Study & Evaluation Scheme

of

Bachelor of Medical Lab Technology

[Applicable for 2021-24]

Version 2021

[As per CBCS guidelines given by UGC]

Approved in BOS	Approved in BOF	Approved in Academic Council
24/07/2021	13/08/2021	14/11/2021 Vide agenda no. 6.5.5

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Study & Evaluation Scheme Study Summary

Name of the Faculty	Faculty of Health Sciences
Name of the School	Quantum School of Health Sciences
Name of the Department	Department of Paramedical Sciences
Program Name	Bachelor of Medical Lab Technology
Duration	3 Years + 6 months internship
Medium	English

Evaluation Scheme

Type of Papers	**Internal Evaluation (%)**	**End Semester Evaluation (%)**	**Total (%)**
Theory	40	60	100
Practical/ Dissertations/Project Report/ Viva-Voce	40	60	100
Internal Evaluation Components (Theory Papers)			
Mid semester Examination I	60 Marks		
Assignment –I	30 Marks		
Assignment-II	30 Marks		
Attendance	30 Marks		
Internal Evaluation Components (Practical Papers)			
Quiz One	30 Marks		
Quiz Two	30 Marks		
Quiz Three	30 Marks		
Lab Records/ Mini Project	40Marks		
Attendance	30 Marks		
End Semester Evaluation (Practical Papers)			
ESE Quiz	40 Marks		
ESE Practical Examination	40 Marks		
Viva- Voce	20 Marks		

Structure of Question Paper (ESE Theory Paper)

The question paper will consist of 5 questions, one from each unit. Student has to Attempt all questions. All questions carry 20 marks each. Parts a) and b) of question Q1 to Q5 will be compulsory and each part carries 2 marks. Parts c), d) and e) of Q1 to Q5 Carry 8 marks each and the student may attempt any 2 parts.

Important Note:

1. The purpose of examination should be to assess the Course Outcomes (CO) that will ultimately lead to attainment of Program Outcomes (PO). A question paper must assess the following aspects of learning planned for specific courses i.e..RememberUnderstand, Apply, Analyze, Evaluate & Create (reference to Bloom's Taxonomy). The standard of question paper will be based onmapped BL level complexity of the unit of the syllabus, which is the basis of CO attainment model adopted in the university.

2. Case Study is essential in every question paper (wherever it is being taught as a part of pedagogy)for evaluating higher-order learning. Not all the courses might have case teaching method used as pedagogy.

3. There shall becontinuous evaluation of the student and there will be a provision ofreal time reporting on QUMS. All the assignments will be evaluated through module available on ERP for time and access management of the class.

Program Structure – Bachelor of Medical Lab Technology

Introduction

Bachelor of Medical Lab Technology

Bachelor of Medical Laboratory Technology (BMLT) is a branch of science that deals with the diagnosis, treatment and prevention of diseases using clinical laboratory tests. This involves analysis of the body fluids, including tissues and blood.

Bachelor of Medical Laboratory Technology presents the development in the medical laboratory science. It discusses the general laboratory glassware and apparatus. It addresses a more specialized procedure in mechanization, automation, and data processing. Some of the topics covered in the book are the composition of glass; cleaning of glassware; the technique of using volumetric pipettes; technique for centrifugation; the production of chemically pure water; principal foci of a converging lens; micrometry; magnification; setting up the microscope; and fluorescence microscopy. The precautions against infection are covered.

Technologist/Technician

This field is a highly technical one Medical Laboratory Technician (MLT) health professional is skilled in conducting laboratory tests and responsible for the initiation of the treatment process by observing symptoms and subsequently aid in diagnosing, treating, and preventing disease They form an integral part of the healthcare industry. Medical laboratory technicians/technologists play a pivotal role in the comprehensive system by collecting, sampling, testing, reporting, and documenting medical investigations. They deal with biochemical, pathological, and microscopic examination of the body's cells, tissues, and fluids.

Diagnostic and Therapeutic branches

Medical Laboratory Technician health professional is thus concerned with the diagnosis, treatment, and prevention of disease through the use of clinical laboratory tests. This course offers a challenging career in a hospital, minor Emergency centers, private laboratory, blood donor centers, doctor's office or clinics. The medical lab technicians/technologists-MLT- work collaboratively with other healthcare professionals, including physicians, surgeons, nurses, dentists, and pharmacists, and play an important role in evaluating, monitoring, and assessing a patient's health situation, thus keeping the doctors and others informed to devise a course of treatment and plan appropriate care arrangements for the patient. The medical laboratory science practitioner of today must, of necessity, be theoretically sound and practically effective in his selective discipline.

INTERNSHIP: FULL TIME SIX MONTHS

The internship for the Qualifying BMLT program will be of six months. Minimum of 720 hours of an internship should be completed by the candidate to be awarded the degree.Students must undertake the rotational postings during which students have to work under the supervision of experienced staff in the following areas:

Sl. No	Postings	Duration
1.	Hematology	1 Month
2.	Clinical pathology	15 Days
3.	Microbiology	1 Month
4.	Biochemistry	1 Month
5.	Immunology & Serology	1 Month
6.	Histopathology	1 Month
7.	Blood Bank	15 Days

Other Details

- The entire internship shall be done in a Hospital or MedicalCollege.
- Every candidate after successfully completing the final examination of Bachelor of Science in Medical laboratory Technology will be required to undergo a compulsory internship up to satisfaction of the University for a period of six months to be eligible for the award of the degree of Bachelor of Science in Medical laboratory Technology.
- The University shall issue a provisional degree of Bachelor of Science in Medical laboratory Technology on passing the final examination and completion of the internship, if the candidatedemands it.
- The internee shall be entrusted with clinical responsibilities under the direct supervision of a Senior Medical Officer/Technologist. They shall not be working independently.
- Internee will not authorize to sign any official certificate/reports during her/his internship.
- After six months of internship trainee will receive their training certificates than they will be eligible for receiving their professional degrees from certain organization.

Assessment of Internship

- The Internee shall maintain the record of work, which is to be verified and certified by the Technologist followed by HOD under whom he/she worked.
- The internee submitted an internship completion certificate issued by the concerned hospital/ medical college authority.
- After satisfactory completion of an internship, the university shall award the degree of Bachelor of Science in Medical laboratory Technology.

Curriculum (21-24) Version 2021

Quantum School of Health Sciences

Department of Paramedical Sciences

Bachelor of Medical Lab Technology-PC: 06-3-05

BREAKUP OF COURSES

Sr. No	CATEGORY	CREDITS
1	Foundation Core (FC)	28
2	Program Core (PC)	96
3	Value Added Programs (VAP)	07
4	General Proficiency (GP)	06
5	Seminar	03
6	Open Elective (OE)	**09**
7	Clinical Training (CP)	**18**
8	Disaster Management*	**02***
	TOTAL NO. OF CREDITS	**167**

*Non-CGPA Audit Course

BREAKUP OF CATEGORY

Category	Foundation Core	Program Core	Sub Total	%
Program Core (PC), Foundation Core (FC)	28	96	124	76.47
Value Added Programs (VAP)	7		7	4.06
General Proficiency (GP)	6		6	2.94
Open Elective (OE)	9		9	5.53
Clinical Training (CP)	18		18	10.59
Seminar	3		3	1.76
Disaster Management*	2*		2*	
Grand Total			**167**	100

*Non-CGPA Audit Course

SEMESTER-WISE BREAKUP OF CREDITS

Sr. No	CATEGORY	SEM 1	SEM2	SEM3	SEM4	SEM5	SEM 6	TOTAL
1	Foundation Core	17	11					28
2	Program Core	11	08	20	20	23	14	96
3	Open Elective	-	3	3	3	-	-	09
4	Clinical Training (CP)	-	-	06	-	06	06	18
5	VAPs	1	1	1	2	2	0	07
6	Seminar	-	-	-			3	03
7	GP	1	1	1	1	1	1	06
8	Disaster Management*		2*					2*
TOTAL		**30**	**24**	**31**	**26**	**32**	**24**	**167**

*Non-CGPA Audit Course

Minimum Credit Requirements:

Bachelor of Medical Lab Technology: 167 credits

SEMESTER 1

Course Code	Category	Course Title	L	T	P	C	Version	Course Prerequisite
RD3101	FC	Human Anatomy - I	3	0	0	3	1.0	NIL
ND3105	FC	Biochemistry	3	0	0	3	1.0	NIL
BL3101	PC	Basic Hematology& Clinical Pathology-I	3	0	0	3	1.0	NIL
RD3106	FC	Basics of Human Physiology- I	3	0	0	3	1.0	NIL
BL3102	PC	Fundamentals of Microbiology-I	3	0	0	3	1.0	NIL
BL3103	PC	Preventive Medicine & Community Healthcare-I	3	0	0	3	1.0	NIL
EG3102	FC	Professional Communication	2	0	0	2	1.0	NIL
CY3105	FC	Environmental Studies	2	0	0	2	1.0	NIL
RD3140	FC	Human Anatomy Lab- I	0	0	2	1	1.0	NIL
RD3143	FC	Basics of Human Physiology Lab- I	0	0	2	1	1.0	NIL
BL3140	PC	Basic Hematology& Clinical Pathology Lab-I	0	0	2	1	1.0	NIL
ND3144	FC	Bio-Chemistry Lab	0	0	2	1	1.0	NIL
BL3141	PC	Fundamentals of Microbiology Lab-I	0	0	2	1	1.0	NIL
EG3140	FC	Professional Communication Lab	0	0	2	1	1.0	NIL
VP3101	VAP	Communication & Professional Skills-I	0	0	2	1	1.0	NIL
GP3101	GP	General Proficiency	0	0	0	1	1.0	NIL
TOTAL			**22**	**0**	**14**	**30**		

Contact Hrs. =36

SEMESTER 2

Course Code	Category	COURSE TITLE	L	T	P	C	Version	Course Prerequisite
RD3201	FC	Human Anatomy – II	3	0	0	3	1.0	NIL
BL3201	PC	Basic Hematology& Clinical Pathology-I	3	0	0	3	1.0	NIL
RD3206	FC	Basics of Human Physiology- II	3	0	0	3	1.0	NIL
BL3202	PC	Fundamentals of Microbiology-II	3	0	0	3	1.0	NIL
CS3102	FC	Fundamentals of Computer Applications	2	0	0	2	1.0	NIL
RD3240	FC	Human Anatomy- II Lab	0	0	2	1	1.0	NIL
BL3240	PC	Basic Hematology& Clinical Pathology-II Lab	0	0	2	1	1.0	NIL
RD3243	FC	Basics of Human Physiology- II Lab	0	0	2	1	1.0	NIL
BL3241	PC	Fundamentals of Microbiology-II Lab	0	0	2	1	1.0	NIL
CS3141	FC	Fundamentals of Computer Applications- Lab	0	0	2	1	1.0	NIL
VP3201	VAP	Communication & Professional Skills-II	0	0	2	1	1.0	NIL
	OE	Open Elective I	3	0	0	3	1.0	NIL
GP3201	GP	General Proficiency	0	0	0	1	1.0	NIL
CE3201	FC	Disaster management	2	0	0	2*	1.0	NIL
TOTAL			**19**	**0**	**12**	**24**		

*Non-CGPA AuditCourse

Contact Hrs. =31

OPEN ELECTIVE I

S.No.	Course Name	Course Code	Department Offering
1	Carbon Emission& Control	CE3011	Civil Engineering
2	HTML5	CS3011	Computer Science and Engineering
3	Mining and Analysis ofBig data	CS3021	Management + CSE
4	Ornamental Horticulture	AG3011	Agriculture
5	Entrepreneurial Environment in India	BB3011	Business &Management
6	Media Concept and Process (Print and Electronic)	JM3011	Journalism
7	Indian Cuisine	HM3011	Hospitality & Tourism
8	SAP 1	MB3011	Management
9	French Beginner A1	EG3011	English
10	Microsoft Office Specialist (MSO-Word)	CS3031	Computer Science and Engineering
11	Digital Marketing	CS3004	Computer Science and Engineering
12	Introduction of IOT	CS3002	Computer Science and Engineering

SEMESTER 3

Course Code Code	Category	COURSETITLE	L	T	P	C	Version	Course Prerequisite
BL3301	PC	Pathology and Allied Subject-I(Hematology andClinical Pathology)	4	0	0	4	1.0	NIL
BL3302	PC	Clinical Biochemistry-I(Separative and Instrumental Techniques)	4	0	0	4	1.0	NIL
BL3303	PC	Medical Microbiology-I(Bacterial Pathogens and associated diseases)	4	0	0	4	1.0	NIL
BL3304	PC	Immunology and Serology Techniques-I	4	0	0	4	1.0	NIL
BL3340	PC	Pathology and Allied Subject-I(Hematology andClinical Pathology) Lab	0	0	2	1	1.0	NIL
BL3341	PC	Clinical Biochemistry-I Lab	0	0	2	1	1.0	NIL
BL3342	PC	Medical Microbiology-I Lab	0	0	2	1	1.0	NIL
BL3343	PC	Immunology and Serology Techniques-I Lab	0	0	2	1	1.0	NIL
BL3344	CP	Clinical Training	0	0	2	6	1.0	NIL
VP3301	VAP	Employability Skills-I Numerical Abilities	0	0	2	1	1.0	NIL
	OE	Open Elective II	3	0	0	3	1.0	NIL
GP3301	GP	General Proficiency	0	0	0	1	1.0	NIL
TOTAL			**19**	**0**	**12**	**31**		

Contact Hrs. = 31

OPEN ELECTIVE II

S.No.	Course Name	Course Code	Department Offering
1	Environment Pollution and Waste Management	CE3013	Civil Engineering
2	Java Script	CS3013	Computer Science and Engineering
3	Big Data Analytics: HDOOP Framework	CS3023	Management + CSE
4	Organic farming	AG3013	Agriculture
5	Establishing a NewBusiness	BB3013	Business &Management
6	Photojournalism	JM3013	Journalism
7	Chinese Cuisine	HM3013	Hospitality & Tourism
8	SAP 3	MB3013	Management
9	French Intermediate B1	EG3013	English
10	MS -Excel (Advanced) MSO Certification	CS3033	Computer Science and Engineering
13	Report Writing	EG3002	Humanities and Social Sciences

