



SNDT Women's University, Mumbai

**Undergraduate Degree / UG
Programme (Syllabus as Per NEP) -
Faculty of Science & Technology**

**Bachelor of Science
(Clinical Laboratory Science)**

B.Sc. (CLS)

As Per NEP – 2020

Semester – I & II

**Syllabus
(W.E.F. Academic Year 2026-27)**

Terminologies

Vertical	Full-Form/Definition	Remarks	Related To Major And Minor Courses
Major (Core)	Subject Comprising Mandatory and Elective Courses, Major Specific IKS, Vocational Skill Courses, Internship/ Apprenticeship, Field Projects, Research Projects Connected to Major	Minimum 50% Of Total Credits Corresponding to Three/Four - Year UG Degree- Mandatory Courses	Related To The Major
Minor Course	Course From Same Or Different Faculty	Minimum 18-20 Credits to Be Completed in The First Three Years of UG Programme	Related To the Minor
OEC	Open Elective Courses/ Generic Courses	10-12 Credits to Be Offered in I And/Or II Year. Faculty-Wise Baskets of OEC To Be Prepared	OEC Is to Be Chosen Compulsorily from Faculty Other Than That of the Major
VSC	Vocational Skill Courses, Including Hands On Training Corresponding To The Major And/Or Minor Subject	8-10 Credits, To Be Offered in First Three Years, Wherever Applicable Vocational Courses Will Include Skills Based on Advanced Laboratory Practical's of Major	Related To the Major or Minor
SEC	Skill Enhancement Courses	06 Credits, To Be Offered in I And II Year, To Be Selected from The Basket of Skill Courses Approved by University	Related To the Major or Minor Any Relevant Skill
AEC	Ability Enhancement Courses	08 Credits, To Be Offered in I And II Year, English: 04 Credits to Be Earned in Sem - I, Modern Indian Language Of 04 Credits to Be Offered in II Year	NA
VEC	Value Education Courses	Understanding India, Environmental Science/Education, Digital and Technological	NA

		Solutions, Health & Wellness, Yoga Education, Sports, And Fitness	
IKS	Indian Knowledge System	Generic IKS Course: Basic Knowledge Of The IKS To Be Offered At First Year Level	Major-Specific IKS Courses: Advanced Information About the Major, Part of the Major Credit to Be Offered at Second- Or Third-Year Level
OJT	On-Job Training (Internship / Apprenticeship)	Corresponding To the Major Subject	Related To The Major
FP	Field Projects	Corresponding To the Major Subject	Related To the Major
CC	Co-Curricular Courses	Health And Wellness, Yoga Education Sports, And Fitness, Cultural Activities, NSS/NCC And Fine/ Applied/Visual/ Performing Arts	NA
CE	Community Engagement and Service		Related To Major
RP	Research Project	Corresponding To the Major Subject	Related To Major

Programme Template

Faculty		Science & Technology
Degree		B.Sc.
Programme		Clinical Laboratory Science
Preamble		B.Sc. Clinical Laboratory Science (B.Sc. CLS) is an allied health professional degree programme. This programme includes clinically oriented subjects such as Microbiology, Hematology, Immunology, Biochemistry, Anatomy, and Physiology. It covers the diagnosis, treatment, and prevention of diseases through the use of clinical laboratory tests on body fluids, including biochemical, pathological, and microscopic analyses. The programme also imparts knowledge of sample collection, testing, documentation, and reporting. Clinical laboratory professionals play a crucial role in providing the best patient care by collecting and analyzing the information required for diagnosis and treatment. Clinical laboratory professionals have a wide range of career opportunities in hospitals, clinics, nursing homes, and commercial laboratories.
Programme Specific Outcomes (PSOs)		After completing this programme, the learners will be able to:
	1	Apply the knowledge and technical skills associated with Clinical Laboratory Science.
	2	Be eligible for enrollment in Master's and/or Ph.D. programmes.
	3	Obtain employment in private, municipal, public, semi-government, State Government, and Central Government laboratories and hospitals.
	4	Be eligible to obtain a paramedical practice license and become an entrepreneur.
	5	Work as a leader in professional and industrial research organizations across the globe.
	6	Apply appropriate tools and techniques learned during the programme.
	7	Use available resources and information technology (IT) tools for the analysis and synthesis of data, particularly in the outcome-based learning of the final-year subjects.
Eligibility Criteria for Programme		Female candidates who have passed the 12th Standard (Science) with Physics, Chemistry, and Biology (PCB). Female candidates who have completed a three-year full-time Diploma in Medical Laboratory Technology (DMLT) approved by the Directorate of Technical Education (DTE), AICTE, and the State Government are eligible for Direct

		Second Year admission. <i>(Note: Admissions will be based on merit.)</i>
Intake (For SNTD WU Departments and Conducted Colleges)		First Year 30 seats Direct Second Year 50% of the approved intake of the First Year.

