CO4: Utilize Microbiological Techniques in Practice Outcome: Students will be skilled in applying microbiological techniques, such as culturing, staining, and identifying microorganisms, to practical problems in laboratory and field settings, demonstrating competency in standard microbiological procedures.

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 measurers 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
- Mannual 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 Mannual and work book for Microbiology in Health and Disease; Robert Fuerst W. B. Sunderu

Paper Title: UMLTV - 191 MICROBIOLOGY LAB - I

List of Experiments: (B**ased on UMLTV – 101)**

- 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

Paper Title: UMLTV - 102: FUNDAMENTALS OF ANATOMY & PHYSIOLOGY

Job Role: Junior Medical Lab Technician

Course Objectives:

- Understand Basic Anatomical Terminology Objective: To provide students with a foundational understanding of anatomical terminology and concepts, including the language used to describe the locations and functions of different body structures.
- Explore Human Body Systems Objective: To enable students to learn about the major systems of the human body (e.g., cardiovascular, respiratory, digestive, musculoskeletal), including their structures, functions, and interrelationships.
- Analyze Physiological Processes Objective: To introduce students to the basic physiological processes that maintain homeostasis, including mechanisms of regulation and control in various body systems.
- Apply Anatomical and Physiological Knowledge Objective: To help students apply their knowledge of anatomy and physiology to understand how disruptions in normal body functions can lead to diseases and health conditions.

Course Outcomes:

CO1: Demonstrate Knowledge of Anatomical Terminology Outcome: Students will be able to accurately use anatomical terminology to describe the locations, structures, and functions of various body parts.

CO2: Identify and Describe Body Systems Outcome: Students will be proficient in identifying and describing the major body systems, including their components and their roles in maintaining overall body function.

CO3: Explain Physiological Mechanisms Outcome: Students will be able to explain basic physiological mechanisms and processes that contribute to homeostasis, including feedback systems and regulatory functions.

CO4: Relate Anatomy and Physiology to Health and Disease Outcome: Students will be capable of applying their understanding of anatomy and physiology to recognize how imbalances or malfunctions in body systems can lead to specific health conditions or diseases.

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

Paper Title: UMLTV - 192 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY LAB

List of Experiments: (Based on UMLTV – 102)

- 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^{st}. to 7^{th}. Rib).

Paper Title: UGEN – 182: COMPUTER FUNDAMENTALS & IT

Course Objectives:

- To introduce students to the fundamental concepts of computers and information technology. This includes understanding computer hardware, software, and their interconnections.
- To develop basic computer skills: Students will learn to operate computer systems, use productivity software, and access information resources effectively.
- To foster digital literacy: Students will be equipped with the knowledge and skills to use computers and information technology responsibly and ethically.
- To prepare students for further studies: This course will lay the foundation for advanced computer courses and IT-related fields.

Course Outcomes:

CO1: Demonstrate basic computer hardware knowledge: Students will be able to identify and describe the components of a computer system and their functions.
CO2: Utilize computer software effectively: Students will be proficient in using operating systems, word processors, spreadsheets, and presentation software.
CO3: Access and utilize information resources: Students will be able to search for, evaluate, and use information from various digital sources.
CO4: Apply digital literacy skills: Students will demonstrate responsible and ethical use of computers and information technology.

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: UMLTV - 181: LABORATORY SCIENCE & HUMAN BODY

Job Role: Junior Medical Lab Technician

Course Objectives:

- Understand Laboratory Techniques and Equipment Objective: To provide students with a thorough understanding of common laboratory techniques, tools, and equipment used in the analysis of biological samples and studies related to the human body.
- Apply Scientific Methodology in Laboratory Settings Objective: To teach students how to apply scientific methodologies and procedures in laboratory experiments, including hypothesis formation, experimentation, data collection, and analysis.
- Analyze Biological Samples Objective: To enable students to perform and interpret various tests on biological samples, such as blood, urine, and tissue samples, to understand normal and abnormal physiological conditions.
- Integrate Laboratory Findings with Human Body Systems Objective: To help students integrate their laboratory findings with knowledge of human body systems, understanding how laboratory results can reflect the health status and functioning of different body systems.

Course Outcomes:

CO1: Demonstrate Proficiency in Laboratory Techniques Outcome: Students will be able to demonstrate proficiency in using laboratory techniques and equipment, including accurate measurement, sample preparation, and application of analytical methods.

CO2: Implement Scientific Methodology Effectively Outcome: Students will be capable of implementing scientific methodology in laboratory settings, designing experiments, collecting and analyzing data, and drawing valid conclusions.

