



Shri Rawatpura Sarkar University, Raipur
Faculty of Science
BACHELOR OF VOCATIONAL TRAINING IN
MEDICAL LABORATORY TECHNOLOGY

B.Voc MLT Semester V

Examination Scheme in UGC CBCS Pattern
(Effective from the session: 2022-23)

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	SBV03501T	Scientific methodology, Biostatistics & Technical writing	4	-	-	4	30	70	100	3
2	SBV03502T	Medical Techniques: Social, Legal & ethical issues & community Health	4	-	-	4	30	70	100	3
3	SBV03503T	Biomedical Instrumentation & Techniques	4	-	-	4	30	70	100	3
4	SBV03504T	Cytogenetics & Tissue culture	4	-	-	4	30	70	100	3
5	SBV03591P	Practical Medical Lab technology	-	-	4	2	15	35	50	4
6	SBV03592P	Practical Molecular Diagnostics	-	-	4	2	15	35	50	4
7	SBV03593P	Practical Cytogenetics & Tissue culture	-	-	4	2	15	35	50	4
Total						22			550	

Course Title	SCIENTIFIC METHODOLOGY, BIOSTATISTICS & TECHNICAL WRITING				
Course Code	SBV03501T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Scientific Methodology/ Biostatistics				
Course Objectives	The student will learn to collect, tabulate, & analyze data as a researcher.				
Course Contents	<p>UNIT – 1 1.1 Research Methodology 1.2 Introduction & types, y. Types of research –Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical Literature survey, 1.4 Importance & Primary and secondary sources.</p> <p>UNIT – 2 Research Design Basic principles, Characteristics of a good design.</p> <p>UNIT – 3 Formulation of hypothesis Meaning, Techniques and Precautions of Interpretation.</p> <p>UNIT – 4 Research Report Writing Structure and components of scientific reports, Types of report, Different steps in the preparation –Layout, structure and Language of typical reports –Illustrations and tables , Bibliography, referencing and footnotes. Research paper writing- Main components and structure.</p> <p>UNIT – 5 Biostatistics Mean, Median, Mode, standard deviation, Variance, Student ‘t’ test, Chi square test, Correlation & Regression, Probability.</p>				
Course Outcomes	1: Design types of research based on data set available as Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. 2: Demonstrate knowledge of biostatistic tools used for scientific data analysis. 3; Construct a research paper listing out step by step procedure with scientific layout. 4: Demonstrate knowledge of scientific data analysis, representation and its interpretation 5: Illustrate Research design, hypothesis formulation, and scientific writing methodology				
Textbooks And Reference Books	1. Research Methodology, Dr. A Mustufa, First Edition, AITBS Publishers (2010) 2. Research Methodology, C R Kothari, Second revised, New Age International. (2014)				

Course Title	MEDICAL TECHNIQUES:SOCIAL, LEGAL & ETHICAL ISSUES & COMMUNITY HEALTH				
Course Code	SBV03502T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Medical Techniques				
Course Objectives	The course is designed to improve the intelligence of the students regarding medical law.				
Course Contents	<p>UNIT – 1 Medical Ethics Intro/History – Moral theories & guiding principles. Research ethics & informed consent. Physician Patient Relationship Source and Justification of Medical Ethics.</p> <p>UNIT – 2 Modern Genetics and Reproductive Technologies & control. Ethical Issues in Organ Transplantation, abortion & euthanasia. Scarce medical resources & paying for healthcare.</p> <p>UNIT – 3 COMMUNITY HEALTH General concepts of health and diseases with reference to natural history of disease with pre-pathogenic and pathogenic phase. The role of socio-economic and cultural environment in health and diseases- Epidemiology and scope. Public health administration-An overall view of the health Administration set up at centre and state level. The National Health Programmes- National Health programmes including tuberculosis, malaria, MCH and HIV/AIDS. Health problems in vulnerable groups-Pregnant and lactating women and infants and school going children-occupational groups, geriatrics.</p> <p>UNIT – 4 Occupational Health- Definition, scope-Occupational diseases, prevention of occupational diseases and hazards. Social security and other measures for the protection of occupational hazards, accidents and disease. Details of compensation acts. Family planning objectives of National family planning methods. A general idea of advantages and disadvantages of the method.</p> <p>UNIT – 5 Mental Health- community aspects of mental health; role of physiotherapists, therapists in mental health problems such as mental retardation etc. Communicable disease-An overall view of the communicable disease. Classification according to the principal mode of transmission. Role of insects and their vectors. International health agencies.</p>				
Course Outcomes	1: Demonstrate the social,legal and ethical issues in correlation with the health care sector. 2: Determine the medical diagnostics techniques and instrumentation. 3: Acquire the knowledge about molecular techniques in diagnosis. 4: Understand the waste and laboratory management , that will help in laboratory development. 5: Apply the knowledge for troubleshooting in pathological laboratory..				