Structure with Course Title

B. Sc. (Clinical Laboratory Science)

Semester – I

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	Semester I					
10034301	Biochemistry - Part A (Th)	Major (Core)	2	50	50	0
		Major (Core)	2	50	50	0
		Major (Core)	2	50	50	0
10434311	Haematology - I (Th + Pr)	OEC	4	100	50	50
10634302	Basics of Biochemistry (Pr)	VSC S1	2	50	50	0
10734321	Microbiology – I (Pr)	SEC	2	50	0	50
10810111	English For Academic Writing - Paper I (For Students of English Medium)	AEC (English) (Any One)	2	50	0	50
10810112	English Language and Literature - I (For Students of Non-English medium)					
	AEC Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/aec-syllabus/ug-degree/ability-enhancement-course.pdf (Available on Website)					
11051111	Inception of India Knowledge System IKS Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/iks-syllabus/ug-	IKS (Generic)	2	50	0	50

	degree/inception-of-indian-knowledge-system.pdf (Available on Website)					
10952111	Introduction to Indian Constitution Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/vec-syllabus/ug-degree/introduction-to-indian-constitution.pdf (Available on Website)	VEC	2	50	0	50
11450121	Basics of National Service Scheme	CC (Any One)	2	50	50	0
11450221	National Cadets Corps. (NCC) Studies - I					
11450322	Health and Wellness					
11450421	Performing Arts Exploration					
	CC Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/cc-syllabus/ug-degree/co-curricular-course-as-per-nep-2020-semester-i-syllabus.pdf (Available on Website)					
			22	550	300	250

Semester – II

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	Semester II					
20034311	Biochemistry - Part B (Th)	Major (Core)	2	50	0	50
		Major (Core)	2	50	0	50
		Major (Core)	2	50	0	50
		VSC S2	2	50	50	0
		VSC S3	2	50	50	0
20434311	Microbiology – II (Th + Pr)	OEC	4	100	50	50
20734301	Computer Application (Th)	SEC	2	50	50	0
20810111	English For Academic Writing - Paper II (For Students of English Medium)	AEC (English) (Any One)	2	50	0	50
20810112	English Language and Literature - II (For Students of Non-English medium)					
	AEC Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/aec-syllabus/ug-degree/ability-enhancement-course.pdf (Available on Website)					
20952111	Environment Awareness Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/vec-syllabus/ug-degree/environment-awareness.pdf	VEC	2	50	0	50

	(Available on Website)					
21450121	Volunteerism and National Service Scheme	CC (Any One)	2	50	50	0
21450221	National Cadets Corps. (NCC) Studies - II					
21450323	Yoga Education					
21450421	Fine Art					
	CC Link: https://www.sndt.ac.in/pdf/academics/syllabus-as-per-nep/cc-syllabus/ug-degree/co-curricular-course-as-per-nep-2020-semester-ii-syllabus.pdf (Available on Website)					
			22	550	250	300

Exit with UG Certificate with 4 Extra Credits (44+4 Credits)

Course Syllabus

Semester – I

.1.1 Major (Core)

Course Titles	Biochemistry - Part A (Th)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to,
	1. Recognize different types of carbohydrates and their functions.
	2. Identify the different types of cells and transport processes.
	3. Summarize different types of buffers, role and importance of glassware.
	4. Interpret different biochemical tests and instruments used.
	5. Exemplify about care and maintenance of equipment.
Module 1 (Credit 1) – Cell and Transport	
Learning Outcomes	After learning the module, learners will be able to,
	1. Apply the basic concepts of Biochemistry.
	2. Elucidate different cells and their transport mechanisms.
Content Outline	• Structure, components, and their respective functions of the following cells: human cell, bacterial cell, red blood cell, and white blood cell.
Module 2 (Credit 1) – Buffer Systems	
Learning Outcomes	After learning the module, learners will be able to,
	1. Recognize different types of buffers and their uses in Clinical Biochemistry.
	2. Evaluate the factors causing diseases.
Content Outline	• Buffer systems of the cell and the importance of maintaining the pH of cellular constituents. • Introduction to Clinical Biochemistry and the major factors responsible for causing diseases.