CO3: Interpret Results of Biological Tests Outcome: Students will be able to interpret the results of various biological tests, understanding their implications for normal and abnormal physiological states and making informed assessments.

CO4: Relate Laboratory Results to Human Body Function Outcome: Students will be able to relate laboratory findings to the functioning of human body systems, integrating their understanding of anatomy and physiology with practical laboratory observations and analyses.

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.
- Chaursia, 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

Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

B.Voc. in Medical Lab Technology (UGC)

(Effective for Academic Session 2024-2025)

Year - 1 Diploma (SEMESTER - II)

Paper Title: UMLTV - 201: ADVANCED LABORATORY SCIENCE TECHNIQUES & TESTING PROCESS

Job Role: Junior Medical Lab Technician

Course Objectives:

- Master Advanced Laboratory Techniques Objective: To equip students with advanced laboratory techniques and methodologies used in modern scientific research, including precision instrumentation, complex assays, and high throughput analysis.
- Enhance Skills in Testing Processes Objective: To develop students' abilities to conduct sophisticated testing processes, including sample preparation, analytical techniques, and interpretation of complex data in various scientific fields.
- Implement Quality Control and Assurance Objective: To familiarize students with quality control and quality assurance practices in laboratory settings, ensuring accuracy, reliability, and reproducibility of experimental results.
- Apply Advanced Techniques to Real World Problems Objective: To enable students to apply advanced laboratory techniques to solve real world problems, including the development of new methods or improvements in existing testing processes.

Course Outcomes:

CO1: Demonstrate Proficiency in Advanced Techniques Outcome: Students will be able to demonstrate proficiency in using advanced laboratory techniques and equipment, including complex instrumentation and analytical methods.

CO2: Conduct Complex Testing Processes Outcome: Students will be capable of conducting complex testing processes with precision, including the preparation of samples, execution of assays, and analysis of results.

CO3: Apply Quality Control Measures Outcome: Students will effectively apply quality control and assurance measures to their laboratory work, ensuring the accuracy and reliability of their experimental results.

CO4: Solve Real World Laboratory Problems Outcome: Students will be able to apply their advanced laboratory skills to address real world problems, including the development and implementation of new testing methods or enhancements to existing processes.

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, 5thed, St. Louis, Mo: Mosby Elsevier, 2007

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

List of Experiments: (Based on UMLTV – 201)

- 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 from
- 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

Paper Title: UMLTV - 202: MICROBIOLOGY - II

Job Role: Junior Medical Lab Technician

Course Objectives:

- Explore Advanced Microbial Physiology and Genetics Objective: To deepen students' understanding of advanced microbial physiology and genetics, including the mechanisms of microbial metabolism, genetic variation, and molecular genetics techniques.
- Investigate Microbial Interactions and Pathogenicity Objective: To examine microbial interactions with hosts and environments, focusing on mechanisms of microbial pathogenicity, infection, and the immune response.
- Study Environmental and Industrial Microbiology Objective: To introduce students to the role of microorganisms in environmental and industrial contexts, including bioremediation, wastewater treatment, and the production of industrial products.
- Apply Microbiological Techniques to Research Objective: To enable students to apply advanced microbiological techniques in research settings, including molecular methods, culture techniques, and diagnostic tools to investigate microbial systems and solve practical problems.

Course Outcomes:

CO1: Demonstrate Knowledge of Microbial Physiology and Genetics Outcome: Students will be able to explain advanced concepts in microbial physiology and genetics, including microbial metabolism, gene regulation, and genetic engineering techniques.

CO2: Analyze Microbial Pathogenicity and Host Interactions Outcome: Students will be capable of analyzing mechanisms of microbial pathogenicity and interactions with hosts, including understanding the development of infections and the immune response.

CO3: Understand Environmental and Industrial Microbiology Applications Outcome: Students will demonstrate an understanding of the applications of microbiology in environmental and industrial settings, including how microorganisms are used in bioremediation and industrial processes.

CO4: Utilize Advanced Microbiological Techniques Outcome: Students will be proficient in applying advanced microbiological techniques and methods in research and diagnostic contexts, effectively using molecular and culture based approaches to address scientific and practical challenges.

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, Ricketssia, Chalmydia, 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 – 202)

- 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

Paper Title: UMLTV - 203: BIOCHEMISTRY - I

Job Role: Junior Medical Lab Technician

Course Objectives:

- Understand Fundamental Biochemical Concepts Objective: To provide students with a foundational understanding of key biochemical principles, including the structure and function of biomolecules such as carbohydrates, lipids, proteins, and nucleic acids.

