Re-Accredited 'B++' 2.86 CGPA by NAAC
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યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન B.Sc. Medical Technology અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, B.Sc. Medical Technology Program નાં PO, PSO and CO મેડીકલ ટેકનોલોજી વિષયની અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ બોર્ડવતી અને વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજુર કરી એકેડેમિક કાઉન્સિલ ને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ તા.૧૪/૧૨/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૯ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૧૪/૧૨/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૩૯

:: આથી ઠરાવવામાં આવે છે કે, B.Sc. Medical Technology Program નાં PO, PSO and CO મેડીકલ ટેકનોલોજી વિષયની અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ બોર્ડવતી અને વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજુર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./PO,PSO,CO/પરિપત્ર/૩૦૩૬૩/૨૦૨૨
તા.૧૯-૧૨-૨૦૨૨

કુલસચિવ

પ્રતિ,

૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન B.Sc. Medical Technology અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓ..... આપશ્રીની કોલેજ/ડિપાર્ટમેન્ટના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

Program Outcome, Program Specific Outcome & Course Outcome

Program Name: B. Sc. Medical Laboratory Technology_

Program Outcome:

Bachelor of Science (B.Sc.) in Medical Technology / Medical Laboratory Technology program is designed to prepare students for a career in laboratory. This course provides in-depth understanding and on hand training of principles, concept and techniques of Clinical laboratory tests for disease diagnosis. Some of the major areas that will be covered in this program are: Microbiology, Immunology, Biochemistry and Enzymology, Histology and Cytology, Hematology and Blood Banking, Pathology and Parasitology, Laboratory management, basics of Biostatistics, Bioinformatics, toxicology and cancer and tumor marker.

At the end of the program, graduates will be able to...

- Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support.
- Perform routine clinical laboratory procedures within acceptable quality control parameters in different departments like, Haematology, Clinical Pathology, Biochemistry, Blood Bank and Microbiology of clinical laboratories.
- Demonstrate technical skills, social behaviour and professional awareness for functioning effectively as a laboratory technologist or laboratory technician.
- Function in an ethical and professional manner without bias against any ethnicity, race, religion, caste or gender.

Program Specific Outcome:

B. Sc. Medical Technology / Medical Laboratory Technology is concerned with the diagnosis, treatment and prevention of disease through the use of clinical laboratory tests. Doctors rely on laboratory technologies to detect, diagnose and treat diseases. The programme covers the basics of precliniclal subjects such as Biochemistry, Pathology, Histology and cytology, Microbiology, Immunology, Parasitology, Haematology, Blood banking, Laboratory management and Instrumentation and Rescent advances in diagnostic techniques. Medical laboratory technologist do these tests by analysing different specimens like, blood, body fluids, tissues, urine, stool, sputum, semen etc. One month training in pathology laboratory (hospital acquired or private) is also included in Last year of graduation programme.

At the end of programme, the graduate shall be able to:

1. Perform all the diagnostic techniques.
2. Use discretely the essential laboratory services.
3. Manage all types of clinical diagnostic methods.
4. Handle and operate the modern equipments and instruments in laboratory test.
5. Develop leadership qualities to function effectively as a leader in the laboratory environment.
6. Render services to the laboratory set up and to communicate effectively with the doctors, patients and the hospital management.
7. Development of skill and competency in data processing, reporting and maintenance of records & Laboratory investigations.
8. Apply safety precautions, quality assurance, biomedical waste management, automation in in the laboratory.

Course Outcome (Subject wise):

F. Y. B. Sc. Semester: I		
1	**Course (subject) Code**	**MLT 01**
	Subject Title	**Organization of Clinical Laboratory**
	Subject Outcome	At the end of the course, the students will get knowledge of • Basics of clinical laboratory and its types • Ethics and Law of clinical laboratory • Different types of solution and glass wares used in clinical laboratory • Basics of Standard clinical laboratory set up and organization • Laboratory safety and waste management
2	**Course (subject) Code**	**MLT 02**
	Subject Title	**Equipments and Instruments Medical Technology Laboratory**
	Subject Outcome	At the end of the course, the students will get knowledge of • Working Principle, components, operation, care and maintenance of different types of microscopes and other equipments like, colorimeter, spectrometer, potentiometer, osmometer, centrifuge, incubator, distillation unit and weighing balance • Equipments used for sterilization like autoclave, hot air oven, incinerator and various filters