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

- Group discussion on types of carbohydrates and their functions.
- Group discussion on different types of cells and their transport systems.
- Create a detailed diagram illustrating the structure of a cell, labelling its main components and organelles.

- Chart preparation on biochemical tests commonly used in clinical practice and their relevance to specific disease conditions.
- Seminar on the major factors responsible for causing diseases at the biochemical level, such as genetic mutations, environmental toxins, and metabolic dysregulation.

References

1. Textbook of Medical Laboratory Technology, Dr. P. B. Godkar, 3rd Edition, Published 2018.
2. Biochemistry, U. Satyanarayana, Published 2005, Reprinted 2010, Publisher: Anuradha Sen.
3. Schaum's Outline of Biochemistry, 3rd Edition, Ralston and Kuchel.
4. Harper's Biochemistry, 31st Edition, Robert K. Murray.
5. Medical Biochemistry, Rana Shinde, 8th Edition, Jaypee Brothers.
6. Principles of Biochemistry, Lehninger, 7th Edition, David L. Nelson.

Semester – I

1.4 Open Elective Courses / Generic (OEC)

Course Titles	Haematology - I (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to,
	1. Collect blood samples.
	2. Carry out complete hemogram.
	3. Identify various blood parasites.
	4. Handle the autoanalyzer.
	5. Perform quality control procedures.
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to,
	1. Differentiate various blood cells.
	2. Appraise the techniques of blood collection, cell count, and hemoglobin determination.
Content Outline	• Introduction to Hematology. • Blood and its functions. • Phlebotomy. • Haematopoiesis. • Cell count.
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to,
	1. Calculate cell indices.
	2. Perform blood smear preparation, differential count, identify abnormal cell morphology, and blood parasites.
Content Outline	• Determination of PCV, ESR, and cell indices. • Differential WBC count and morphology of all blood cells and parasites. • Autoanalyzers.
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to,
	1. Evaluate the pathophysiology of different anemic conditions.
	2. Prepare blood smears.
	3. Investigate different anemic conditions and erythropoiesis.

Content Outline	• Determination of anisocytosis and poikilocytosis. • Cell count using Neubauer's chamber and cell counter. • Differential WBC count and morphology of RBCs and WBCs using autoanalyzers.
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to,
	1. Recognize the pathophysiology of thrombopoiesis.
	2. Investigate different leukocyte disorders.
Content Outline	• Determination of platelet count. • Staining techniques (Wright's stain and Field stain). • Determination of Mentzer's Index. • Determination of ESR by Wintrobe's and Westergren's methods.

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE)

- Project work: Interview a hematologist or hematopathologist to learn about their career path, daily responsibilities, and the challenges they face in their field.
- Project work: Prepare a comparative analysis of the structure and function of red blood cells, white blood cells, and platelets.
- Seminar presentation on blood cell morphology.
- Seminar presentation on blood cell indices.
- Discuss safety precautions, infection control measures, and potential complications associated with phlebotomy procedures.
- Perform calculations to determine MCV, MCH, and MCHC values based on the provided blood analysis data.

References

1. Textbook of Medical Laboratory Technology, Dr. P. B. Godkar, 3rd Edition, Published 2018.
2. Dacie and Lewis Practical Haematology, 12th Edition, Barbara Bain.
3. Williams Manual of Hematology, Marshall Lichtman, 10th Edition, McGraw Hill.
4. Medical Laboratory Technology, Kanai L. Mukherjee, 4th Edition, CBS Publishers.
5. Bethesda Handbook of Clinical Haematology, 4th Edition, Wolters Kluwer.

Semester – I

.1.5 Vocational Skill Courses (VSC-S1)