SEMESTER 4

Course Code	Category	COURSETITLE	L	T	P	C	Version	Course Prerequisite
BL3401	PC	Pathology and Allied Subject-II (Histopathology & Cytology Techniques)	4	0	0	4	1.0	NIL
BL3402	PC	Clinical Biochemistry-II(Metabolic and Blood Biochemistry)	4	0	0	4	1.0	NIL
BL3403	PC	Medical Microbiology-II (Technical Methods in Medical Microbiology)	4	0	0	4	1.0	NIL
BL3404	PC	Immunology and Serology Techniques-II	4	0	0	4	1.0	NIL
BL3440	PC	Pathology and Allied Subject-II (Histopathology & Cytology Techniques) Lab	0	0	2	1	1.0	NIL
BL3441	PC	Clinical Biochemistry-II Lab	0	0	2	1	1.0	NIL
BL3442	PC	Medical Microbiology-II Lab	0	0	2	1	1.0	NIL
BL3443	PC	Immunology and Serology Techniques-II Lab	0	0	2	1	1.0	NIL
VP3401	VAP	Employability Skills-II (Aptitude & Reasoning)	2	0	0	2	1.0	NIL
	OE	Open Elective III	3	0	0	3	1.0	NIL
GP3401	GP	General Proficiency	0	0	0	1	1.0	NIL
TOTAL			**21**	**0**	**08**	**26**		

Contact Hrs. = 29

OPEN ELECTIVE III

S.No.	Course Name	Course Code	Department Offering
1	Hydrology	CE3015	Civil Engineering
2	J Query & Databases	CS3015	Computer Science and Engineering
3	Data Science Models: Regression, Classification and Clustering	CS3025	Management + CSE
4	Mushroom Cultivation	AG3015	Agriculture
5	E-commerce	BB3015	Business &Management
6	Media industry and Management	JM3015	Journalism
7	Italian Cuisine	HM3015	Hospitality & Tourism
8	SAP 5	MB3015	Management
9	French Advance C1	EG3015	English
10	MSO Access Certification	CS3035	Computer Science and Engineering

SEMESTER 5

Course Code	Category	COURSETITLE	L	T	P	C	Version	Course Prerequisite
BL3501	PC	Immunohematology & Blood bank Technology	4	0	0	4	1.0	NIL
BL3502	PC	Clinical Biochemistry-I (Biostatics, Automation& Endocrinology)	4	0	0	4	1.0	NIL
BL3503	PC	Medical Microbiology -I (Pathogenic Viruses & Miscellaneous Microbes)	4	0	0	4	1.0	NIL
BL3504	PC	Clinical Biochemistry-II (Diagnostic Enzymology)	4	0	0	4	1.0	NIL
BL3505	PC	Diagnostic Cytology	4	0	0	4	1.0	NIL
BL3540	PC	Immunohematology & Blood bank Technology Lab	0	0	2	1	1.0	NIL
BL3541	PC	Clinical Biochemistry -I(Clinical Enzymology & Automation) Lab	0	0	2	1	1.0	NIL
BL3542	PC	Medical Microbiology-I Lab	0	0	2	1	1.0	NIL
VP3501	VAP	Employability Skills-III (GDPI)	2	0	0	2	1.0	NIL
BL3543	CP	Clinical Training	0	0	0	6	1.0	NIL
GP3501	PC	General Proficiency	0	0	0	1	1.0	NIL
TOTAL			**22**	**0**	**6**	**32**		

Contact hours: 28

SEMESTER 6

Course Code	Category	COURSETITLE	L	T	P	C	Version	Course Prerequisite
BL3601	PC	Pathology and allied subject-II (Histopathology & Cytology)	4	0	0	4	1.0	NIL
BL3602	PC	Medical Microbiology -II (Applied microbiology and Advance Techniques.	4	0	0	4	1.0	NIL
BL3603	PC	Clinical Virology	2	2	0	3	1.0	NIL
BL3605	S	Seminars	3	0	0	3	1.0	NIL
BL3640	PC	Pathology and allied subject-II (Histopathology & Cytology) Lab	0	0	2	1	1.0	NIL
BL3641	PC	Medical Microbiology-II Lab	0	0	2	1	1.0	NIL
BL3642	PC	Clinical Biochemistry-II Lab	0	0	2	1	1.0	NIL
BL3643	CT	Clinical Training	0	0	0	6	1.0	NIL
GP3601	GP	General Proficiency	0	0	0	1	1.0	NIL
TOTAL			**13**	**2**	**6**	**24**	**0**	**6**

Contact hours: 21

B. Choice Based Credit System (CBCS)

Choice Based Credit System (CBCS) is a versatile and flexible option for each student to achieve his target number of credits as specified by the UGC and adopted by our university.The following is the course module designed for the Bachelor of Medical Lab Technology program:

Core competency: Students will acquire core competency inParamedical Studies and in allied subject areas.

Skilled communicator: The course curriculum incorporates basics and advanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation.

Critical thinker and problem solver: The course curriculum also includes components that can be helpful to graduate students to develop critical thinking ability by way of solving problems/numerical using basic&Advance knowledge and concepts ofParamedical Studies.

Sense of inquiry: It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation.

Skilled healthcare worker: The course curriculum has been designed in such a manner as to enabling a graduate student to become a skilled healthcare worker by acquiring knowledge about patient handling and management, writing, planning, study of ethical standards and rules and regulations pertaining to patient care.

Ethical awareness/reasoning:A graduate student requires understanding and developing ethical awareness/reasoning which the course curriculums adequately provide.

Lifelong learner: The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing Employability opportunity.

Value Added Course (VAC): A value added audit course is a non-credit course which is basically meant to enhance general ability of students in areas like soft skills, quantitative aptitude and reasoning ability - required for the overall development of a student and at the same time crucial for industry/corporate demands and requirements. The student possessing these skills will definitely develop acumen to perform well during the recruitment process of any premier organization and will have the desired confidence to face the interview. Moreover, these skills are also essential in day-to-day life of the corporate world. The aim is to nurture every student for making effective communication, developing aptitude and a general reasoning ability for a better performance, as desired in corporate world. There shall be four courses of Aptitude in Semester I, II, III&IV semesters and two courses of Soft Skills in III&IV Semesters and will carry no credit, however, it will be compulsory for every student to pass these courses with minimum

45% marks to be eligible for the certificate. These marks will not be included in the calculation of CGPI. Students have to specifically be registered in the specific course of the respective semesters.

Skill Enhancement Course: This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Generic/Open Elective (OE): Open Elective is an interdisciplinary additional subject that is compulsory in a program. The score of Open Elective is counted in the overall aggregate marks under Choice Based Credit System (CBCS). Each Open Elective paper will be of 3 Credits in II, III and IVsemesters. Each student has to take Open/Generic Electives from department other than the parent department. Core / Discipline Specific Electives will not be offered as Open Electives.

Non CGPA Audit Course (NCAC): This is a compulsory course but not includedin CGPA calculation and will be of 3 credits. Each student of Bachelor of Medical Lab Technology Program has to compulsorily pass the Disaster Management.

C. Program Outcomesof Bachelor of Medical Lab Technology

PO-01	Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support.
PO-02	Perform routine clinicallaboratory procedures within acceptable quality control parameters in hematology, biochemistry, immunohematology, and microbiology.
PO-03	Demonstrate technical skills, social behavior, and professional awareness for functioning effectively as a laboratory technician.
PO-04	Apply problem solving techniques in identification and correction of pre analytical, post analytical & analytical variables.
PO-05	Operate and maintain laboratory equipment utilizing appropriate quality control and safety procedures.
PO-06	Recognize and impact of laboratory tests in a global and environmental context.
PO-07	Communicate effectively by oral, written, and graphical means.
PO-08	Function as a leader/team member in diverse professional and industrial research areas.
PO-09	Apply the fundamentals of research process to complete and present research studies that enrich the field of physical therapy.
PO-10	Function in an ethical and professional manner without bias against any ethnicity,race, religion, caste, or gender.
PO-11	Practice professional and ethical responsibilities with high degree of credibility, integrity, and social concern.

Program Specific Outcomes:

PSO1: Knowledge of Lab tests: Possess theoretical and practical knowledge of laboratory test associated with the diagnosis of diseases including biochemical, pathological, and microbiological test in the laboratory.

PSO2: Thinking Abilities: Utilize the principles of scientific test, thinking analytically, clearly, and critically, while solving laboratory problems and making patient reports after sample processing in daily practice.

PSO3: Planning Abilities: Demonstrate effective planning abilities including laboratory test timing management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PSO-04: Professional identity: Understand analyze and communicate the value of their professional roles in society (e.g. health care professionals, laboratory supervisors and managers) through consideration of social,economic, and health issues.

PSO-05: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the laboratory practice.

PSO-06: Life- long learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadcast context of medical laboratory change.

E. Program Educational Objectives (PEO's)

PEO1. Acquire comprehensive knowledge of structure and functions of human body, physiological and biochemical mechanisms involved in normal and abnormal health condition, knowledge of light microscopic and ultrastructure of human specimen. Knowledge of structure and functional correlation of blood constituents with disease process and be able to communicate the same clearly and with precision.

PEO 2. Be aware of contemporary advances and developments in the field of medical laboratory sciences.

PEO 3. Acquire Knowledge of modern research techniques and be familiar with the recent advances in medical laboratory tests.

PEO 4. Inculcate habit of scientific enquiry and be able to identify lacunae in the existing knowledge in a given area.

PEO 5. Have acquired skills in interpreting the results to medical and paramedical professionals as Laboratory manager/supervisor or healthcare administrator.

PEO 6. Have acquired skills in effectively communicating with the students and colleagues from various medical and paramedical fields as educational consultant or laboratory coordinator etc.

PEO 7. Have acquired skills of integrating laboratory tests with other disciplines of medical sciences as and when needed.

F. Pedagogy & Unique practices adopted:

"Pedagogy is the method and practice of teaching, especially for teaching an academic subject or theoretical concept". In addition to conventional time-tested lecture method, the institute will Emphasize on experiential learning:

Role Play & Simulation:Role- play and simulation are forms of experiential learning. Learners take on different roles, assuming a profile of a character or personality, and interact and participate in diverse and complex learning settings. Role-play and simulation function as learning tools for teams and groups or individuals as they "play" online or face-to-face. They alter the power ratios in teaching and learning relationships between students and educators, as students learn through their explorations and the viewpoints of the character or personality they are articulating in the environment. This student-centered space can enable learner-oriented assessment, where the design of the task is created for active student learning. Therefore, role-play& simulation exercises such as virtual share trading, marketing simulation etc. are being promoted for the practical-based experiential learning of our students.

Video Based Learning (VBL)&Learning through Movies (LTM):These days technology has taken a front seat and classrooms are well equipped with equipment and gadgets. Video-based learning has become anindispensable part of learning. Similarly, students can learn various concepts through movies. In fact, many teachers give examples from movies during their discourses. Making students learn few important theoretical concepts through VBL & LTM is a good idea and method. The learning becomes really interesting and easy as videos add life to concepts and make the learning engaging and effective. Therefore, our institute is promoting VBL&LTM, wherever possible.

Field/Live Projects:The students, who take up experiential projects in companies, where senior executives with a stake in teaching guide them, drive the learning. All students are encouraged to do some live project other their regular classes.

Industrial Visits:Industrial visit are essential to give students hand-on exposure and experience of how things and processes work in industries. Our institute organizes such visits to enhance students' exposure to practical learning and work out for a report of such a visit relating to their specific topic, course or even domain.

MOOCs:Students may earn credits by passing MOOCs as decided by the college. Graduate level programs may award Honors degree provided students earn pre-requisite credits through MOOCs. University allows students toundertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval. Keeping this in mind, University proposed and allowed a maximum of two credits to be allocated for each MOOC courses. In the pilot phase it is proposed that a student undertaking andsuccessfully completing a MOOC course through only NPTEL could be given 2 credits for each MOOC course.

For smooth functioning and monitoring of the scheme the following shall be the guidelines forMOOC courses, Add-on courses carried out by the College from time to time.

a) It will be necessary for every student to take at least one MOOC Course throughout theprogram me.

b) There shall be a MOOC co-ordination committee in the College with a faculty at the level ofProfessor heading the committee and all Heads of the Department beingmembers of theCommittee.

c) The Committee will list out courses to be offered during thesemester, which could be requested by the department or the students and after deliberating on all courses finalize a list of courses to be offered with 2 creditsdefined for each course and the mode of credit consideration of the student. The complete process shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course, the approval will be valid only for the semester on offer.

d) Students will register for the course and the details of the students enrolling under the coursealong with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Coordinator MOOC through the Principal of the College.

e) After completion ofMOOC course, Student will submit the photocopy of Completioncertificate of MOOC Course to the Examination cell as proof.

f) Marks will be considered which is mentioned on Completion certificate of MOOC Course.

g) College will consider the credits only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.

Special Guest Lectures (SGL) &Extra Mural Lectures (EML):Some topics/concepts need extra attention and efforts as they either may be high in difficulty level or requires experts from specific industry/domain to make things/concepts clear for a better understanding from the perspective of the industry. Hence, to cater to the present needs of industry we organize such lectures, as part of lecture-series and invite prominent personalities from academia and industry from time to time to deliver their vital inputs and insights.

Student Development Programs (SDP):Harnessing and developing the right talent for the right industry anoverall development of a student is required. Apart from the curriculum teaching various student development programs (training programs) relating to soft skills, interview skills, SAP, Advanced excel training etc. that may be required as per the need of the student and industry trends, are conducted across the whole program. Participation in such programs is solicited through volunteering and consensus.

