



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

B.Voc MLT Semester IV

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	SBV03401T	General Pathology & Clinical Pathology	4	-	-	4	30	70	100	3
2	SBV03402T	Cytopathology & Histopathology	4	-	-	4	30	70	100	3
3	SBV03403T	Molecular Diagnostics	4	-	-	4	30	70	100	3
4	SBV03404T	Biostatistics	4	-	-	4	30	70	100	3
5	SBV03491P	Practical General Pathology	-	-	4	2	15	35	50	4
6	SBV03492P	Practical Histology	-	-	4	2	15	35	50	4
7	SBV03493P	Practical Cytology	-	-	4	2	15	35	50	4
Total						22			550	

Course Title	GENERAL PATHOLOGY & CLINICAL PATHOLOGY				
Course Code	SBV03401T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Biochemistry/ Basic Biology				
Course Objectives	The module gives an introduction to clinical biochemistry. It gives emphasis on normal & abnormal body processes. It also gives insight about routine biochemical tests and profile testing.				
Course Contents	<p>UNIT – 1 Introduction to Pathology. Normal composition of body fluids : (semen, sputum, exudate, transudate) CSF, Synovial and serous fluids.</p> <p>UNIT – 2 Examination of Urine: Formation of urine, Physical, Chemical & Microscopical examination.</p> <p>UNIT – 3 Examinations of body fluids : CSF, Pleural, peritoneal & pericardial fluid, Bronchoalveolar lavage fluid, hydatid cyst fluid, Joint fluid. Physical, chemical & Microscopical examination.</p> <p>UNIT – 4 Examination of Semen: Physical, Chemical & Microscopical examination.</p> <p>UNIT – 5 Examination of Stool: Physical, Chemical & Microscopical examination</p>				
Course Outcomes	1:Learn basic principles and introduction pathology 2:Understand the composition of body fluids, blood, sputum and semen. 3:Understand the physical and chemical examination of urine. 4:Physical and chemical examination of Semen and Urine 5:Learn stool examination to diagnose the obstruction in digestive system.				
Textbooks And Reference Books	1. Medical laboratory Technology, Kanai L Mukherjee, McGraw Hill (2015) 2. Textbook of Pathology, Harsh Mohan, Seventh Edition, Jaypee. (2015) 3. Basic Pathology, Kumar Abbas Aster, First Edition, Elsevier (2018)				

Course Title	CYTOPATHOLOGY & HISTOPATHOLOGY				
Course Code	SBV03402T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Cytopathology and Histopathology				
Course Objectives	The module is designed to provide introduction to hematology. It also gives insight about blood collection and routine tests performed in hematology section with result interpretation.				
Course Contents	<p>UNIT – 1 Introduction to histology and histopathology, Techniques in histopathology.</p> <p>UNIT – 2 Laboratory equipment for histology and cytology, Their use and care.</p> <p>UNIT – 3 Laboratory Techniques in Histology: Logging of specimen, preparation of tissues, Processing of tissues, routine staining procedures in histo technology.</p> <p>UNIT – 4 special stains and staining techniques, stains for particular substances, frozen section techniques, Handling and embedding of small tissue fragments.</p> <p>UNIT – 5 Laboratory techniques in Diagnostic exfoliative cytology Principle: Preparation of specimens for cytological evaluation, cytological stains and staining techniques, characteristics of benign and malignant cells.</p>				
Course Outcomes	<p>1: Develop the essential functional English aspects and communication skills essential for the health care professionals in delivering the patient care</p> <p>2: Train the students in oral presentations, expository writing, logical organization and structural support in English language.</p> <p>3: Understanding Acquire skills in communication techniques.</p> <p>4: Students will be able to express better, grow personally and professionally, develop poise and confidence and achieve success.</p> <p>5: Understand the management of bio medical waste, safety and first aid.</p>				
Textbooks And Reference Books	<ol style="list-style-type: none"> 1. Medical laboratory Technology, Kanai L Mukherjee, McGraw Hill (2015) 2. Textbook of Pathology, Harsh Mohan, Seventh Edition, Jaypee. (2015) 3. Basic Pathology, Kumar Abbas Aster, First Edition, Elsevier (2018) 				