3	**F. Y. B. Sc. Semester – I Practical**	
	Subject Title	**Practical**
	Subject Outcome	At the end of the course, the students will be able to • Handle and operate bright field and dark field microscope • Calibrate and operate pH meter • Sterilization, cleaning, handling and calibration of laboratory glass wares • Calculation and preparation of various types of solutions • Do First aid for different types of clinical laboratory hazards
F. Y. B. Sc. Semester: II		
1	**Course (subject) Code**	**MLT 03**
	Subject Title	**Fundamentals of Medical Technology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Collection, preservation, transportation and storage of various clinical samples: blood, urine, faeces, CSF, sputum, throat and mouth specimen, eye and ear specimen, wound, abscess, burn and sinuses specimen and urogenital specimen • Physical (moist heat, dry heat, radiation, filtration) and chemical (phenol and phenolic compounds, alcohol, halogen, heavy metal and gaseous chemicals) methods of sterilization • Ideal characteristics and mode of action of disinfectant
2	**Course (subject) Code**	**MLT 04**
	Subject Title	**Introduction to Microbial World**
	Subject Outcome	At the end of the course, the students will get knowledge of • Basics of microorganism • Morphology and economic importance of Eukaryotes (mould, yeast, protozoa) • Morphology, cultivation and pathogenic significance of atypical bacteria (Rickettsia, Chlamydia, Mycoplasma, Actinomycetes) • General structural properties and types of virus • General characteristics of bacteriophage
3.	**F. Y. B. Sc. Semester: 2 Practical**	
	Subject Title	Practical

	Subject Outcome	At the end of the course, the students will be able to • Cultivate and study of morphological and growth characteristics of microorganisms. • Perform differential and special staining techniques for identification of causative agents. • Identify fungi (*Aspergillus, Mucor, Rhizopus, Fusarium, candida albicans, Saccharomyces cerevisiae*) based on morphological and growth characteristics. • Check the effect of various physical and chemical agents on bacterial growth.
S. Y. B. Sc. Semester III		
1	**Course (subject) Code**	**MLT 05**
	Subject Title	**Environment and Food Microbiology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Treatment and testing of drinking and waste water, disposal and treatment of solid waste. • Air microflora and enumeration. • Intrinsic and extrinsic factors effecting the growth of microorganisms in food, their role in beverage production and food industry, detection of pathogens in food, food borne diseases and use of probiotics. • Various microorganisms in soil and their functions, use of biofertilizers, bioinsecticides and biopesticides.
2	**Course (subject) Code**	**MLT 06**
	Subject Title	**Human Anatomy and Physiology-1**
	Subject Outcome	At the end of the course, the students will get knowledge of • Structure and functions of cell and tissues and homeostasis of human body. • Anatomy and physiology of circulatory, nervous and skeletal system.
3	**Course (subject) Code**	**MLT 07**
	Subject Title	**General Biochemistry-1**
	Subject Outcome	At the end of the course, the students will get knowledge of • Function, classification and types of carbohydrates and lipid. • Classification of amino acid and protein. • Structure, properties and denaturation of protein.

		• Basics of Enzyme, mechanism of action, inhibition and factor affecting enzyme activity. • Coenzymes and isoenzymes.
4	**S. Y. B. Sc. Semester III practical**	
	Subject Title	**Practical**
	Subject Outcome	At the end of the course, the students will be able to • Perform microbiological analysis of air, water and soil. • Study enzyme activity and enzyme producing capacity. • Collection of blood and identification of blood cells. • Identification of biomolecules (carbohydrates, lipids, protein and non-protein nitrogenous substance) by qualitative analysis. • Measurement of Pulse and Blood pressure.