Industry Focusedprogrammed:Establishing collaborations with various industry partners todeliver the programmeonsharing basis. The specific courses are to be delivered by industry experts to provide practice-based insight to the students.

Special assistance program for slowlearners &fast learners:The program has provision to identify slow and fast learners, syllabus adheres the university policy for slow and fast learners are given research problems and higher order learning assignments whereas slow learners are given additional resources and per group learning across the subjects.

Induction program:Every year 3 weeks induction program is organized for 1st year students and senior students to make them familiarize with the entire academic environment of university including Curriculum, Classrooms, Labs, Faculty/ Staff members, Academic calendar and various activities.

Mentoring scheme:There is Mentor-Mentee system. One mentor lecture is provided per week in a class. Students can discuss their problems with mentor who is necessarily a teaching faculty. In this way, student's problems or issues can be identified and resolved.

Competitive exam preparation:Students are provided with one class in every week for GATE/ Competitive exams preparation.

Extra-curricular Activities:Organizing& participation in extracurricular activities will bemandatory to help students develop confidence & face audience boldly. It brings out their leadership qualities along with planning & organizing skills. Students undertake various cultural, sports and other competitive activities within and outside then campus. This helps them build their wholesome personality.

Career & Personal Counseling: - Identifies the problem of student as early as possible and gives time to discuss their problemsindividually as well as with the parents. Counseling enables the students to focus on behavior and feelings with a goal to facilitate positive change.Its major role lies in giving: Advice, Help, Support, Tips, Assistance, and Guidance.

Participation in Flip Classes, Project based Learning (A2 Assignment), Workshops, Seminars&writing & Presenting Papers:Departments plan to organize the Flip Classes, Project based Learning (A2 Assignment), workshops, Seminars& Guest lecturers time to time on their respective topics as per academic calendar. Students must have to attend these programs. This participation would be count in the marks of general Discipline & General Proficiency which is the part of course scheme as non-credit course.

Formation of Student Clubs, Membership& Organizing & Participating events:Every department has the departmental clubs with the specific club's name. The entire student's activity would be performed by the club. One faculty would be the coordinator of the student clubs & students would be the members with different responsibility.

Capability Enhancement& Development Schemes:The Institute has these schemes to enhance the capability and holistic development of the students. Following measures/ initiatives are taken up from time to time for the

same: Career Counseling, Soft skill development, Remedial Coaching, Bridge Course, Language Lab, Yoga and Meditation, Personal Counseling

Library Visit & Utilization of QLRC:Studentsmay visit the library from morning10 AM to evening 8 PM. Library created its resources Database and provided Online Public Access Catalogue (OPAC) through which users can be accessed from any of the computer connected in the LAN can know the status of the book. Now we are in process to move from OPAC to KOHA.

Detailed Syllabus (Semester wise /course wise)

SEMESTER 1 Year -1

RD3101	**Title:Human Anatomy- I**	**L T P C** **3 0 03**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	Anatomy is a key component of all education programs for BMLT.To develop the basic concept of gross, functional, and applied anatomy and should have a strong focus on organ position,orientation and relationships.	
Unit No.		**No. of hours (per Unit)**
Unit: I	**Terminology and General Plan of the Body**	8
Terminology and General Plan of the Body, Body Parts and Areas,Terms of Location and Position, Body Cavities and Their Membranes, Dorsal cavity, Ventralcavity, Planes andSections.		
Unit II	**Cells**	7
Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division Tissue, Types, Structure, Location and Function of Epithelial Tissue, Connective Tissue, Muscle Tissue, Nerve Tissue, MEmbranes, Glandular tissue, The Integumentary System: structure and function of The Skin, Subcutaneous Tissue		
Unit III	**Musculoskeletal System**	7
Musculoskeletal System: Basic anatomy of important muscles and bones		
Unit IV	**Respiratory system**	7
Respiratory system: Basic anatomy of nose, larynx, trachea, bronchi and lungs		
Unit V	**Digestive system**	7
Digestive system: basic anatomy of esophagus, stomach, small intestine, large intestine, liver, Gall bladder, pancreas.		
Textbooks	1. Waugh A, Grant A. Ross & Wilson Anatomy and Physiology in Health and Illness E-Book. Elsevier Health SciencesChourasia BD, Garg K. BD	
Reference Books	1. Chourasia's Human Anatomy: Lower limb, abdomen & pelvis. CBS Publishers& Distributors. 2. Principles of Anatomy and Physiology, Gerard J. Tortora and Bryan H. Derrickson	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for RD3101

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn about Terminology, GeneralPlanes, Body Cavities and Their Membranes.	1	S
CO2	Students will be able to study about cells, tissue, and the integumentary system of human body.	2	S
CO3	Students will be able to know about Introduction of Musculoskeletal System: Basic anatomy of muscles and bones.	2	S
CO4	Students will be able to study the basic anatomy of respiratory system and its clinical disorders.	2	S
CO5	Students will be able to learn basic anatomy of esophagus, stomach, small & large intestine, liver, Gall bladder, pancreas.	1	S

CO-PO Mapping for RD3101

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate-2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	1	1	2	2	2	2	2	2	1	1	2	2	3	1
CO 2	1	1	2	2	1	2	3	3	3	2	3	2	2	2
CO 3	2	2	3	2	2	1	2	2	3	1	3	3	3	2
CO 4	2	1	1	3	3	3	2	2	3	3	2	3	3	1
CO 5	2	1	3	1	2	1	3	2	3	1	3	3	2	2
Avg	**1.6**	**1.2**	**2.2**	**2**	**2**	**1.8**	**2.4**	**2.2**	**2.6**	**1.6**	**2.6**	**2.6**	**2.6**	**1.6**

RD3106	Title: Basics of Human Physiology I	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	To enable the students to understand the normal functioning of Variousorgan systems of the body, and their interactions.	
Unit No.		No. of hours (per Unit)
Unit: I	Cell and Tissues	7
Cell – Structure and functions. Physiological properties of protoplasm. Levels of cellular organization. Organelles, tissues, organs and systems. Cell membrane transport. Tissues - Structure and functions of epithelial, connective, muscular and nervous tissue. Water and electrolyte balance - Distribution of water and electrolytes, requirements and sources, regulationof water balance, electrolyte balance, deficiency and excess.		
Unit II	Digestive System	7
Accessory organs of digestion – Structure and functions – Teeth, Tongue, Salivary glands; Saliva – Composition and functions. Organs of Digestion – Oesophagus, Stomach, Small intestine and Large intestine – Structure and functions, Movements of the digestive system. Associated organs of digestion – Liver, Gall bladder, Pancreas (Digestive function) and Spleen. Disorders and Diseases – anorexia, Achlorhydria, Peptic ulcer, gastric ulcer and duodenal ulcer, gastritis, typhoid, jaundice.		
Unit III	Circulatory System	7
Blood – Formation, composition and functions, blood coagulation, blood groups and Rhesus factor, blood transfusion. Disorders – Anemia, Leukemia, hemophilia. Blood vessels – Types of Blood vessels. Disorders - Varicose veins, arteriosclerosis. Blood Pressure – Factors affecting blood pressure, hypertension, Pulse, Tachycardia and Bradycardia.Heart - Structure and functions, cardiac cycle, conduction system of the heart, ECG and its significance. Disorders – Angina pectoris, myocardial infarction. Lymphatic system – Lymph glands and its functions; Lymph - Composition and functions.		
Unit IV	Excretory System	7
Organs of Excretion – Structure and functions of kidney, ureter, urinary bladder, urethra. Mechanism of urine formation,composition of urine, Micturition. Role of kidney in maintaining pH of blood. Acid-base balance. Disorders and Diseases – nocturnal enuresis, polyuria, diuresis, uremia, hematuria, nephritis.		
Unit V	Respiratory System	8
Upper respiratory passages – nasal cavities, pharynx, larynx and trachea. Lungs – Structure and functions, Lung capacity, Respiratory Quotient. Exchange and Transportation of respiratory gases. Role of hemoglobin and buffer systems. Disturbances in respiration – Apnea, Dyspnea, Hypoxia. Diseases – Bronchitis, Tuberculosis, Pneumonia, Asthma.		
Textbooks	1 Meyer B J, Mei H S and Meyer A C., Human Physiology, AITBS Publishers and Distributors. 2. Wilson, K.J.W and Waugh, Ross and Wilson, Anatomy and Physiology in Health and Illness, Churchill Livingstone	
Reference Books	1. Jain, A.K., Textbook of Physiology, Vol. I and II, Avichal Publishing Co., New Delhi. 2. Chatterjee C.C., Human Physiology, Vol. I & II, Medical Allied Agency, Calcutta. 3. Guyton, A.G. and Hall, J.B., Textbook of Medical Physiology, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for RD3106

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn about basic physiology of cells & tissues and their distribution in human body	1	Emp
CO2	Students should be able to learn about digestive system and their disorders	2	Emp
CO3	Students should be able to learn about circulatory system and its working	2	Emp
CO4	Students should be able to learn about basic physiology of excretory system	2	Emp
CO5	Students should be able to learn about the mechanism of respiratory system in the human	2	Emp

CO-PO Mapping for RD3106

Course Outcome	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	1	1	3	3	2	1	2	1	3	1	3	1	3	1
CO 2	2	1	2	1	2	2	2	1	2	1	2	3	1	1
CO 3	3	2	3	3	1	3	2	2	3	2	3	3	3	1
CO 4	2	2	1	3	1	3	2	2	1	2	1	2	2	2
CO 5	3	2	3	1	1	1	2	2	3	2	3	3	3	2
Avg	**2.2**	**1.6**	**2.4**	**2.2**	**1.4**	**2**	**2**	**1.6**	**2.4**	**1.6**	**2.4**	**2.2**	**2.4**	**1.4**

ND3105	Title: Biochemistry	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	At the end of the course, the students will have enough knowledge of the equipment's and their applications as well as taking care & maintenance of equipment's and samples.	
Unit No.		No. of hours (per Unit)
Unit: I	Introduction to Fundamental and Clinical Biochemistry	7
Introduction to Fundamental and Clinical Biochemistry, First aid in laboratory accidents. Principle, working, care & maintenance of Weighing balance, hotplate, centrifuges, incubator, hot air oven, colorimeter, spectrophotometer, pH meter.		
Unit II	Buffers	8
Preparation of solution and reagents, normal solution, molar solutions, percent solution, buffer solution, dilutions, w/v, v/v, concepts of acid and base, units of measurement: SI unit, reference range, conversion factor,units for measurement of enzymes, protein, osmolarity, drugs, hormones, vitamins.		
Unit III	Carbohydrates, Lipids and Enzyme	7
Carbohydrates: Structure, Classification and their function in biological system. Proteins: Classification, Primary, secondary and tertiary structure and functions of protein. Amino acids: classification, Structure, properties and biological functions. Lipids: Classification of lipids, Classification of fatty acids, their biological functions. Enzymes: Definition, classification of enzyme, units for measuring enzyme activity.		
Unit IV	Nucleic acids	7
Nucleic acids: Structure, function and types of DNA and RNA. Nucleotides,Nucleosides,Nitrogen bases, and role of Nucleic acid.		
Unit V	Vitamins	7
Vitamins: classification, function and disease associated with vitamins. Role of Minerals and ions: Calcium, Iron, Iodine, Zinc, Phosphorus, Copper, Potassium, Zinc.		
Textbooks	1. Vasudevan DM, Sreekumar S, Vaidyanathan K. Textbook of biochemistry for medical students. JP Medical Ltd.	
Reference Books	1. Hames BD, Hooper NM, Hames BD. Instant notes in biochemistry. Biochemical education. 2. Devlin TM, editor. Textbook of biochemistry: with clinical correlations.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for ND3105

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to understand the biological oxidation processes and role of enzymes in metabolism	2	Emp
CO2	Students should be able to learn the various molecular aspects of transport in body.	1	Emp
CO3	Students should be able to learn the structure and metabolism process related to carbohydrates	2	Emp
CO4	Students should be able to learn the structure and metabolism process related to lipids	2	Emp
CO5	Students should be able to learn the structure and metabolism process related to proteins.	2	Emp

CO-PO Mapping for ND3105

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	2	2	1	2	3	3	1	1	2	2	2
CO 2	3	2	3	1	3	1	1	3	1	2	2	2	2	2
CO 3	3	3	3	3	3	2	1	3	2	2	1	2	3	1
CO 4	2	3	3	3	3	2	2	2	3	1	2	3	3	3
CO 5	3	3	3	3	3	3	3	3	2	3	2	3	1	2
Avg	**2.8**	**2.6**	**2.6**	**2.4**	**2.8**	**1.8**	**1.8**	**2.8**	**2.2**	**1.8**	**1.6**	**2.4**	**2.2**	**2**