- Explore Enzyme Function and Kinetics Objective: To introduce students to the mechanisms of enzyme action, enzyme kinetics, and factors affecting enzyme activity, emphasizing their roles in biochemical reactions and metabolic pathways.

- Analyze Metabolic Pathways Objective: To enable students to study and analyze major metabolic pathways, including glycolysis, the citric acid cycle, and oxidative phosphorylation, understanding their regulation and integration in cellular metabolism.

- Apply Biochemical Principles to Practical Problems Objective: To help students apply their knowledge of biochemical concepts to real world problems, such as understanding metabolic disorders, drug interactions, and biochemical techniques used in research and industry.

Course Outcomes:

CO1: Demonstrate Knowledge of Biochemical Principles Outcome: Students will be able to demonstrate a solid understanding of fundamental biochemical concepts, including the structure and function of essential biomolecules and their roles in biological systems.

CO2: Explain Enzyme Function and Kinetics Outcome: Students will be proficient in explaining the mechanisms of enzyme function, enzyme kinetics, and the impact of various factors on enzyme activity, including inhibition and regulation.

CO3: Describe Major Metabolic Pathways Outcome: Students will be capable of describing and analyzing major metabolic pathways, including their components, regulation, and integration into overall cellular metabolism.

CO4:. Apply Biochemical Knowledge to Real World Issues Outcome: Students will be able to apply their understanding of biochemistry to address real world issues, such as diagnosing and understanding metabolic disorders, evaluating drug mechanisms, and utilizing biochemical techniques in practical settings.

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: Colorimetery / Spectrophotometery, Flame photometery , Atomic absorption spectroscopy, electrophoretic determination of Na+ and k+, 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 – 203)

- 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

Paper Title: UGEN – 281: SOFT SKILL & PERSONALITY DEVELOPMENT

Course Objectives

- Enhance interpersonal communication: Develop students' ability to communicate effectively with diverse audiences, both verbally and non-verbally.
- Foster personal and professional development: Equip students with the necessary skills to build self-confidence, time management, and leadership qualities.
- Improve critical thinking and problem-solving: Enhance students' ability to analyze complex situations, make informed decisions, and find effective solutions.
- Develop teamwork and collaboration: Cultivate students' ability to work effectively in groups, share responsibilities, and achieve common goals.

Course Outcomes

CO1: Effective communication: Students will be able to communicate clearly, concisely, and persuasively in various settings.
CO2: Personal and professional growth: Students will demonstrate improved self-awareness, time management, and leadership skills.
CO3: Critical thinking and problem-solving: Students will be able to analyze problems, generate solutions, and make informed decisions.
CO4: Teamwork and collaboration: Students will effectively collaborate with others to achieve shared objectives.

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.

UNIT - V

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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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 – 282: BUSINESS ANALYSIS: ENVIRONMENT, SALES & MARKETING

Course Objectives:

- Analyze the Business Environment: Equip students with the tools and techniques to analyze the external and internal business environment, including market trends, economic conditions, regulatory frameworks, and competitive landscapes.
- Understand Sales Strategies and Techniques: Provide students with a deep understanding of various sales strategies and techniques, focusing on how to develop, implement, and assess sales plans that drive customer acquisition and revenue growth.
- Explore Marketing Principles and Practices: Introduce students to core marketing principles, including market research, segmentation, targeting, positioning, and the development of marketing strategies to effectively reach and engage target audiences.
- Integrate Sales and Marketing Analysis: Teach students how to integrate insights from sales and marketing analyses to create comprehensive business strategies that align with environmental factors and drive organizational success.

Course Outcomes:

CO1: Competence in Analyzing the Business Environment: Students will be able to analyze various aspects of the business environment, including market conditions, economic factors, and competitive dynamics, and understand their impact on business strategies.

CO2: Ability to Develop Sales Strategies: Students will demonstrate the ability to create and implement effective sales strategies, using data driven insights to optimize sales performance, customer acquisition, and retention.

CO3: Proficiency in Marketing Principles and Practices: Students will apply marketing principles to design and execute marketing strategies, including conducting market research, segmenting target markets, and positioning products or services effectively.

CO4: Integration of Sales and Marketing Insights: Students will be capable of integrating sales and marketing analyses to formulate cohesive business strategies that address environmental factors and contribute to overall business growth and success.

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 FinancialSystem, 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.

UNIT – V

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

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