Course Title	MOLECULAR DIAGNOSTICS				
Course Code	SBV03403T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Molecular diagnostics				
Course Objectives	The module gives an introduction to fundamentals of basic and modern Pathology. It gives emphasis on routine body fluid examination.				
Course Contents	<p>UNIT – 1 Isolation and Purification of Nucleic acids: Principles and Methods. Molecular cloning, labeling of nucleic acid, hybridization.</p> <p>UNIT – 2 Nucleic acid amplification methods and types of PCR: Reverse Transcriptase-PCR, Real-Time PCR, Multiplex PCR, Nested PCR, PCR-ELISA, Ligase Chain Reaction.</p> <p>UNIT – 3 Applications of PCR: 3.1 PCR based microbial typing: Eubacterial identification based on 16S rRNA sequences- 3.2 Amplified Ribosomal DNA Restriction analysis (ARDRA)-Culture independent analysis of bacteria- DGGE and TRFLP. 3.3 Molecular diagnosis of fungal pathogens based on 18S rRNA sequences-Detection of viral pathogens through PCR. 3.4 RAPD for animal and plants- PCR in forensic science-AmpFLP, STR, Multiplex PCR-Determination of Paternity- Human identification and sex determination.</p> <p>UNIT – 4 Automated DNA sequencing Principles and Methods and Instrumentation- Advances in DNA sequencing- Pyrosequencing- Microarrays- Personalised Medicine- Pharmacogenomics.</p> <p>UNIT – 5 Proteomics- Clinical Proteomics 5.1 Good Laboratory Practices. Different Levels of Biosafety, Containment Levels for rDNA experiments. Biosafety aspects of transgenic plants and germplasm.</p>				
Course Outcomes	<p>1: Acquire the knowledge about of gene cloning.</p> <p>2: Analyze the process of Polymerase Chain Reaction (PCR), RT PCR, Nested PCR, Ligase chain reaction and evaluation of their products.</p> <p>3: Analysis of 16S and 18S sequencing of rRNA in species identification.</p> <p>4: Understand the automated sequencing of DNA and the concept about microarray.</p> <p>5: Develop the concept of proteomics and biosafety.</p>				
Textbooks And Reference Books	<p>1. Genes VIII by B. Lewin, Oxford University Press. (2004)</p> <p>2. An Introduction to Genetic Analysis by A.J.F. Griffiths, J.H. Miller, D.T. Suzuki, R.C. Lewontin and W.M. Gelbart, W.H. Freeman, New York.(2000)</p> <p>3. Molecular Biology of the Gene by J.D. Watson, Tania A baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick, Pearson Education Pte. Ltd. (Singapore). (2004)</p> <p>4. Essentials of Molecular Biology by G. M. Malacinski and D. Friefelder, Jones & Bartlett Publishers. (1998)</p>				

	5. An Introduction to Forensic DNA Analysis Rudin,N and Inman,K.CRC Press.(2002) 6. Forensic DNA Typing, Biology, Technology and Genetics of STR markers John M. Butler, Elsevier Academic Press, Amsterdam.(2005) 7. Molecular Diagnostics: Fundamentals, Methods & Clinical applications . Lele Buckingham and Maribeth L. Flaws. (2007). 8. Fundamentals of Molecular Diagnostics . David E. Bruns, Edward R. Ashwood, Carl A. Burtis. Saunders Group.(2007)
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Course Title	BIostatISTICS				
Course Code	SBV03404T				
Course Credits	L	T	P	C	
	4	-	-	4	
Prerequisites	Introductory Biostatistics				
Course Objectives	The module gives an introduction to basic procedures and techniques used in a blood bank. The module also gives insights about blood typing, compatibility testing and complications in case of blood transfusion.				
Course Contents	UNIT – 1 Biostatistics Introduction to biostatistics, as a science, as figure, scope, common terms. UNIT – 2 Source & presentation of data Types of data, Qualitative & quantitative, methods of data collection and presentation. UNIT – 3 Measures of dispersion: Range , Mean deviation & standard deviation. UNIT – 4 Population & Sampling Principle Sampling frame, Sampling methods and errors. UNIT – 5 CHI Square method				
Course Outcomes	1: Understand the basics of statistics and biostatistics mean,median and standard deviation 2: Acquire knowledge on sample size calculation and sampling error 3: Analysis of the probability and significance of the acquired data 4: Demonstrate the use of chi square test in scientific data 5: Demonstrate the knowledge in statistical calculations required for conducting the research				
Textbooks And Reference Books	1. Methods in Biostatistics, B K mahajan,7th, Jaypee Brothers. (2010).				

Course Title	LAB COURSE I: – (Practical general pathology)				
Course Code	SBV03491P				
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	1. Physical examination of urine and stool and body fluid 2. Chemical test for glycosuria and proteinuria 3. Microscopic analysis of urine crystal and parasites. 4. Detection of pigment in urine 5. Stool Examination for Occult blood. 6. Urine examination for hematuria.				
Course Outcomes	1: Understand the basics of pathology in urine, stool and other fluid. 2: Acquire knowledge on sample collection and preservation for long time. 3: Analysis of the pus cells, epithelial cells, RBC under the microscope. 4: Demonstrate the all over the procedure of Urine, stool and other fluid processing.				
Textbooks & Reference Books	Pathology Practical Books, Harsh Mohan, Second Edition, Jaypee Brother Medical Publishers. (2015)				

Course Title	LAB COURSE II : – (Practical Histology)				
Course Code	SBV03492P				
Course Credits	L	T	P	C	
	-	-	2	2	
Prerequisites	Theoretical Knowledge of Medical Biochemistry				
Course Objectives	The practical course is designed to learn serological diagnosis of various diseases which includes WIDAL, HIV, HBSAG, HCV etc.				
Course Contents	1. Tissue fixation and Dehydration 2. Tissue processing: Clearing , Impregnation, Embedding 3. Preparation of Section. 4. Preparation of cell block.				
Course Outcomes	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	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)

Course Title	LAB COURSE III: – (Practical Cytology)				
Course Code	SBV03493P				
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	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	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	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)				