BL3101	Title:Basic Hematology& Clinical Pathology - I	L T P C 3 0 0 3
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	At the end of the course, the students will have enough knowledge of the concept of Hemopoiesis, specific technique for sample collection and analyzing infected blood samples	
Unit No		**No. of hours (per Unit)**
Unit: I		8
Introduction to Hematology, Organization of laboratory and safety measures, Laboratory Safety guidelines, Biomedical waste management, BMW– Segregation, collection, transportation, treatment, and disposal (including color coding), Personal Protective Equipment,The Microscope and its parts, care and maintenance, monocular and binocular microscope, Corrective Actions in Light Microscopy, Important equipment used in hematology Lab.		
Unit II		7
Hematopoiesis,Erythropoiesis, Leucopoiesis,Thrombopoiesis, Mechanismofhemopoiesis, stagesofcelldevelopment, sitesof hemopoiesis, Bloodanditscomposition, plasmaandits composition,RBC, WBC,Platelets,Anticoagulants,mechanismof action,typesanduses, meritsanddemerits, effectofstorageon bloodcells		
Unit III		6
Collection,Transport, Preservation,andProcessingofvarious clinicalSpecimens, Bloodcollectionforhematological investigations, Venipuncture, Capillary blood, Arterialblood, Vacutainer, its type and uses, sample acceptance and rejection criteria.		
Unit IV		8
Hemoglobin, structure, function andtypes, Hemoglobinometry,Hemoglobin estimationbyvarious methods, advantages anddisadvantages, physiological andpathologicalvariationsonblood parameters Hemocytometry, visual and electronic method, Neubauer counting chamber, RBC count, WBC count, Platelets count, absolute eosinophil count, principle, procedure, calculation, significance, precautions involved during counting, absolute count of various WBCs.Physiological and pathological changes in values		
Unit V		7
Preparationofthinandthicksmears,staiingofsmears, Romanowsky dyes, preparation and staining procedures of blood smears, Morphology of normal blood cells and their identifications, differential leucocytes count bymanual and automated method, physiological and pathological variations in value.		
Text Books	1. Textbook of Medical lab Technology, Praful B Godkar, IIIrd edition 2. Textbook of Medical Lab Technology, RamnikSood, Jaypee Publishers	
Reference Books	3. MedicalLab Technologyby K. L.Mukherjee, 4. Practical Hematology, Dacie& Lewis, 11th edition 5. De GRUCHY'SCLINICALHEMATOLOGYINMEDICALPractice ***6. https://www.hEmatology.org/education*** ***7. https://www.vet.cornell.edu/animal-health-diagnostic-center/laboratories/clinical pathology***	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3101

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand the formation of blood & its composition	2	Emp
CO2	Students will be able to learn different stage of cells development.	1	Emp
CO3	Students will be able to understand the concept of hemopoiesis, biomedical waste management, & microscopy	2	Emp
CO4	Students will be able to apply the specific technique for sample collection, its preservation & biomedical waste management	3	Emp
CO5	Students will be able to analyze infected blood samples and sites for hematologicalinvestigations	4	Emp

CO-PO Mapping for BL3101

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate-2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	2	1	2	1	2	2	3	2	2	2	1
CO 2	2	3	2	3	2	2	3	1	3	2	3	3	2	3
CO 3	3	2	3	2	3	3	3	3	2	2	3	3	2	3
CO 4	3	2	1	3	3	3	2	2	2	3	3	3	3	3
CO 5	3	2	3	3	3	3	1	2	3	3	3	3	2	3
Avg	**2.8**	**2.2**	**2.2**	**2.6**	**2.4**	**2.6**	**2**	**2**	**2.4**	**2.6**	**2.8**	**2.8**	**2.2**	**2.6**

BL3102	Title: Fundamentals of Microbiology - I	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	At the end of the course, the students will have enoughknowledge of theconcept of Microbiology, specific technique for sample collection and analyzing infected microbes.	
Unit No		No. of hours (per Unit)
Unit: I		8
Developmentofmicrobiologyasadiscipline,ContributionsofAntonovLeeuwenhoek, LouisPasteur,RobertKoch,Joseph Lister, Alexander Fleming, Edward Jenner and others. Lab organization, Laboratory Safety measures in Microbiology, Occurrence of lab infections, route of infections in laboratory, Universal precautions		
Unit II		7
Microscopy: Study of compound microscope–magnification, numerical aperture, resolution, and components of microscope. Darkground illumination, care and maintenance of microscope		
Unit III		6
Prokaryotic and eukaryotic cells, bacterial taxonomy ,Classification of Bacteria, Morphology basedonsize ,shape, arrangement, motility, flagella, spores, capsules, cell wall, plasma membrane,pili, ribosome's.		
Unit IV		8
Introduction and basic features of bacteria, viruses, fungi, protozoa Cell size, shape and arrangement, cell-wall, composition, and detailed structure of Gram-positive and Gram-negative cell walls		
Unit V		7
Introduction and principles of staining, dye and stain, staining methodssuchasGram,AFB, Albert's, Capsule staining, bacterial wall, spirochetes Aseptic techniques in microbiology		
Textbooks	1. Ananthan RayanR. and PanikerC.K.J. (2009) Textbook of 2. Microbiology.8th edition, University Press Publication	
Reference Books	***1.*** Goering R., Dockrell H., Zuckerman M. andWakelinD. (2007) MIMS'MEDICALMICROBIOLOGY. 4THEDITION.ELSEVIER 3. 2.Willey JM, Sherwood LM, and Woolverton CJ.(2013) 4. 3.http://www.ppup.ac.in/e-Content/_edetails.php?id=2017 5. 4.http://ecoursesonline.iasri.res.in/course/view.php?id=108	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3102

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand theories and concepts of microorganisms.	2	Emp
CO2	Students will be able to understand microscope, its components and maintenance.	2	Emp
CO3	Students will be able to learn to describe the morphology of eukaryotic and prokaryotic cells.	1	Emp
CO4	Students will be able to apply microscopy to study basic features of microorganisms	3	Emp
CO5	Students will be able to analyze different stains and staining techniques	4	Emp

CO-PO Mapping for BL3102

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate-2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO2	PSO 3
CO 1	3	3	2	1	1	2	1	2	2	3	3	2	2	1
CO 2	2	3	2	3	2	2	3	1	3	2	2	2	2	2
CO 3	3	2	3	2	1	2	1	1	2	2	2	3	2	2
CO 4	3	2	2	2	3	3	2	2	2	3	3	3	1	3
CO 5	3	2	3	2	3	3	1	2	3	3	3	3	2	3
Avg	**2.8**	**2.4**	**2.4**	**2**	**2**	**2.4**	**1.6**	**1.6**	**2.4**	**2.6**	**2.6**	**2.6**	**1.8**	**2.2**

BL3103	Title: Preventive Medicine & Community Healthcare-I	L T P C 3 0 0 3
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge on basic concept of health and universal disease concepts.	
Unit No.		**No. of hours (per Unit)**
Unit: I		**8**
Definition and concepts of health, important public health acts, health problems of developed and developing countries, environment and health. Nutrition and detection of nutritional disorders, manifestations and prevention of such disorders role of regular exercise and yoga in prevention and management of various diseases.		
Unit II		7
Epidemiology and diseases, Basic Emergency care and first aid Epidemiology, etiology, pathogenesis and control of communicable disease like malaria, cholera, tuberculosis, leprosy, diarrhea, poliomyelitis, viral hepatitis, measles, dengue, rabies, AIDS		
Unit III		6
National Health Policy and Programs, DOTS, National AIDS control programme, National cancer control programme, universal and national immunization programs, and vaccine schedules.		
Unit IV		8
Population, problems of population growth, birth rates, death rates and fertility rates, MMR, CPR, Reproductive and child health. Hygiene and sanitation		
Unit-V		7
Family welfare and planning, Objectives and goals of WHO, UNICEF, Indian Red Cross Society, UNFPA, FAO, ILO		
Textbooks	1. Textbook of PreventiveSocial Medicine,K.Parks, SunderLal,	
Reference Books	2. Park & Park, Preventive & SocialMedicine 3. 2. https://www.hindawi.com/journals/apm/contents/	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3103

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students are able to understand the Concept of Community Health, preventive Medicine & Family Welfare.	2	Emp
CO2	Students are able to understand the Nutrition and major Nutritional disorders and their prevention	2	Emp
CO3	Students are able to describe epidemiology and etiology of communicable disease.	1	Emp
CO4	Students are able to apply National health policy programmers, Universal Immunization and Vaccines schedule.	3	Emp
CO5	Students are able to analyze population related problems and its effect on growth and development	4	Emp

CO-PO Mapping for BL3103

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO1	PSO 2	PSO 3
CO 1	1	3	2	3	2	2	2	3	3	2	3	3	2	1
CO 2	2	2	2	2	2	3	3	2	3	2	1	2	2	2
CO 3	3	2	2	2	2	1	1	2	2	2	1	3	2	2
CO 4	1	3	3	3	1	3	2	1	3	2	2	2	3	1
CO 5	3	3	3	3	3	3	3	3	3	3	3	3	2	3
Avg	**2**	**2.6**	**2.4**	**2.6**	**2**	**2.4**	**2.2**	**2.2**	**2.8**	**2.2**	**2**	**2.6**	**2.2**	**1.8**

EG3102	Title: Professional Communication	L T P C 2 0 0 2
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	To introduce students to the theory, fundamentals, and tools of communication and to develop in them vital communication skills	
Unit No.		No. of hours (per Unit)
Unit I	Fundamentals of Communication	5
Introduction–Communication Process, Distinction between General and Technical Communication. Language as a Tool of Communication; Interpersonal, Organizational, Mass Communication. Formal Communication: Downward, Upward, Lateral/ Horizontal, Diagonal; Informal Communication (Grapevine). Barriers to Communication		
Unit II	Components of Technical Written Communication	5
Vocabulary building: Synonyms and Antonyms, Homophones, Conversions. Common Grammatical Errors, Paragraph Development, Précis writing. Technical Papers: Project,Dissertation and Thesis.		
Unit III	Forms of Business Communication	5
Business Correspondence- Types:Memorandum; Official letters. Job Application, Resume/CV/Bio-data; Notice, Agenda, Minutes of Meetings. Technical Proposal: Types, Significance, Format and Style of Writing Proposals. Technical Report: Types, Significance, Format and Style of Writing Reports.		
Unit IV	Presentation Techniques and Soft Skills	5
Presentation- Defining Purpose, Audience and Location; Organizing Contents; Preparing Outline; Audio-Visual Aids in Presentations. On-Verbal Aspects of Presentation: Kinesics, Proxemics, Chronemics, Paralanguage. Listening Skills: Importance, Active and Passive listening. Speaking Skills: Common Errors in Pronunciation; Vowels, Consonants and Syllables; Accent, Rhythm andIntonation.		
Unit V	Value-based Text Readings	4
Thematic and value-based critical reading of the following essays with Emphasis on the mechanics of writing and speaking:1. The Language of Literature and Science by Aldous Huxley 2. Of Discourse by Francis Bacon		
Suggested Reference Books	1. Braun K. Mitra, *Effective Technical Communication*, OxfordUniversity Press 2. Meenakshi Raman and Sangeeta Sharma, *Technical Communication-Principles and Practices*, Oxford University. Press 3. Prof.R.C. Sharma& Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw Hill &Co. Ltd.NewDelhi 4. V.N. Arora and Laxmi Chandra *Improve Your Writing*, Oxford Univ. Press, New Delhi 5. Ruby Gupta, *Basic Technical Communication*	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forEG3102

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn about Fundamentals of Communication	2	S
CO2	Students will be able to learn about Components of Technical Written Communication	1	S
CO3	Students will be able to learn about Forms of Business Communication	3	S
CO4	Students will be able to learn about Presentation Techniques and Soft Skills	2	S
CO5	Students will be able to learn about Value-based Text Readings	2	S

CO-PO Mapping for EG3102

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	1	1	1	2	1	2	2	1	2	1	2	1	1	2
CO 2	1	2	2	2	2	2	1	2	2	2	1	2	2	2
CO 3	2	1	2	1	2	1	2	1	1	2	1	2	2	2
CO 4	2	1	1	2	1	2	2	2	3	3	1	1	1	2
CO 5	1	2	1	3	1	1	1	1	1	2	1	2	3	1
Avg	**1.4**	**1.4**	**1.4**	**2**	**1.4**	**1.6**	**1.6**	**1.4**	**1.8**	**2**	**1.2**	**1.6**	**1.8**	**1.8**

CY3105	Title:Environmental Studies	L T P C 2 0 02
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	Students wwillunderstand the transnational characterofenvironmentalproblemsandwaysofaddressingthem,includin ginteractionsacrosslocalto global scales.	
Unit No.		No. of hours (per Unit)
Unit I	Introduction to Environmentalstudies&Ecosystems	
Multidisciplinary nature of environmental studies, Scope and importance, Need for public awareness. Concept, Structure and function of an ecosystem, Energy flow in an ecosystem: food chains, food webs and ecological pyramids. Examples of various ecosystems such as: Forest, Grassland, Desert, Aquatic ecosystems(ponds, streams,		
Unit II	Natural Resources: Renewable &Non-renewable resources	
Lands are source, land degradation ,landslides (natural man-induced), soil erosion and desertification. Forests &Forest resources: Use and over-exploitation, deforestation. Impacts of deforestation ,mining, dam building on environment and forests .Resettlement and rehabilitation of project affected persons; Problems and concerns with examples.Waterresources:Useandover-exploitationofsurfaceandgroundwater,floods,drought,conflictsover water(international&inter-state).Foodresources:WorldfoodproblEms,changescausedbyagricultureandovergrazing, effects of modern agriculture, fertilizer-pesticide problems with examples .Energy resources :Renewable andnon-renewable energy sources, use of alternate energysources,growingenergyneeds.		
Unit III	Biodiversity & Conservation	
Levelsofbiologicaldiversity: genetic, speciesandecosystemdiversity. Bio-geographiczonesofIndia. Ecosystemandbiodiversityservices. Biodiversitypatternsandglobalbiodiversityhotspots, Indiamega-biodiversity nation; Endangered andendemicspeciesofIndia. Threats tobiodiversity: Habitatloss,poachingofwildlife, man-wildlifeconflicts,biologicalinvasions. Conservation of biodiversity: In-situandEx-situconservation of biodiversity.		
Unit IV	Environmental Pollution	
Environmentalpollutionanditstypes. Causes,effectsandcontrolmeasuresof a) Airpollutionb) Waterpollution– Freshwaterandmarinec)Soil pollutiond) Noisepollutione) Thermalpollution		
Unit V	Environmental Policies &Practices	
Conceptof sustainabilityand sustainabledevelopment. Waterconservation&watershedmanagement. Climatechange, globalwarming,acidrain, ozonelayer depletion. Disastermanagement: floods, earthquake,cyclonesand landslides Wasteland reclamation. Environment Protection Act. Air (Prevention andControl of Pollution) Act. Water(Preventionand controlof Pollution) Act, WildlifeProtectionAct, ForestConservationAct, Issues involvedinenforcementofenvironmentallegislation. Environment: rightsandduties. Populationgrowth		
Suggested Reference Books	1. Bharucha.E,TextbookofEnvironmentalStudiesforUndergraduateCourses. 2.KaushikAnubhav, KaushikCP, PerspectivesinEnvironmentalStudiesNewAge	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for CY3105