Course Titles	Basics of Biochemistry (Pr)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Demonstrate proficiency in safe laboratory practices, proper handling of glassware, and accurate preparation of standard and percentage solutions.
	2. Operate common biochemical instruments and equipment with appropriate calibration, care, and maintenance.
	3. Adhere to good laboratory practices by maintaining equipment, ensuring safety, and producing reliable and reproducible results.
Module 1 (Credit 1) – Introduction to Biochemistry Laboratory	
Learning Outcomes	After learning the module, learners will be able to
	1. Students will be able to understand the basic structure, rules, and safety measures of a biochemistry laboratory.
	2. Students will be able to perform accurate pipetting and dispensing techniques and determine the normality of the solution.
Content Outline	• Introduction to the Biochemistry laboratory, responsibilities, and related safety measures. • Introduction to various types of glassware and maintenance of glassware. • Determination of the normality of 10% sodium hydroxide and learning pipetting and dispensing techniques. • Standardization of 1.0 ml volumetric pipette and learning to use, care, and maintain various balances. • Preparation of primary normal solution (1N sodium carbonate). • Preparation of normal solutions (1N hydrochloric acid). • Preparation of percent solution (V/V): 2% (V/V) acetic acid (WBC diluting fluid).
Module 2 (Credit 1) – Introduction to the Instrumentation	
Learning Outcomes	After learning the module, learners will be able to
	1. Students will be able to operate an instrument accurately and demonstrate proper calibration, care, and maintenance.
	2. Students will integrate theoretical knowledge with practical skills to perform basic biochemical investigations and interpret instrumental readings.

Content Outline	• Learning use, care, and maintenance of pH meter. • Preparation of protein-free filtrate, separation of serum and plasma from appropriate blood, and learning to use, care, and maintain a centrifuge. • Learning use, care, and maintenance of a hot air oven, water bath, and incubator. • Preparation of a complex reagent (e.g., Benedict's qualitative reagent) and learning to use, care, and maintain the hot plate and magnetic stirrer. • Learning use, care, maintenance, and operation of a photometer and spectrophotometer.
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References:

1. Textbook of Medical Laboratory Technology by Dr. P. B. Godkar, 3rd Edition, published in 2018.

Semester – I

.1.6 Skill Enhancement Courses (SEC)

Course Titles	Microbiology - I (Pr)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Apply their knowledge of sterilization and disinfection methods in diverse settings, including healthcare facilities, laboratories, food processing plants, and other industries where microbial control is essential for public health and safety.
	2. Evaluate the effectiveness and efficiency of different sterilization and disinfection methods in various contexts and propose solutions to challenges or limitations encountered in practice.
	3. Demonstrate competency in using an inoculating hood and light microscope to perform aseptic procedures, such as culture inoculation, colony isolation, and microscopic examination of microbial specimens.
	4. Evaluate the appropriateness of different staining techniques based on clinical scenarios and laboratory findings.
Module 1 (Credit 1) – Sterilization and Disinfection	
Learning Outcomes	After learning the module, learners will be able to,
	1. Recognize physical methods of sterilization, filtration techniques, and indicators of sterilization.
Content Outline	• Different methods of sterilization and disinfection • Dry heat, Moist heat • Radiation
Module 2 (Credit 1) – Staining Methods & Instrumentation	
Learning Outcomes	After learning the module, learners will be able to
	1. Perform Gram staining, Acid-Fast, Metachromatic granule staining.
	2. Illustrate structure, principle, and applications of Incubator, Hot-air oven, Autoclave, Inspissator.
Content Outline	• Different types of staining and clinical significance of staining • Different aseptic techniques in the routine laboratory • Use inoculating hood and laminar microscopy

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE)

- Compile a comprehensive list of different methods of sterilization and disinfection commonly used in laboratory and healthcare settings.
- Prepare a diagrammatic report on historic events in microbiology.

- Research and prepare a chart of different staining techniques used in microbiology, including simple staining, differential staining (e.g., Gram staining, acid-fast staining), and special staining (e.g., endospore staining, capsule staining).

Reference Books

1. Textbook of Medical Laboratory Technology by Dr. P. B. Godkar, 3rd Edition, Published in 2018.
2. Medical Microbiology by Dr. Ananthnarayan, 12th Edition, Universities Press, India.
3. Shoum's Outline Microbiology, 2023.
4. Microbiology: An Introduction by Gerald J. Tortora, Berdell R. Funke, and Christine L. Case, 13th Edition, 2018, Published by Pearson.
5. Prescott's Microbiology, 10th Edition, Published by McGraw Hill.