Textbooks And Reference Books	1. The cambridge textbook of bioethics, Peter A. Singer, Cambridge University Press (2008)
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Course Title	BIOMEDICAL INSTRUMENTATION & TECHNIQUES				
Course Code	SBV03503T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Biochemistry/ Basic Biology				
Course Objectives	Understand the medical devices applied in measurement of parameters related to cardiology, neurology and the methods of continuous monitoring and transmitting them. Learn some of the cardiac assist devices.				
Course Contents	<p>UNIT – 1 Cardiac Equipment: 1.1 Electrocardiograph, Normal and Abnormal Waves, Heart rate monitor, Holter Monitor, Phonocardiography, Plethysmography. 1.2 Cardiac Pacemaker- Internal and External Pacemaker– Batteries, AC and DC Defibrillator- Internal and External.</p> <p>UNIT – 2 Neurological Equipment Clinical significance of EEG, Multi channel EEG recording system, Epilepsy, Evoked Potential– Visual, Auditory and Somatosensory, MEG (Magneto Encephalo Graph). EEG Bio Feedback Instrumentation.</p> <p>UNIT – 3 Skeletal Muscular Equipment 3.1 Generation of EMG, recording and analysis of EMG waveforms, fatigue characteristics, 3.2 Muscle stimulators, nerve stimulators, Nerve conduction velocity measurement, EMG Bio Feedback Instrumentation.</p> <p>UNIT – 4 Extracorporeal Devices and Special Diagnostic Techniques :Principle Hemo Dialyser unit, Lithotripsy, Principles of Cryogenic technique and application, Endoscopy, Laparoscopy. Thermography – Recording and clinical application, ophthalmic instruments.</p> <p>UNIT – 5 Bio-chemical Measurement Blood glucose sensors - Blood gas analyzers, colorimeter, flame photometer, spectrophotometer, blood cell counter, auto analyzer (simplified schematic description).</p>				
Course Outcomes	<p>1: Understand electrocardiograph, Phonocardiography and Plethysmography.</p> <p>2: Acquire the knowledge about the Importance of neurological equipments EEG and MEG.</p> <p>3: Developed the concept about skeletal muscular equipments and their feedback instrumentation.</p> <p>4: Analysis of extracorporeal devices, biochemical autoanalyzer and blood glucose sensors.</p> <p>5: Understand the principle and application of laparoscopy and thermography.</p>				
Textbooks And Reference Books	<p>1. Khandpur R.S, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi,(2003) (Units II & IV)</p> <p>2. Sujata V. Bhatt, “Biomaterials”, Second Edition, Narosa Publishing House,(2005).</p>				

Course Title	CYTOGENETICS& TISSUE CULTURE				
Course Code	SBV03504T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Biochemistry/ Basic Biology				
Course Objectives	This course is intended to learn basic principal of animal tissue culture.				
Course Contents	<p>UNIT – 1 Introduction to cytogenetics and tissue culture. Terminolgy, classification and nomenclature of human chromosomes. Barr body -origin, sampling, staining and its demonstration.</p> <p>UNIT – 2 Karyotyping - methods of chromosome analysis. (I) Culture and direct preparation (II) Banding techniques. (III) Major chromosomal abnormalities.</p> <p>UNIT – 3 Tissue culture: principle and brief outline, indications. Equipments: (I) Laminar flow equipment., (II) Carbon dioxide incubator. (III) Inverted microscope.</p> <p>UNIT – 4 Derivation of culture from the tissue. (I) Enzymatic digestion of the tissue using collagenase, protease etc. (II) Plating of cells in tissue using collagenase, protease etc. (III) Observation of cells in Invertoscope (I V) Subculturing and derivation of cell lines</p> <p>UNIT – 5 Characterization of cell lines. (I) Determination of biochemical markers in cells. (II) Chromosomal and DNA contents of cells. (III) Immunological properties of cells.</p>				
Course Outcomes	<p>1: Understanding the concepts and basic techniques of cytogenetics</p> <p>2: Analysis and application of Karyotyping</p> <p>3: Design, evaluation and application of cytological techniques</p> <p>4: Experimental design and culture of in vitro cells and tissues</p> <p>5: Evaluation of karyotyping results</p>				
Textbooks And Reference Books	1. Biotechnology Expending Horizone, B D Singh,Kalyani Publication (2008)				