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about issues related to the environment and their impact on human life.	2	S
CO2	Students will be able to understand about the solutions related to the environmental problems.	2	S
CO3	Students will be able to understand about different components of the environment and their function and sustainable development.	2	S
CO4	Students will be able to comprehend the importance of ecosystem and biodiversity	1	S
CO5	Students will be able to correlate the human population growth and its trend to the environmental degradation.	1	S

CO-PO Mapping for CY3105

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	1	1	3	2	1	1	2	3	2	1	2	1	1	2
CO 2	1	2	2	2	2	2	1	2	2	2	1	2	2	2
CO 3	2	1	2	1	2	2	2	1	1	2	3	2	2	3
CO 4	2	3	3	2	1	2	2	3	3	3	3	1	1	2
CO 5	3	2	3	3	1	2	1	3	1	2	1	2	3	3
Avg	**1.8**	**1.8**	**2.6**	**2**	**1.4**	**1.8**	**1.6**	**2.4**	**1.8**	**2**	**2**	**1.6**	**1.8**	**2.4**

EG3140	Title: Professional Communication Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The student will be able to retain and apply his skills of English communication effectively in personal, social and professional interactions.	
Experiment No.	List of Experiments	

1. Common conversation skills
2. Introductions
3. Making requests
4. Asking for permission
5. Asking questions
6. Describing events, people, places
7. Learning correct pronunciation, syllable, stress, intonation
8. Extempore speaking
9. Role play
10. Presentation skills
11. Grammar-tense practice
12. Mother tongue influence-correction
13. Speech making / public speaking
14. Listening effectively
15. E-mail Etiquettes

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for EG3140

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn about Common conversation skills	2	Emp
CO2	Students should be able to know about speech making/public speaking, listening effectively and write a Email.	1	Emp
CO3	Student should be able to communicate with others through different modes of communication and should present his/her skills.	3	Emp

CO-PO Mapping for EG3140

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	2	1	2	2	0	1	2	2	0	2	2	0	1	1
CO 2	2	2	2	0	2	2	1	2	2	2	1	1	2	1
CO 3	1	2	1	2	1	1	2	3	1	1	1	2	2	2
Avg	**1.6**	**1.6**	**1.6**	**1.3**	**1**	**1.3**	**1.6**	**2.3**	**1**	**1.6**	**1.3**	**1**	**1.6**	**1.3**

RD3140	Title:Human Anatomy Lab-I	L T P C 0 0 2 1
Version No.	3.0	
Course Prerequisites	NIL	
Objectives	The anatomy component will make easy to diagnose for MLT students.	
Experiment No	List of Experiments	
1. Major organs through models and permanentslides. 2. Parts of circulatory system frommodels. 3. Parts of respiratory system frommodels. 4. Digestive system frommodels. 5. Excretory system frommodels.		
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for RD3140

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn about Major organs through models and permanent slides	1	Emp
CO2	Students will be able to learn about Parts of circulatory system and respiratory system from models.	2	Emp
CO3	Students will be able to learn about Digestive system and excretory system from models	2	Emp

CO-PO Mapping for RD3140

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate-2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	2	1	1	2	1	1	2	1	1	2	1	1	1	1
CO 2	1	2	3	3	2	3	2	2	2	1	2	2	3	1
CO 3	3	1	1	3	1	3	1	2	1	3	2	1	1	1
Avg	**2**	**1.3**	**1.6**	**2.6**	**1.3**	**2.3**	**1.6**	**1.6**	**1.6**	**2**	**1.6**	**1.3**	**1.6**	**1**

RD3143	Title:Basics of Human Physiology Lab-I	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The students will be able to explain the morphology of human body, tissues and able to determine hemoglobin content of the blood.	
Experiment No.	List of Experiments	

1. To measure pulse rate, heart rate
2. To measure blood pressure
3. To measure temperature
4. Measurement of the Vital capacity.
5. Calculation and evaluation of daily energy and nutrient intake.
6. Measurement of basal metabolic rate
7. Microscopic study of different tissues - Epithelial, connective, muscular & nervous tissues
8. Microscopic study of digestive organs - Pancreas, stomach, small intestine, liver
9. Microscopic study of respiratory organs - Lung, trachea
10. Microscopic study of excretory system - Kidney, nephron
11. Microscopic examination of prepared slides - Fresh mount of blood and stained blood smear

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for RD3143

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Student should be able to learn about microscopic studies of different human body systems.	2	Emp
CO2	Student should be able to learn about microscopic studies of different types of tissues	2	Emp
CO3	Student should be able to learn about monitoring heart rate, pulse rate, blood pressure, temperature, and BMI.	1	Emp

CO-PO Mapping for RD3143

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	1	3	2	1	3	2	2	2	2	3	1	1	3	1
CO 2	3	1	1	2	2	1	2	1	1	1	3	2	1	3
CO 3	1	2	3	1	1	2	1	3	3	2	1	1	1	1
Avg	**1.6**	**2**	**2**	**1.3**	**2**	**1.6**	**1.6**	**2**	**2**	**2**	**1.6**	**1.3**	**1.6**	**1.6**

ND3144	Title: Biochemistry Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Expected Outcome	The students will be able to isolate starch, ascorbic acid from natural sources.	
Experiment No.	List of Experiments	

1. Demonstration of LabGlassware and Instruments.
2. Preparation of Normalsolution.
3. Preparation ofAcidic Buffers & Alkaline buffer
4. Demonstration of Acid-BaseIndicator
5. Determination of Acid number in edibleoil.
6. Determination of Iodine number in edibleoil.
7. Determination of Saponification number in edibleoil.
8. Identification of CHO by Molish test.
9. Identification of reducing & non-reducing sugars.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for ND 3144

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn the preparation methods of starch.	2	Emp
CO2	Students should be able to learn to determine the acid value, iodine value and Saponification value of fats to check their purity.	2	Emp
CO3	Students should be able to learn to estimate the various vitamins and minerals through food sources	2	Emp

CO-PO Mapping for ND3144

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	1	3	2	1	3	2	2	2	2	3	1	1	3	1
CO 2	3	1	1	2	2	1	3	1	1	1	3	2	1	3
CO 3	1	2	3	1	1	2	1	3	3	2	1	1	1	1
Avg	**1.6**	**2**	**2**	**1.3**	**2**	**1.6**	**2**	**2**	**2**	**2**	**1.6**	**1.3**	**1.6**	**1.6**

BL3140	Title: Basic Hematology & Clinical Pathology Lab-I	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Expected Outcome	The students will be able to learn and apply some Blood estimations.	
Experiment No.	List of Experiments	

1. To learn general laboratory safety rules.
2. To demonstrate glass wares, apparatus and plastic wares used in laboratory.
3. To prepare EDTA, Sod. Citrate & Sod. Fluorideanticoagulantsand bulbs/vials used in laboratory.
4. Demonstration ofVacutainer.
5. To demonstratemethod of blood collection.
6. To separate serum and plasma.
7. Demonstration of microscope
8. Determination of Hemoglobin by various methods.
9. Determination of TLC
10. Preparation of thick and thin smear
11. Determination of DLC
12. Determination of Total RBC
13. Determination of total platelet count

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3140

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn Safety rules, glass wares, anticoagulants and Vacutainer.	2	Emp
CO2	Students should be able to apply Blood collection, separate serum & plasma, microscopy &hemoglobin.	3	Emp
CO3	Students should be able to determine TLC,DLC, RBC & platelet count.	2	Emp

CO-PO Mapping for BL3140

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	3	3	3	3	3	2	2	2	3	3	3	3	1
CO 2	3	3	3	2	2	3	3	1	1	3	2	3	1	3
CO 3	1	2	3	3	2	2	1	3	3	2	3	3	1	1
Avg	**2.3**	**2.6**	**3**	**2.6**	**2.3**	**2.6**	**2**	**2**	**2**	**2.6**	**2.6**	**3**	**1.6**	**1.6**

BL3141	Title:Fundamentals of Microbiology Lab-I	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Expected Outcome	The students will be able to learn and apply many microbiology practices in Laboratory.	
Experiment No.	List of Experiments	

1. To demonstrate safe code practice for microbiology laboratory.
2. To demonstrate glassware used in microbiology.
3. To demonstrate working and handling of Microscope.
4. To demonstrate method of sterilization by autoclave.
5. To demonstrate method of sterilization by Hot air oven.
6. To perform Gram staining
7. To perform Acid fast staining (ZeelNielsen staining)
8. To perform Indian ink staining
9. To perform ALBERT'S Staining

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3141

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn general safety in microbiology, glass wares, & microscopy.	2	Emp
CO2	Students should be able to learn to determine the autoclaving, hot air oven & gram staining.	2	Emp
CO3	Students should be able to apply AFB, India ink method & Albert's staining.	3	Emp

CO-PO Mapping for BL3141

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO2	PSO3
CO 1	3	3	2	3	3	2	2	2	2	3	3	3	3	2
CO 2	3	1	3	2	2	1	3	1	3	3	3	2	1	3
CO 3	1	3	3	1	1	2	1	3	3	2	1	3	1	2
Avg	**2.3**	**2.3**	**2.6**	**2**	**2**	**1.6**	**2**	**2**	**2.6**	**2.6**	**2.3**	**2.6**	**1.6**	**2.3**

SEMESTER 2 Year -1

RD3201	**Title: Human Anatomy- II**	**L T P C** **3 0 0 3**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The students will have enough knowledge on anatomy of human body a which is essential in day-to-day routine as well as special procedures.	
Unit No.		**No. of hours (per Unit)**
Unit: I	**Cardiovascular system**	8
Cardiovascular system: Basic anatomy of heart and important blood vessels, Brief introduction about Lymphatic System		
Unit II	**The Nervous System**	7
The Nervous System: Basic anatomy of brain and spinal cord, meninges and cerebrospinal fluid, Cranial Nerves		
Unit III	**Endocrine System**	7
Endocrine System: Brief anatomy of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal		
Unit IV	**Special Senses**	7
Special Senses: Basic anatomy of eye, ear and nose		
Unit V	**Genitourinary system**	7
Genitourinary system: Basic anatomy of kidney and associated organs, male reproductive organs, female reproductive organs		
Textbooks	1. Waugh A, Grant A. Ross & Wilson Anatomy and Physiology in Health and Illness E-Book. Elsevier Health Sciences, Chourasia BD, Garg K.BD 2. Chourasia's Human Anatomy: Lower limb, abdomen & pelvis. CBS Publishers &Distributors.	
Reference Books	1. Garg K. BD Chourasia's Human Anatomy–Regional and Applied Dissection and Clinical: Volume 1 Upper Limb and Thorax. 2. Principles of Anatomy and Physiology, Gerard J. Tortora and Bryan H. Derrickson	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24-07-2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for RD3201

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn the basic anatomy of cardiovascular system and clinical disorders	3	Emp
CO2	Students will be able to study the basic anatomy of brain and spinal cord, meninges, and cerebrospinal fluid.	2	Emp
CO3	Students will be able to know about the Endocrine System: Anatomy of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal glands.	2	Emp
CO4	Students will be able to study the basic anatomy of special senses.	3	Emp
CO5	Students will be able to study the basic anatomy of Genitourinary organs and reproductive system.	2	Emp

CO-PO Mapping for RD3201

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	2	3	1	2	3	1	2	3	1	2	3	3	1
CO 2	3	2	2	3	1	1	2	1	2	2	2	3	2	2
CO 3	2	2	3	1	2	2	3	2	3	1	2	2	2	1
CO 4	3	2	1	3	3	3	2	3	1	3	2	3	3	1
CO 5	3	1	3	2	2	1	1	2	3	1	2	3	2	2
Avg	**2.8**	**1.8**	**2.4**	**2**	**2**	**2**	**1.8**	**2**	**2.4**	**1.6**	**2**	**2.8**	**2.4**	**1.4**

RD3206	Title:Basics of Human Physiology II	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	This will provide students the ability to integrate physiology from the cellular and molecular level to the organ system and organism level of the organization.	
Unit No.		No. of hours (per Unit)
Unit: I	Nervous System	7
Central nervous system - Brain and spinal cord – structure and function. Cerebrospinal fluid. Peripheral nervous system - cranial and spinal nerves. Autonomic nervous system – parasympathetic and sympathetic system – conduction of nerve impulse, synapse, reflex arc, reflex action. Diseases and Disorders - insomnia, Alzheimer's disease, schizophrenia, hydrocephaly, meningitis.		
Unit II	Sensory Organs	8
Eye – Structure and functions. Physiology of vision. Defects in vision – myopia and hypermetropia, astigmatism. Diseases – Conjunctivitis, trachoma, glaucoma, cataract. Ear – Structure and functions. Deafness, vertigo. Nose – Structure and functions. Sinusitis. Skin – Structure and functions. Dermatitis and burns.		
Unit III	Endocrine System	7
Endocrine secretions, glands, role and regulatory functions of endocrine, site of secretions, regulation of secretions. Disorders related to over and under secretion of hormones.		
Unit IV	ReproductiveSystem	7
Male reproductive system – Structure and functions. Spermatogenesis. Female reproductive system – Structure and functions. Oogenesis. Menstrual cycle, Puberty, Menopause. Fertilization, Development of fertilized ovum (Brief account) – Placenta and its functions – Parturition. Physiology of lactation – Hormonal control in lactation. Abortion, Ectopic pregnancy, multiple pregnancy, artificial insemination, test tube baby - IVF, ETT		
Unit V	Musculoskeletal System	7
Skeletal system – Structure of bone, Functions of the skeletal system. Joints – Types of joints. Muscular system – Functions of the muscles. Muscular contraction. Diseases and disorders - arthritis, osteoporosis, tetany, and muscle fatigue, rigor mortis, myasthenia gravis.		
Textbooks	1. Meyer B J, Mei H S and Meyer A C., Human Physiology, AITBS Publishersand Distributors. 2. Wilson, K.J.W and Waugh, A.: Ross and Wilson, Anatomy and Physiology in Health and Illness, 8th Edition, Churchilllivingstone.	
Reference Books	1. Ranganathan, T.S.: A Textbook of Human Anatomy, Chand & Co. N.Delhi. 2. Jain, A.K.: Textbook of Physiology, Vol. I and II. Avichal Publishing Co., New Delhi. 3. Chatterjee C.C.: Human Physiology, Vol. I & II, Medical Allied Agency,Calcutta. 4.Guyton, A.G. and Hall, J.B.: Textbook of Medical Physiology, (9th Edition,W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for RD3206