Course Syllabus

Semester – II

.2.1 Major (Core)

Course Titles	Biochemistry - Part B (Th)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to,
	1. Analyze different biochemical tests and instruments used.
	2. Exemplify about care and maintenance of equipment.
	3. Demonstrate competency in operating and maintaining laboratory equipment safely and effectively, following manufacturer instructions and best practices.
	4. Empower students to become competent and responsible laboratory practitioners, capable of contributing meaningfully to scientific advancements and discoveries while upholding the highest standards of safety, accuracy, and integrity in their work.
Module 1 (Credit 1) – Vitamins and Minerals	
Learning Outcomes	After learning the module, learners will be able to,
	1. Identify the different types of Vitamins and minerals.
	2. Evaluate their physiological role and its significance.
Module 2 (Credit 1) – Carbohydrates	
Learning Outcomes	After learning the module, learners will be able to,
	1. Identify the different types of carbohydrates.
	2. Elucidate various metabolic pathways of carbohydrates.
Content Outline	• Carbohydrate Chemistry, Definition, importance, classification, properties, structural formulae of various mono and disaccharides, Isomerism. • Digestion and absorption of carbohydrates, Metabolism of carbohydrates – Glycolysis, TCA cycle, HMP Pathway, Glycogenesis, Gluconeogenesis, etc.

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

- Chart preparation on identification of various dietary sources of vitamins, highlighting specific foods rich in each vitamin category.
- Group discussion on various topics such as vitamin deficiency diseases and their clinical manifestations, emphasizing the importance of adequate vitamin intake for maintaining health.
- Provide evidence-based recommendations for optimizing vitamin and mineral intake in the general population.

- Group discussion on the interconversion of carbohydrates with various metabolic pathways.
- Discuss case study on clinical case or scenario involving carbohydrate metabolic disorders, such as diabetes mellitus.

References

1. Textbook of Medical Laboratory Technology: Dr. P. B. Godkar, 3rd Edition, Published 2018.
2. Biochemistry: U. Satyanarayana, Published 2005, Reprinted 2010, Publisher Anurabha Sen.
3. Shaum's Outline Biochemistry, 3rd Edition, Published by Ralston, Kuchel.
4. Harper's Biochemistry, 31st Edition, Published by Robert K. Murray.
5. Medical Biochemistry, Rana Shinde, 8th Edition, Published by Jaypee Brothers.
6. Principles of Biochemistry, Lehninger, 7th Edition, by David Nelson.

Semester – II

.2.6 Open Elective Courses/ Generic (OEC)

Course Titles	Microbiology - II (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to
	1. Classify different types of bacteria based on Gram staining.
	2. Perform various methods of preparing cultures.
	3. Evaluate different culture media.
Module 1 (Credit 1) – Classification of Bacteria, Growth & Multiplication	
Learning Outcomes	After learning the module, learners will be able to
	1. Explore different types of Gram-negative and Gram-positive bacteria.
	2. Evaluate the bacterial growth curve, generation time, and population doubling time.
Content Outline	• Classification of Gram-negative and Gram-positive bacteria. • Factors affecting the growth and multiplication of bacteria. • Significance of the growth curve in routine culture. • Perform tests on biochemical media.
Module 2 (Credit 1) – Cultivation of Microorganisms	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyze normal flora with examples.
	2. Identify and study general-purpose, enrichment, enriched, selective, and transport culture media.
Content Outline	• Different types of culture media classification based on ingredients. • Classification of culture media based on consistency. • Preparation of biochemical media.
Module 3 (Credit 1) – Microbial Metabolism	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyze metabolic pathways of microorganisms such as glycolysis, fermentation, aerobic respiration, and anaerobic respiration.
	2. Evaluate autotrophs and heterotrophs.
Module 4 (Credit 1) – Pathogenesis of Bacterial Infection and Study of Gram-negative Bacteria	
Learning	After learning the module, learners will be able to

Outcomes	1. Explain the epidemiology and pathophysiology of diseases.
	2. Illustrate the morphological, cultural, and biochemical study of Gram-negative bacilli.
	3. Identify the characteristics of the Enterobacteriaceae family.
Content Outline	• Sources of infection and incubation period. • Clinical symptoms. • Diagnostic techniques in the routine laboratory. • Colony characteristics and biochemical reactions. • Pathogenesis and clinical symptoms. • Laboratory diagnosis and treatment.

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

1. Provide examples of Gram-negative and Gram-positive bacterial species, including their morphological features, habitats, and pathogenicity.
2. Prepare a chart on how growth curves are generated using microbial cultures incubated under controlled laboratory conditions.
3. Select and perform biochemical tests commonly used for bacterial identification and characterization, such as the catalase test, oxidase test, indole test, and citrate utilization test.
4. Prepare a chart on the classification of culture media based on their ingredients, including complex media, defined media, selective media, and differential media.
5. Discuss the advantages, limitations, and clinical utility of different diagnostic methods in routine laboratory practice, considering factors such as sensitivity, specificity, turnaround time, and cost-effectiveness.
6. Prepare a chart for the schematic representation of the pathogenesis of infectious diseases, including the mechanisms by which pathogens invade host tissues, evade immune defenses, and cause tissue damage or systemic effects.