Course Title	LAB COURSE I: – Practical Medical Lab Technology				
Course Code	SBV03591P				
Course Credits	L	T	P	C	
	-	-	2	2	
Prerequisites	Theoretical Knowledge of Medical Biochemistry				
Course Objectives	This practical course is based on study of Human anatomical structure and blood smear, study of plasma are also included.				
Course Contents	<ol style="list-style-type: none"> 1. Spots : Anatomical structures, Heart ,Kidney, Eye ,Skeleton 2. Blood clotting and anti-coagulation with EDTA 3. Height, weight measurement and BMI calculation 4. Bacterial broth culture and turbidity. 5. Sickling Test 6. Qualitative analysis of protein. 7. Qualitative analysis of carbohydrate. 				
Course Outcomes	<ol style="list-style-type: none"> 1:Acquire the chemical and molecular Structure, function and interrelationship of bimolecular and human fluids. 2:Develop the knowledge on human specimens, extracted fluids aspects of metabolism, and their regulatory pathway mechanisms. 3:Obtain interpretive skill about biochemical properties collected from the human body specimens. 4:Understand the management of bio medical waste, safety and first aid. 				
Textbooks And Reference Books	1. Medical Laboratory Technology, Kanai L Mukhjee, Second Edition, Mc Graw Hill. (2015)				

Course Title	LAB COURSE II : – Practical Molecular Diagnostics				
Course Code	SBV03592P				
Course Credits	L	T	P	C	
	-	-	2	2	
Prerequisites	Theoretical Knowledge of Medical Biochemistry				
Course Objectives	This practical is designed to teach students about the molecular diagnostic procedures.				
Course Contents	<ol style="list-style-type: none"> 1. Isolation of DNA 2. SDS PAGE 3. Isolation of antibiotic producing organisms by crowded plate technique Preparation of cell block. 4. Isolation cultivation & identification of E.coli. 5. Test for microbial toxins 6. Bleeding time & clotting time 				
Course Outcomes	<ol style="list-style-type: none"> 1: Employ the concept on DNA isolation in molecular diagnostics. 2: Understand about chromosomal size by karyotyping . 3: Determine the basic principle about serology. 4: Practice the protein separation by electrophoresis. 				
Textbooks And Reference Books	1. Experimental Microbiology and Biotechnology by Aneja, New Age international Publication.(2015)				

Course Title	LAB COURSE III: – Practical Cytogenetics & Tissue culture				
Course Code	SBV03593P				
Course Credits	L	T	P	C	
	-	-	2	2	
Prerequisites	Theoretical Knowledge of Medical Biochemistry				
Course Objectives	This practical course is based on blood group identification, blood transfusion reaction and some social issues.				
Course Contents	<ol style="list-style-type: none"> 1. Working Principle, parts and study of microscope – Light and Electron Microscope 2. FNAC – Aspiration, smear preparation and staining 3. Gram staining with Paraffin section. 4. Hematoxylin & Eosin staining 5. Smear preparation for cytology 				
Course Outcomes	<ol style="list-style-type: none"> 1. Analyze the cross match reaction to check the compatibility of donor's blood. 2. Understanding the the structure and morphological characteristics of cells, tissues, organs and organ systems 3. Acquire knowledge about types of abnormalities, function and structure of the abnormal cells and tissue. 4. Evaluate transverse sections of tissues. 				
Textbooks And Reference Books	<ol style="list-style-type: none"> 1. Fine Needle Aspiration Cytology, Pranab Day, Jaypee Brother Medical Publishers. (2012) 2. Pathology practical book by harsh Mohan, Second Edition, Jaypee Brother Medical Publishers. (2015) 				