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Student should be able to understand about the different mechanism of nervous system in human body	3	Emp
CO2	Student should be able to understand about physiology, structure and function of different sense organs.	2	Emp
CO3	Student should be able to understand about hormones and their role in human body.	1	Emp
CO4	Student should be able to understand about various physiologies of male and female reproductive organs.	1	Emp
CO5	Student should be able to understand about the musculoskeletal system of human body.	2	Emp

CO-PO Mapping for RD3206

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO 3
CO 1	3	2	3	1	2	2	2	1	3	1	2	2	3	1
CO 2	2	2	3	3	3	2	2	1	2	1	2	1	3	2
CO 3	3	2	2	1	3	2	1	1	1	3	3	2	3	1
CO 4	1	2	3	3	2	3	3	2	2	1	3	2	3	1
CO 5	3	2	3	2	2	3	3	2	2	2	3	2	2	3
Avg	**2.4**	**2**	**2.8**	**2**	**2.4**	**2.4**	**2.2**	**1.4**	**2**	**1.6**	**2.6**	**1.8**	**2.8**	**1.6**

BL3201	Title:Basic Hematology & Clinical Pathology I	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn basic of Hematology, Immunohematology as well as Blood bank technologies.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Erythrocyte sedimentation rate, manual andautomatedmethod, factoraffecting ESR, packed cell volume, red cellindices(MCV, MCH, MCHC), Physiological and pathological variations in value		
Unit II		7
Complete blood count, determination by automated method and significanceofeachparameter,Reticulocytecount,routine examination of CSF, semen, sputum, and stool.		
Unit III		6
Mechanism of coagulation, coagulation factors, bleeding time, clotting time, platelet count, protamine sulphate test, clot retraction test		
Unit IV		8
Introduction to immunohematology and blood banking technology, antigen, antibody, complements, ABO & Rh blood group system, method of determination, other blood group system, Donor selection, blood collection, anticoagulants, additivesystems, blood bags, its labeling, storage and transportation		
Unit V		7
Uses, care&maintenanceandcalibrationofCoultercounter, coagulometer,automaticESRanalyzer, urineanalyzer, pointofcare testing. Pre and post analytical variables, automation in hematology		
Textbooks	1. Textbook of Medical lab Technology, Praful B Godkar, IIIrdedition 2. Bookof Medical Lab Technology, RamnikSood,Jaypee Publishers	
Reference Books	3. PracticalHematology, Dacie&Lewis,11th edition 4. 2.https://www.Emjreviews.com/innovations/article/e-learning-in-pathology-education-a-narrative-review-and-personal-perspective	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3201

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand the blood banking techniques & the principle on which these are based.	2	Ent
CO2	Students will be able to understand of basic mechanism of coagulation &its related disorders.	2	Ent
CO3	Students will be able to describeimmune-hematology and blood banking technology.	2	Emp
CO4	Students will be able to apply of technique for routine investigations in clinicalhematology laboratory.	3	Emp
CO5	Students will be able to analyze the cause of disease by examining CSF, Sputum, Semen, Stool	4	Emp

CO-PO Mapping for BL3201

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO1	PSO2	PSO 3
CO 1	2	2	3	3	3	1	2	3	3	3	2	2	3	3
CO 2	3	3	2	3	2	3	3	3	2	2	3	3	3	2
CO 3	1	1	3	3	3	3	3	3	3	3	3	2	3	3
CO 4	3	3	1	1	2	2	2	1	3	3	3	3	3	1
CO 5	1	2	3	3	3	3	2	1	1	1	1	2	1	3
Avg	**2**	**2.2**	**2.4**	**2.6**	**2.6**	**2.4**	**2.4**	**2.2**	**2.4**	**2.4**	**2.4**	**2.4**	**2.6**	**2.4**

BL3202	Title:Fundamentals of Microbiology II	L T P C 3 0 0 3
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective of this course is to learning about various concepts of Microbiology as well as to understand infections and its transmission, sterilization, Segregation, Treatment, Disposal of biomedical waste, specimen collection sites for microbiological investigations.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
General safety measures used in Microbiology laboratory, Sterilization, and disinfection: Various physical methods of sterilization – heat, UV radiation, ionizing radiation, filtration, characters affecting sterilization, auto clave control and sterilization indicators. Biomedical waste management in a Medical Microbiologylaboratory: Types of the waste generated, Segregation, Treatment, Disposal		
Unit II		7
Antiseptics&Disinfectants:Definition,typesandproperties, modeof action, use, qualities of good disinfectants Chemical disinfectants–phenolanditscompounds, alcohol, halogen, heavy metalsandquaternaryammoniumcompounds, aldehyde, gaseous compound.Useandabuseofdisinfectants. Precautions while using the disinfectants.		
Unit III		6
Principle,working,use,care&maintenanceofLaminarairflow, Centrifuge, Autoclave,hotairOven,Incubator,ColonyCounter, Muffle Furnace, Mac-ntos Field-jar etc. Sterility testing of I/v fluids, Collection, transportation, and processing of I/v fluids for bacterial contamination, Recording the result and interpretation		
Unit IV		8
Normal bacterial flora of the body, pathogenic microorganisms Host pathogen interaction: Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Carriers andtheir types, Opportunistic infections, Nosocomial infections. Transmission of infection		
Unit V		7
Hospitalacquired infection, Specimen collectionfrompatients, clinicsandhospitals,Specimencollectionfor epidemiologicalinvestigations, role ofmicrobiologylaboratoryincontrolof nosocomial infection		
Textbooks	1. 1. Ananth Narayan and PanikerC.K.J. (2009) Textbook of Microbiology.8 edition, University Press Publication 2. 2. Brooks G. F., CarrollK.C., Buetel J.S., Morse S.A.andMietzner, T.A.(2013)	
Reference Books	3. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley, and Klein's Microbiology. 9th edition. McGraw Hill Higher Education 4. Goldsby RA, Kinds TJ, Osborne BA. (2007). Koby's Immunology. 6th edition W.H. Freeman and Company, New York. 5. 3.https://openstax.org/details/books/microbiology 6. 4.https://onlinecourses.swayam2.ac.in/cec19_bt11/preview	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3202

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use, for more than one*)
CO1	Students will be able to understand the concept of infections and its transmission.	2	Emp
CO2	Students will be able to understand thetypesandpropertiesofdisinfectantand sterilization.	2	Emp
CO3	Students will be able to describe Segregation, Treatment, Disposal of biomedical waste.	2	Emp
CO4	Students will be able to apply safety measures used in laboratory.	3	Emp
CO5	Students will be able to analyze specimen collection sites for epidemiologicalinvestigations.	4	Emp

CO-PO Mapping for BL3202

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	2	2	2	2	3	3	2	3	2	2	1	3	2
CO 2	2	3	3	3	2	3	1	3	2	3	2	2	2	3
CO 3	1	2	2	3	3	2	3	3	3	2	3	3	3	2
CO 4	3	3	3	3	1	3	3	1	1	2	2	2	2	2
CO 5	3	3	3	2	3	3	1	3	3	1	3	1	3	1
Avg	**2.4**	**2.6**	**2.6**	**2.6**	**2.2**	**2.8**	**2.2**	**2.4**	**2.4**	**2**	**2.4**	**1.8**	**2.6**	**2**

CS3102	Title: Fundamentals of Computer Applications	L 2	T 0	P 0	C 2
Version No.	1.0				
Course Prerequisites	NIL				
Objective	On completion of subject the students will be able to apply, Fundamental of Computers, Architecture of Computer Arithmetic of Computer, Basics of Computer Programming.				
Unit No.		**No. of hours (per Unit)**			
Unit 1	**Architecture of Computer**	4			
What is Computer: Brief History and Evolution Chain, Concept of Hardware, The Inside Computer [Hard Drives (HD), Solid State Drives (SSD), Concept of CPU, Concept Of RAM					
Unit 2	**Arithmetic of Computer**	5			
Number SystEm [Decimal, Binary, Octal, Hexadecimal], Conversions, Binary Arithmetic [Addition, Subtraction, Multiplication, Division, 1s Compliment, 2s Compliment					
Unit 3	**Algorithms & Flow Chart**	5			
Algorithm [What is Algorithm? Algorithm Writing Examples] Flow Chart [What is Flow Chart? Flow Chart Symbols, how to make Flow Chart? Types of Flow Chart, Flow Chart Examples]					
Unit 4	**Basics of DOS**	5			
Disk Operating SystEm: Dos Commands Internal - DIR, MD, CD, RD, COPY, DEL, REN, VOL, DATE, TIME, CLS, PATH, TYPE. External- CHKDSK, XCOPY, PRINT, DISKCOPY, DISCOMP, DOSKEY, TREE, MOVE, LABEL, APPEND, FORMAT, SORT, FDISK, BACKUP, EDIT, MODE, ATTRIB HELP, SYS.					
Unit 5	**Windows Concepts**	5			
Hardware requirements of Windows, Windows, Windows concepts, Calculator, Notepad, Paint, and Windows Explorer: Creating folders and other explorer facilities. Entertainment, CD Player, DVD Player, Media Player, Sound Recorder, Volume Control.					
Textbooks	Computer Fundamentals by P.K. Sinha				
Reference Books	Computer Fundamentals by Anita Goel "Pearson " Google Windows help				
Mode of Evaluation	Internal and External Examinations				
Recommended by Board of Studied on	24/07/2021				
Date of Approval by the Academic Council on	14/11/2021				

Course Outcome for CS3102

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn the architecture of computer.	1	Emp
CO2	Students will be able to study the arithmetic of computer.	2	Emp
CO3	Students will be able to study the algorithms and flow chart of computer.	3	Emp
CO4	Students will be able to study about disk operating study and its Dos commands.	3	Emp
CO5	Students will be able to learn about hardware of windows concepts.	2	Emp

CO-PO Mapping for CS3102

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	1	1	1	2	3	2	1	1	1	1	3	2	1	1
CO 2	2	3	1	2	3	1	1	1	2	1	1	2	2	2
CO 3	2	1	1	1	2	1	1	3	1	3	2	2	1	1
CO 4	2	1	2	3	1	1	1	2	1	1	1	2	3	1
CO 5	2	2	2	2	2	3	1	1	2	2	2	2	1	3
Avg	**1.8**	**1.6**	**1.4**	**2**	**2.2**	**1.6**	**1**	**1.6**	**1.4**	**1.6**	**1.8**	**2**	**1.6**	**1.6**

RD3240	Title: Human Anatomy-II Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The students will have enough knowledge on anatomy of human body which is essential in day-to-day routine as well as special procedures.	
Experiment No.	List of Experiments	
1. Nervous systemfrom models. 2. Structure of eye and ear 3. Structural differences between skeletal, smooth, and cardiac muscles. 4. Various bones 5. Various joints 6. Various parts of male &female reproductive systemfrom models		
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for RD3240

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship (Ent)/None (*Use, for more than one*)
CO1	Students will be able to learn about Nervous system, bones, and joints from models.	1	Emp
CO2	Students will be able to understand about Structure of eye and ear, various parts of male &female reproductive system from model.	2	Emp
CO3	Students will be able to know about Structural differences between skeletal, smooth, and cardiac muscles.	3	Emp

CO-PO Mapping for RD3240

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate-2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	1	2	1	3	1	2	1	1	2	1	3	1	1	1
CO 2	2	3	3	2	2	1	3	2	3	3	2	2	3	2
CO 3	1	2	2	3	1	2	1	2	2	1	3	1	3	3
Avg	**1.3**	**1.6**	**2**	**2.6**	**1.3**	**1.6**	**1.6**	**1.6**	**2.3**	**1.6**	**2.6**	**1.3**	**2.3**	**2**

RD3243	Title: Basics of Human Physiology II Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The students will be able to explain the morphology of human body, tissues and able to count RBC, WBC in blood, heart rate, pulse rate and determine the hemoglobin content of the blood.	
Experiment No.	List of Experiments	

1. Blood count - red blood corpuscles count
2. Blood count - white blood corpuscles count
3. Determination of bleedingtime of blood.
4. Determination of clotting time of blood.
5. Determination of blood groups.
6. Determination of ESR value.
7. Microscopic structure of various glands – Thyroid, pituitary, adrenal
8. Microscopic structure of reproductive organs – Ovary, uterus, mammary gland, testis
9. To demonstrate microscopic structure of bones with permanentslides.
10. To demonstrate microscopic structure of muscles with permanent slides
11. To study about the various wave pattern of ECG
12. Estimation of Hemoglobin by Sahli's Method

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for RD3243

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/ Skill(S)/ Entrepreneurship(Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn the microscopic view of various glands & reproductive organs	2	Emp
CO2	Students should be able to learn the various test related to blood like RBC count, WBC count, coagulation time and blood grouping	3	Emp
CO3	Student should be able to learn about estimation of HB level in human body and to study wave pattern of ECG.	1	Emp

CO-PO Mapping for RD3243

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	2	1	2	2	1	2	1	3	1	1	2	2	1	1
CO 2	1	3	2	3	2	2	3	1	3	2	1	1	2	3
CO 3	2	1	1	2	1	1	1	2	1	1	2	2	1	1
Avg	**1.6**	**1.6**	**1.6**	**2.3**	**1.3**	**1.6**	**1.6**	**2**	**1.6**	**1.3**	**1.6**	**1.6**	**1.3**	**1.6**

BL3240	Title: Basic Hematology& Clinical Pathology II Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn basic and routine Blood Investigations for diagnosis purposes.	
Experiment No.		