Reference Books:

1. Ananthanarayan Textbook of Microbiology, 12th Edition. Publisher: Universities Press.
2. Jawetz, Melnick and Adelberg's *Medical Microbiology*, 27th Edition. Publisher: McGraw-Hill Education.
3. *Textbook of Medical Laboratory Technology* by Dr. P. B. Godkar, 3rd Edition, Published 2018.
4. D. K. Sharma's *Microbiology*. Published by MKM Publishers Pvt. Ltd.
5. *Clinical Microbiology* by Keith Struthers.

Semester – II

.2.7 Skill Enhancement Courses (SEC)

Course Titles	Computer Application (Th)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Carry out the basic computer operations.
	2. Analyze documents and generate e-records.
	3. Apply presentation and data representation analytics.
	4. Evaluate data in tabular format and perform arithmetic calculations on the same.
	5. Analyze medical laboratory data and format it according to categories.
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Apply the basic computer operations.
	2. Design documents and generate e-records.
	3. Design presentations and data representation analytics.
	4. Analyze the basic computer operations.
Content Outline	• Introduction to computers and their functions. • Classification of computer hardware. • Introduction to Windows.
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Evaluate data in tabular format and perform arithmetic calculations on the same.
	2. Analyze medical laboratory data and format it according to categories.
Content Outline	• Application of computers in the medical laboratory. • Features of Windows XP.

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

1. Research Paper on Present and Future Applications of Computers

- Conduct research on the current and potential future applications of computers in various fields such as healthcare, education, business, entertainment, and scientific research.
- Write a research paper summarizing the findings, including examples of how computers are currently used and potential advancements in the future. Discuss

the impact of emerging technologies such as artificial intelligence, machine learning, and quantum computing.

2. Types of Computers and Software/Hardware Components

- Create a presentation or infographic illustrating the different types of computers (mini, micro, mainframe, and supercomputers) and their respective applications.
- Prepare a comparison chart highlighting the key features and differences between each type of computer.
- Write a short essay, write-up, or report detailing the essential hardware and software components of a computer system, including the CPU, memory, storage devices, input/output devices, and operating systems.

3. Exploration of Application Software

- Select two or three types of application software (e.g., word processors, spreadsheets, and presentation graphics) and conduct hands-on exploration and experimentation with each.
- Develop a series of short tutorials or demonstration videos showcasing how to perform common tasks using each application software, such as creating documents, analyzing data, and designing presentations.

4. Computer Connectivity and Internet Usage

- Conduct a survey or interview to gather information about the usage of computer connectivity options and internet services among individuals in different demographics (e.g., age groups, professions, and geographical locations).
- Analyze the survey results and prepare a report summarizing the findings, including trends, preferences, and challenges related to computer connectivity and internet usage.
- Develop a set of recommendations or best practices for optimizing computer connectivity and internet usage based on the survey findings.

5. Microsoft Office Applications Exploration

- Design hands-on activities or exercises to familiarize participants with the basic features and functions of each Microsoft Office application.
- Participants will collaborate on practical projects or assignments using Microsoft Office tools, such as creating documents, spreadsheets, and presentations.

6. Internet and Web Technologies Workshop

- Facilitate interactive discussions and hands-on activities to explore practical aspects of using the internet and web-based applications effectively and safely.

Submission Guidelines

- Assignments can be submitted in various formats, including reports, presentations, infographics, videos, or online portfolios.
- Ensure clarity, coherence, and organization in presenting assignment tasks and findings.
- Encourage creativity, critical thinking, and active participation in completing the assignments.

Assessment Criteria

- Depth of understanding demonstrated in exploring computer basics, types, software/hardware components, connectivity options, and internet/web technologies.
- Clarity and accuracy of explanations regarding the usage and practical applications of computer concepts and tools.
- Relevance and practicality of examples provided for illustrating concepts and applications.
- Creativity and professionalism in presenting assignment tasks and findings.
- Compliance with submission guidelines and formatting requirements.

References

1. *Introduction to Computers* by Satish Sahani.
2. *Computer Programs in Clinical and Laboratory Medicine* by D. John Doyle.
3. *Computer Application* by Sumita Arora.
4. Study of Labsmart Software.
5. *Introduction to Computer Applications* by Dr. Mauparna Nandan and Dr. Ajay Sharma.