S. Y. B. Sc. Semester: IV		
1	**Course (subject) Code**	**MLT 08**
	Subject Title	**Microbial Metabolism and Genetics**
	Subject Outcome	At the end of the course, the students will get knowledge of • Basic concept of Electron transport chain, oxidative phosphorylation, fermentation and regulation of microbial metabolism. • Nutrition and types of microorganisms based on it. • DNA replication, transcription, translation, regulation of gene expression, mutation and recombination methods in microorganisms.
2	**Course (subject) Code**	**MLT 09**
	Subject Title	**Human Anatomy and Physisology-2**
	Subject Outcome	At the end of the course, the students will get knowledge of • Anatomy and physiology of digestive, excretory, respiratory and reproductive system.
3	**Course (subject) Code**	**MLT 10**
	Subject Title	**General Biochemistry-2**
	Subject Outcome	At the end of the course, the students will get knowledge of

		• Classification and mechanism of action of hormones. • Biochemical function, dietary requirements, source, absorption, excretion and disease state of minerals. • Structure of nucleoside, nucleotide, types of DNA and types of RNA. • Classification, structure, daily dietary requirements, dietary source, biological functions and deficiency manifestations of vitamins.
4	**S. Y. B. Sc. Semester IV Practical**	
	Subject Title	**Practical**
	Subject Outcome	At the end of the course, the students will be able to perform • Isolation and identification of pathogens from clinical samples: urine, stool, sputum, pus, CSF • Physical and chemical analysis of Blood, saliva, gastric juice, bile juice and urine
T. Y. B. Sc. Semester V		
1	**Course (subject) Code**	**MLT 11**
	Subject Title	**Bacteriology and Virology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Human normal flora, emerging and re-emerging infectious diseases, Hospital acquired infection • Pathogenesis, laboratory diagnosis and prophylactic measures of bacterial diseases: TB, plague, tetanus, pneumonia, syphilis, gonorrhoea, UTI, typhoid, cholera etc. • Pathogenesis, laboratory diagnosis and prophylactic measures of viral diseases: AIDS, Hepatitis, polio, influenza, dengue, chikungunya
2	**Course (subject) Code**	**MLT 12**
	Subject Title	**Clinical Pathology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Collection, preservation, physical, chemical and microscopic analysis of various clinical specimens: Urine, gastric juice, stool, sputum, semen, CSF, and body fluids
3	**Course (subject) Code**	**MLT 13**
	Subject Title	**Clinical Biochemistry and Enzymology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Regulation and significance of blood glucose level,

		Diabetes and its diagnostic profile tests • Clinical significance of serum cholesterol level, types of lipoproteins and its metabolism, Atherosclerosis • Plasma proteins, its functions and separation methods and clinical significance of total protein, albumin and globulin • Clinical importance of enzyme in heart disease, liver disease and malignancies, isoenzymes and its clinical importance
4	**Course (subject) Code**	**MLT 14**
	Subject Title	**Haematology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Synthesis, morphology, functions, count and abnormalities of Blood cells • Structure, types and estimation methods of haemoglobin • Routine haematological examination: CBC, DC, ESR, PCV and blood indices • Special haematological tests: sickling test, osmotic fragility, G_6PD deficiency, reticulocyte count and AEC • Coagulation cascade and coagulation disorder tests
5	**Course (subject) Code**	**MLT 15**
	Subject Title	**Clinical Laboratory Instrumentation**
	Subject Outcome	At the end of the course, the students will get knowledge of • Principle, types, components and uses of colorimeter, spectrophotometer, flame photometer, fluorimeter and turbidometer • Principle and types of chromatography: Paper chromatography, thin layer chromatography, ion exchange chromatography, HPTLC, affinity chromatography and gel filtration chromatography • Principle and components of electrophoresis, different supporting medium and different electrophoretic techniques like SDS PAGE, Native PAGE, 2 D Gel electrophoresis, IEF, Gradient gel and agarose gel electrophoresis • Types and application of radioactive substances, gamma counter and scintillation counter
6	**Course (subject) Code**	**MLT 16**
	Subject Title	**Laboratory Management**
	Subject Outcome	At the end of the course, the students will get knowledge of • Organization and management of clinical laboratory