1. To perform ESR by Various methods.
2. To perform PCV
3. To determine red cell indices
4. To perform routine stool examination
5. To perform bleeding time
6. To perform clotting time
7. To perform blood grouping by slide method
8. To perform blood grouping by tube method
9. To demonstratecell counter
10. To demonstratecoagulometer

Mode of Evaluation	Internal and External Examinations
Recommendation n by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3240

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn how to perform ESR, PCV & Red Cell Indices.	3	Emp
CO2	Students will be able to perform routine Stool examinations, BT & CT.	2	Emp
CO3	Students will be able to learn about Blood grouping, Coagulometer, & Cell Counter.	3	Emp

CO-PO Mapping for BL3240

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	3	2	2	3	3	2	2	2	1	2	3	3	3
CO 2	2	1	1	3	2	1	3	1	3	3	1	2	2	2
CO 3	3	3	3	2	3	3	2	3	2	2	3	3	3	3
Avg	**2.6**	**2.3**	**2**	**2.3**	**2.6**	**2.3**	**2.3**	**2**	**2.3**	**2**	**2**	**2.6**	**2.6**	**2.6**

BL3241	Title: Fundamentals of Microbiology II Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn basics of Microbiology Lab, Cultures, & Lab Equipment's.	
Experiment No.		
1. To demonstrate techniques for cleaning of glassware. 2. To demonstrate working and maintenance of laminar air flow 3. Preparation of culture media plates andbroth. 4. To demonstrate biomedical waste management 5. To demonstrate hot air oven and sterilization method. 6. To demonstrate the use of disinfectants and preparation of working dilution of various disinfectants. 7. To demonstrate incubator and preservation of cultures. 8. To demonstrate sterilization method by filtration. 9. To perform Radial–Walker phenol coefficient test 10. To perform Kelsey-Sykes test		
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3241

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn Cleaning of glass wares, LAF & preparation of culture medias.	3	Emp
CO2	Students will be able to learn about Biomedical waste, Hot air oven & Disinfectants.	2	Emp
CO3	Students will be able to learn about Sterilization methods, &Various Microbiology testing's.	3	Emp

CO-PO Mapping for BL3241

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	2	3	3	2	2	2	1	2	3	3	3
CO 2	2	1	1	3	2	1	3	1	3	3	1	2	2	2
CO 3	3	3	3	2	3	3	2	3	2	2	3	3	3	3
Avg	**2.6**	**2.3**	**2**	**2.3**	**2.6**	**2.3**	**2.3**	**2**	**2.3**	**2**	**2**	**2.6**	**2.6**	**2.6**

CS3141	Title: Fundamentals of Computer Applications-Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	Identify the basic DOS general purpose commands. Apply and change the ownership and file permissions using DOS commands and Windows exposure.	
Experiment No	List of Experiments	
1. Dos Commands Internal - DIR, MD, CD, RD, 2. Dos Commands Internal COPY, DEL, REN 3. Dos Commands Internal VOL, DATE, TIME 4. Dos Commands Internal CLS, PATH, TYPE 5. Dos Commands External- CHKDSK, XCOPY, PRINT, 6. Dos Commands External- DISKCOPY, DISCOMP, DOSKEY 7. Dos Commands External- TREE, MOVE, LABEL, APPEND 8. Dos Commands External- FORMAT, SORT, FDISK 9. Dos Commands External- BACKUP, EDIT, MODE 10. Dos Commands External- ATTRIB HELP, SYS		
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24-07-2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forCS3141

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn about Dos Commands Internal - DIR, MD, CD, RD,	1	Emp
CO2	Students will be able to learn about Dos Commands Internal COPY, DEL, REN, CHKDSK, XCOPY, PRINT	2	Emp
CO3	Students will be able to learn about Dos Commands Internal VOL, DATE, TIME, CLS, PATH, TYPE	3	Emp

CO-PO Mapping for CS3141

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	1	3	1	1	1	2	1	1	2	1	1	2	2	1
CO 2	2	1	2	3	2	3	1	3	1	3	3	1	1	2
CO 3	1	2	1	1	1	1	2	1	1	1	1	2	1	1
Avg	**1.3**	**2**	**1.3**	**1.6**	**1.3**	**2**	**1.3**	**1.6**	**1.3**	**1.6**	**1.6**	**1.6**	**1.3**	**1.3**

SEMESTER 3 Year -2

BL3301	**Title:Pathology and Allied Subject –I (Hematology& Clinical Pathology)**	**L T P C 4 0 04**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn about Various Disorders, Anemia, Hematological variations, as well as Blood bank Technology.	
Unit No.		**No. of hours (per Unit)**
Unit: I	**Coagulation and Bleeding Disorders**	8
Coagulation; Mechanism of coagulation, coagulation regulation, hyper coagulable state, coagulation disorders Bleeding Disorders:Various types, vascular abnormalities, role of platelet in hEmostasis, platelet disorders, and thrombosis and thrombohEmorrgaic disorders.		
Unit II	**Anemia& Its Classification**	6
AnEmia's: Definition, various types of anaEmia, causes of anEmia, changes in blood morphology due to anEmia.		
Unit III	**Hematological Malignancies**	8
Leukocytosis, neutropenia, & pancytopenia, their causes & significance infectious mononucleosis. HEmatological Malignancies: Various types of malignanciessuch as LeukEmia, Lymphomas, including multiple myeloma. Their identification & Clinical features.		
Unit IV	**Hematological changes**	8
HaEmatological changes in systEmic disorders. Their microscopic picture with identification and clinical features. HEmatological aspects of pediatric and geriatric age groups. HEmatological disorders in pregnancy and their blood picture. HEmatological changes in AIDS . Various parasites in blood and their clinical significance. Lab investigations and methods of identification.		
Unit V	**Blood Bank Technology**	7
Organization, planning and managEment of blood bank. Donor selection and its various aspects. Selection of blood and the guidelines for transfusion practice quality control and safety and basic managEment of blood bank.		
Textbooks	1. 1.Textbook of Medical lab Technology, Praful B Godkar, IIIrdedition 2. 2.Textbookof Medical Lab Technology, RamnikSood,Jaypee Publishers	
Reference Books	3. Practical Hematology, Dacie&Lewis,11th edition 4. 2.https://www.Emjreviews.com/innovations/article/e-learning-in-pathology-education-a-narrative-review-and-personal-perspective	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3301

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about coagulation & Bleeding disorders	2	Emp
CO2	Students will be able to learn different kinds of Anemia's	1	Emp
CO3	Students will be able to understand various Hematological Malignancies	2	Emp
CO4	Students will be able to apply of technique for routine investigations in clinical hematology laboratory.	3	Emp
CO5	Students will be able to describe Blood bank Technology.	2	Emp

CO-PO Mapping for BL3301

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO 1	3	3	2	3	3	3	3	1	3	2	3	3	3	3
CO 2	3	3	3	2	2	2	2	3	2	3	3	2	3	1
CO 3	3	3	3	3	3	3	3	3	3	3	2	3	3	3
CO 4	2	3	1	3	1	2	1	3	1	3	1	1	1	3
CO 5	1	1	3	1	3	1	3	3	3	1	3	3	3	3
Avg	**2.4**	**2.6**	**2.4**	**2.4**	**2.4**	**2.2**	**2.4**	**2.6**	**2.4**	**2.4**	**2.4**	**2.4**	**2.6**	**2.6**

BL3302	Title: Clinical Biochemistry –I (Separative & Instrumental Techniques)	L T P C 4 0 0 4
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The main objective is to be learning about the various Separation techniques by using Different kinds of Equipment's.	
Unit No.		No. of hours (per Unit)
Unit: I	Chromatography & Electrophoresis	8
Chromatography: Thin layer chromatography, gas liquid chromatography, Electrophoresis paper and gel electrophoresis for hEmoglobin, urinary proteins, serum SCF & LDH.		
Unit II	Photometry	8
Photometry Analysis: Colorimetry, Flame photometry, absorption spectroscopy.		
Unit III	Immuno Assay Techniques	7
Immunochemical, Immuno precipitation, Immuno fixation and radial Immuno diffusion tests.		
Unit IV	Bioanalyzers	7
Principle, procedures and applications: Osmometry,Semi autoanalyzer, auto analyzer, diluters & dry chemistry analyzer.		
Unit V	Advance Immuno assay Techniques	7
Principle, procedures and applications of : Coulter Counters, Enzyme Linked immune Assay (ELISA) Reader, Radio Immuno Assay (RIA), Polymerase Chain reaction (PCR).		
Textbooks	1. Vasudevan DM, SreeKumari S, Vaidyanathan K. Textbook of biochemistry for medical students. JP Medical Ltd. 2. Satyanarayana. U, "Biochemistry" 5th Edition; Elsevier	
Reference Books	3. 1 Hames BD, Hooper NM, Hames BD. Instant notes inbiochemistry. Biochemicaleducation. 4. 2. Devlin TM, editor. Textbook of biochemistry: with clinicalcorrelations.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forBL3302

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Student will be able to understand about Chromatography & Electrophoresis.	2	Emp
CO2	Student will be able to learn about Photometry Analysis.	1	Emp
CO3	Student will be able to understand about Immuno Assay techniques.	2	Emp
CO4	Student will be able to Learn about Bioanalyzers.	1	Emp
CO5	Student will be able to understand about Advance Immuno Assay Techniques.	2	Emp

CO-PO Mapping for BL3302

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	3	3	3	3	3	3	3	1	3	3
CO 2	3	2	3	3	2	2	2	3	1	3	2	3	2	2
CO 3	3	3	3	3	2	3	2	2	3	3	2	3	3	1
CO 4	3	1	3	2	3	2	3	3	2	3	3	2	3	3
CO 5	2	3	2	3	2	3	3	2	3	2	3	3	2	3
Avg	**2.8**	**2.4**	**2.8**	**2.8**	**2.4**	**2.6**	**2.6**	**2.6**	**2.4**	**2.8**	**2.6**	**2.4**	**2.6**	**2.4**

BL3303	**Title: Medical Microbiology I (Bacterial Pathogens & associated Diseases)**	**L T P C** **4 0 0 4**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn basic knowledge about Normal Flora, Bacteriology as well as pathogenicity, toxigenicity.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
Normal Micro flora of human body: Skin respiratory system and genitourinary tracts Source of infection, mode of spread and portals of entry		
Unit II		7
Description, pathogenicity, mode of infection, incubationperiod and toxigenicity of: Staphylococcus, Streptococcus,Pneumococcus,Neisseria, Bordetella, Hemophilus.		
Unit III		6
Host parasite interaction in bacterial infections, Pathogenic properties of bacterial colonization of surfaces, invasion of tissue, production of exotoxins and endo toxins). Anti-bacterialdefense of the host. Description,pathogenicity, mode of infection, incubation period and toxigenicity of: Corynebacterial, Erysipelothrix, Listeria., Mycobacteria.		
Unit IV		8
Description,pathogenicity, mode of infection, incubation period and toxigenicity of: Anthrax Bacillus, Yersinia, Pasteurella & Franscisella		
Unit V		7
Physiology & Biochemistry of Bacteria: Protein, Carbohydrate, Lipids, and nucleic acid as antigens.Description ,pathogenicity, mode of infection, incubation, period and toxigenicity of : Salmonella, Shigella, Proteus, Pseudomonas, Loeffler, Vibrio Escherichia coli Clostridia		
Text Books	1.AnanthanarayanR. and PanikerC.K.J. (2009) Textbook of Microbiology.8th edition, University Press Publication	
Reference Books	*1.* Goering R., Dockrell H., Zuckerman M. andWakelinD. (2007) MIMS'MEDICALMICROBIOLOGY. 4THEDITION.ELSEVIER 2. Willey JM, Sherwood LM, and Woolverton CJ.(2013) 3.http://www.ppup.ac.in/e-Content/_edetails.php?id=2017 4.http://ecoursesonline.iasri.res.in/course/view.php?id=108	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forBL3303

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand theories and concepts of microorganisms.	2	Emp
CO2	Students will be able to understand microscope, its components and maintenance	2	Emp
CO3	Students will be able to learn to describe the morphology of eukaryotic and prokaryotic cells.	1	Emp
CO4	Students will be able to apply microscopy to study basic features of microorganisms	3	Emp
CO5	Students will be able to analyze different stains and staining techniques	4	Emp

CO-PO Mapping for BL3303

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	2	2	3	1	3	3	2	3	3	2	3	2	1
CO 2	2	2	3	1	2	3	3	3	2	3	3	1	1	3
CO 3	1	3	2	3	1	3	3	3	3	2	2	3	1	3
CO 4	3	1	1	2	3	2	1	3	3	3	2	2	3	2
CO 5	1	3	2	3	3	1	3	1	1	1	2	3	3	3
Avg	**2**	**2.2**	**2**	**2.4**	**2**	**2.4**	**2.6**	**2.4**	**2.4**	**2.4**	**2.2**	**2.4**	**2**	**2.4**