		• Cost finding, budgeting and fiscal management • Quality control, Total quality management and westguard multirole chart • NABL accreditation criteria
T. Y. B. Sc. Semester V Practical		
7	**Subject Title**	**Practical**
	Subject Outcome	At the end of the course, the students will be able to perform • Identification of causative agents by performing bacteriological analysis of clinical laboratory specimen • Physical, chemical and microscopic analysis of urine, stool, sputum, semen, body fluid • Quantitative estimation of different biomolecules present in blood • Estimation of haemoglobin concentration • Total blood cell count, differential count and peripheral smear study • Sickling test, reticulocyte count, ESR and PCV determination, G_6PD deficiency test, BT, CT, PT and APTT test
8	**Course (subject) Code**	**IDS**
	Subject Title	**Biostatistics and Bioinformatics**
	Subject Outcome	At the end of the course, the students will get knowledge of • Basics of biostatistics: types of data, data collection, accuracy & precision, application of biostatistics • Ideal measures of central tendency, calculation of mean, median, mode, standard deviation, coefficient of variation • Aim and basic information of Bioinformatics • Biological database, its classification and its retrieval system
T. Y. B. Sc. Semester VI		
1	**Course (subject) Code**	**MLT 17**
	Subject Title	**Parasitology and Mycology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Mycosis and its types, specimen collection and microscopic examination for diagnosis of mycosis • Morphology, life cycle and laboratory diagnosis pf Protozoa and Helminth (cestodes, Trematodes and Nematodes)
2	**Course (subject) Code**	**MLT 18**
	Subject Title	**Immunology**

	Subject Outcome	At the end of the course, the students will get knowledge of • Immunity and its types: Innate and Acquired • Antigen, antibody and antigen antibody reaction • Types of hypersensitivity reactions • Auto Immune Haemolytic Anaemia and Immunodeficiency disorder
3	**Course (subject) Code**	**MLT 19**
	Subject Title	**Histology and Cytology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Types of specimen preparation, fixation and types of fixatives and decalcification process • Manual and automated Tissue processing method • Microtomy, types of knives and its sharpening and frozen sectioning • Role and branches of cytology, exfoliative cytology and interventional cytology • Principle and staining procedure of HE and PAP
4	**Course (subject) Code**	**MLT 20**
	Subject Title	**Pathophysiology**
	Subject Outcome	At the end of the course, the students will get knowledge of • Different tests to check the function of kidney, liver, heart and thyroid gland • Mechanism of acid base balance in normal health • Types of Acidosis and Alkalosis
5	**Course (subject) Code**	**MLT 21**
	Subject Title	**Blood Banking**
	Subject Outcome	At the end of the course, the students will get knowledge of • ABO, Rh, Bombay and other blood group system: antigen, antibody, weaker variants, detection methods and significance • Selection and rejection criteria for blood donors, tapping of donor • Compatibility testing: Major, Minor and Emergency • Types of Transfusion reaction and its investigation • Preparation, storage and use of blood components
6	**Course (subject) Code**	**MLT 22**
	Subject Title	**Recent Advances in Diagnostic Techniques**

	Subject Outcome	At the end of the course, the students will get knowledge of • Nucleic acid based methods: PCR, Blotting technique, RFLP and genotyping method • Modern pathology: FISH, Microarray, Karyotype analysis and Computer assisted imaging • Immunological assays: ELISA, RIA, Fluoroimmuno assay, Flow cytometry • Automation in biochemistry, haematology, microbiology and pathology laboratory
T. Y. B. Sc. Semester VI Practical		
7	**Subject Title**	**Practical**
	Subject Outcome	At the end of the course, the students will be able to perform • Identification of fungi and parasites present in blood, stool and urine • Diagnosis of diseases by various immunological tests: widal, RA, CRP, ASO, RPR test, rapid tests for HIV antibodies, HBsAg, HCV, HEV, HAV • FNAC: smear preparation and staining by PAP stain • Histological techniques: Tissue processing, block preparation, microtomy and section staining by HE staining • Determination of blood group, blood group antibody titre, coomb's test ant compatibility testing • Quantitative estimation of biomolecules to check the function of kidney, liver and heart
8	**Course (subject) Code**	**IDS**
	Subject Title	**Toxicology and Cancer and Tumor Markers**
	Subject Outcome	At the end of the course, the students will get knowledge of • Characteristics of cancer, carcinogens and oncogenes • Tumor markers: bladder cancer, genetic markers and biomarkers still in research • Detection methods of Alphafetoprotein, prostate specific antigen, tumor markers, CA 125II • Basics of Toxicology, metabolism and excretion of drug, Principle and determination of different drugs