BL3304	Title: Immunology and Serology Techniques-I	L T P C 4 0 0 4
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn to carry out differential diagnosis of disease by the help of serological techniques.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
Western blotting, Immunodiffusion, Immunoelectrophoretic, Hypersensitivity and its types ofIntroductions to Allergy and its laboratory test		
Unit II		7
Introduction of transplant immunology, graft rejection, tissue typing for kidney and bone marrow transplant, Laboratory test for transplant.		
Unit III		6
Autoimmune disorders, pathogenesis, organ specific and systemic autoimmune disorders and its markers such parietal cell antibody, anti-sperm antibody, lupus anticoagulants, anti-mitochondrial antibody, ANA, ds DNA, HLA-B27, ASMA, anti CCP		
Unit IV		8
Immunological disorders: primary and secondary immunodeficiency, SCID, AIDS, Tumor, types of tumors, Various Tumor Markers, their significance and method of estimation.		
Unit V		7
Vaccines, classification and applications, Active and passive immunization, Immunoprophylaxis schedule in neonates, children and in pregnancy		
Text Books	.Peak man M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg. 6. Richard C and Geffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.	
Reference Books	1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia. 2. Delves P, Martin S, Burton D, Routt IM. (2006). Routt's Essential Immunology.11th edition Wiley Blackwell Scientific Publication, Oxford. 3. Goldsby RA, kind TJ, Osborne BA. (2007). Kubi's Immunology. 6th edition W.H. Freeman and Company, New York. 4. Murphy K, Travers P, Waldport M. (2008). Janeway's Immunobiology.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3304

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand theories and concepts of Immunology Techniques	2	Emp
CO2	Students will be able to understand tissue typing techniques.	2	Emp
CO3	Students will be able to learn various Auto immune Disorders.	1	Emp
CO4	Students will be able to apply Vaccines.	3	Emp
CO5	Students will be able to analyze different types of tumors	4	Emp

CO-PO Mapping for BL3304

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	1	3	2	2	3	2	2	3	3	3	3
CO 2	2	2	2	3	2	2	2	3	2	2	2	2	3	2
CO 3	3	3	3	3	3	3	3	2	3	3	3	3	3	3
CO 4	3	2	1	2	1	2	1	3	2	2	3	3	2	2
CO 5	3	3	3	2	3	2	3	1	2	2	3	2	3	3
Avg	**2.8**	**2.6**	**2.4**	**2.2**	**2.4**	**2.2**	**2.2**	**2.4**	**2.2**	**2.2**	**2.8**	**2.6**	**2.8**	**2.6**

BL3340	Title: Pathology & Allied Subject-I (Hematology& Clinical Pathology) Lab	L T P C 0 0 21
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn about Different Blood Estimations for to Diagnose.	

List of Experiments

1. To perform Hemoglobin by Sahli's Method.
2. Toperform.Hemoglobin by Cyanmethemoglobin Method.
3. To perform Prothrombin time.
4. To perform Platelet count.
5. To perform Bleeding time.
6. Toperform clotting time
7. To perform blood grouping by slide method
8. To perform Leishman's Staining.
9. To demonstrate morphology of blood cells.
10. To demonstrate Coagulometer.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3340

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to perform Hb, platelet count & Prothrombin time.	3	Emp
CO2	Students will be able to learn about BT,CT & Blood grouping.	2	Emp
CO3	Students will be able to perform Leishman staining, Microscopy.	3	Emp

CO-PO Mapping for BL3340

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO3
CO 1	3	3	2	3	1	3	3	3	3	2	2	3	3	2
CO 2	2	3	3	2	2	2	3	2	3	3	3	2	2	2
CO 3	3	2	2	3	3	3	3	3	3	3	2	3	3	3
Avg	**2.6**	**2.6**	**2.3**	**2.6**	**2**	**2.6**	**2.4**	**2.6**	**3**	**2.6**	**2.4**	**2.4**	**2.4**	**2.3**

BL3341	Title: Clinical Biochemistry –I Lab	L T P C 0 0 21
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn about various Biochemical Investigations.	

List of Experiments

1. Demonstration of Colorimetry.
2. Demonstration of Spectroscopy.
3. To perform Glucose by Benedict method.
4. To perform Glucose by Fehling's Method.
5. To perform Protein by Heat coagulation Method.
6. To perform Ketone Bodies by Rothera's Method.
7. To perform Bile Salts by Hay's Sulphur Powder test.
8. Identification of Carbohydrates By Molisch's Test.
9. To Determine Occult Blood by Benzidine Powder Method.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3341

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn about Qualitative testing's	2	Emp
CO2	Students should be able to learn about Photometry	2	Emp
CO3	Students should be able to Identify Carbohydrates	4	Emp

CO-PO Mapping for BL3341

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO3
CO 1	3	3	2	3	2	3	3	3	2	2	3	3	3	3
CO 2	2	2	2	2	3	2	2	2	1	3	3	1	2	3
CO 3	3	3	3	3	3	3	3	3	3	2	3	3	3	3
Avg	**2.6**	**2.6**	**2.3**	**2.6**	**2.6**	**2.6**	**2.6**	**2.6**	**2**	**2.3**	**3**	**2.3**	**2.6**	**3**

BL3342	Title: Medical Microbiology- I Lab	L T P C 0 0 21
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn about various Microbiological Investigations.	

List of Experiments

1. To demonstrate Laminar air flow.
2. To demonstrate working and handling of Microscope.
3. To perform Sterilization by using Autoclave.
4. To perform sterilization by Hot air oven.
5. To prepare Nutrient Agar media.
6. To prepare Nutrient Agar Slant.
7. To perform Negative staining.
8. To perform ALBERT'S Staining.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3342

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn about LAF, Microscopy & Autoclaving.	2	Emp
CO2	Students should be able to perform sterilization, Culture media.	3	Emp
CO3	Students should be able to perform Staining procedures.	3	Emp

CO-PO Mapping for BL3342

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	3	2	3	3	3	2	2	3	3	3	3
CO 2	2	2	3	1	3	2	1	1	3	3	1	1	2	3
CO 3	3	3	2	3	3	3	3	3	3	1	3	3	3	3
Avg	**2.6**	**2.6**	**2.3**	**2.3**	**2.6**	**2.6**	**2.3**	**2.3**	**2.6**	**2**	**2.3**	**2.3**	**2.6**	**3**

BL3343	Title: Immunology and Serology Techniques-I Lab	L T P C 0 0 21
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn about various Immunological Estimations.	

List of Experiments

1. To perform HIV Tridot test.
2. To perform radial immunodiffusion test.
3. To perform immunoprecipitation method.
4. To perform HBsAg rapid test.
5. To perform ASO test
6. To perform ELISA test.
7. To perform TB IgG & IgM test
8. To perform Dengue IgG & IgM test
9. To perform typhi dot test.
10. Introduction of Allergy panel
11. Mantoux test

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3343

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to perform HIVTridot test, RIA, Immunoprecipitation, HBsAg rapid test.	3	Emp
CO2	Students should be able to perform ASO test, ELISA, TB IgG & IgM test, and Dengue IgG & IgM test	3	Emp
CO3	Students should be able to learn Typhi dot test, Allergy panel, &. Mantoux test	2	Emp

CO-PO Mapping for BL3343

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	3	2	3	3	3	2	2	3	3	3	3
CO 2	2	2	2	1	3	2	1	1	2	3	1	1	2	3
CO 3	3	3	3	3	3	3	3	3	3	2	3	3	3	3
Avg	**2.6**	**2.6**	**2.3**	**2.3**	**2.6**	**2.6**	**2.3**	**2.3**	**2.3**	**2.3**	**2.4**	**2.2**	**2.4**	**2.2**

SEMESTER 4 Year -2

BL3401	**Title: Pathology and Allied Subject –II (Histopathology and Cytology Techniques)**	**L T P C** **4 0 0 4**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The main objective is too aware the student about Histopathology Specific Procedures.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
Reception recording and labeling of histology specimen. Fixation and various fixatives. Processing of histological tissues for paraffin Embedding. Embedding-various methods.Microtomes-various tytpes of theeir working principle and maintenance.		
Unit II		6
Section cutting-faults and rEmedies. Microtome knives and knife sharpening. Dye chEmistry theory and practice -of staining.		
Unit III		8
Routine staining procedures H&E mounting and mounting media. Solvents mordents accelerations and accentuators.		
Unit IV		8
Uses of controls in various staining procedures.Special staining procedures for connective tissues carbohydrates amyloids and pigments.		
Unit V		7
Meta chromasia and meta chromatic dyes.Museum techniques.		
Text Books	1. Textbook of Medical lab Technology, Praful B Godkar, IIIrdedition 2. Textbook of Medical Lab Technology, RamnikSood,Jaypee Publishers	
Reference Books	3. PracticalHematology, Dacie&Lewis,11th edition 4. 2.https://www.Emjreviews.com/innovations/article/e-learning-in-pathology-education-a-narrative-review-and-personal-perspective	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forBL3401

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about Histology of Specimens.	2	Emp
CO2	Students will be able to learn different Procedures of Tissue Staining.	2	Emp
CO3	Students will be able to understand Histological tissue processing procedures	2	Emp
CO4	Students will be able to understand Microtomes.	2	Emp
CO5	Students will be able to describe Dyes used in Cytology procedures.	3	Emp

CO-PO Mapping for BL3401

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	3	3	3	2	3	3	2	1	3	2	3
CO 2	2	3	3	2	3	2	2	2	2	3	2	3	3	3
CO 3	3	2	2	3	3	3	3	3	3	2	3	3	2	2
CO 4	2	3	3	2	2	3	3	2	2	3	3	2	3	3
CO 5	3	1	1	3	1	2	2	3	3	2	3	3	3	1
Avg	2.6	2.4	2.2	2.6	2.4	2.6	2.4	2.6	2.6	2.4	2.4	2.8	2.6	2.4

BL3402	Title: Clinical Biochemistry –II (Metabolic and Blood Biochemistry)	L T P C 4 0 0 4
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to aware students about that in Biochemistry why we have to perform many estimation from Patients Blood (Serum) after learning the importance of Metabolic Biochemistry.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
Carbohydrate metabolism,glycolysis,TCA and their clinical importance, Glucose Tolerance Test (GTT).		
Unit II		8
Protein Metabolism- urea cycle and its biomedical significance .Lipid metabolism-Beta oxidation of fatty acids, ketonebodies, metabolic changes in liver and adipose tissues during starvation , lipid profile.		
Unit III		8
Principle, assay procedures and clinical significance of following: Glucose, Proteins, AIG, Urea, BUN, Uric acid, Creatinine, Cholesterol, Bilirubin(Direct & Indirect). Electrolytes: Quantitative estimation of sodium, potassium, calcium, chloride, lithium, phosphorous, magnesium, and their clinical significance.		
Unit IV		7
Acid base balance test, Xylose Absorption test and insulin tolerance test, Urea and creatinine clearance test and their significance. Renal function tests and their clinical interpretation.		
Unit V		6
Principle techniques and clinical significance: Glycosylated Hb (HbA1C), Liver function tests.		
Textbooks	1. Vasudevan DM, Sreekumar S, Vaidyanathan K. Textbook of biochemistry for medical students. JP Medical Ltd. 2. Satyanarayana. U, "Biochemistry" 5th Edition; Elsevier	
Reference Books	1. Hames BD, Hooper NM, Hames BD. Instant notes in biochemistry. Biochemical education. 2. Devlin TM, editor. Textbook of biochemistry: with clinical correlations.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3402

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students may be able to learn about Carbohydrate metabolism.	1	Emp
CO2	Students may be able to learn about Protein metabolism.	1	Emp
CO3	Students may be able to understand about Principal assay procedures of various Biochemistry parameters.	2	Emp
CO4	Students may be able to learn about Advance testing proceduresin MetabolicBiochemistry	2	Emp
CO5	Students may be able to learn about HbA1C, LFT.	2	Emp

CO-PO Mapping for BL3402

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	3	1	3	3	2	3	2	3	3	3	2	3	3
CO 2	3	2	2	2	3	2	2	3	2	2	3	3	2	1
CO 3	2	3	3	3	2	2	3	3	3	3	3	1	3	3
CO 4	3	3	3	1	2	3	2	3	1	2	2	2	1	2
CO 5	2	3	2	3	3	3	1	2	3	3	1	2	3	3
Avg	2.6	2.8	2.2	2.4	2.6	2.4	2.2	2.6	2.4	2.6	2.4	2	2.4	2.4

BL3403	Title: Medical Microbiology II (Technical Methods in MedicalMicrobiology)	L T P C 4 0 0 4
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn about lab diagnosis, culture media, Isolation	
Unit No.		**No. of hours (per Unit)**
Unit I		8
The role of laboratory in the diagnosis and control of infections: Management and quality control of medical microbiology laboratory. A) Specimen Collection from patients, clinics and hospitals.b) Specimen collection for epidemiological investigations.Training of medical microbiologist to handle epidemics.Morphology, Staining, Cultural Character of Bacteria, Selective cultural media, Identification by special tests, Biochemical reactions and sero-typing of:a) Grams positive cocci: Cluster forming, chain forming b) Neisseria, Bordetella and Hemophilus. Pathogenesis and pathology of infectious caused by 2 (a) and (b).		
Unit II		7
Isolation of pure culture and its preservation. Morphology, Staining, Culture character, Selective cultural media, Identification by special tests, Biochemical reactions and Sero typing of:Corynebacterium, Mycobacterium, Atypical Mycobacterium		
Unit III		6
Morphology, Staining, Culture character, Selective cultural media, Identification by special tests, Biochemical reactions and Sero typing of:Anthrax bacillus, Brucella, Yersinia and Pasteurella. Pathogenesis and pathology		
Unit IV		8
Microbial drug sensitivity test and its clinical interpretation. Morphology, staining, Cultural character, Selective cultural media, Identification by special tests, Biochemical reactions and serotyping of-Salmonella, Shigella, Proteus.		
Unit V		7
Morphology, staining, Cultural character, Selective cultural media, Identification by special tests, Biochemical reactions and serotyping of-Pseudomonas, Vibrio, Escherichia coli, Clostridia. Pathogenesis and pathology.		
Text Books	1. AnanthanarayanR. and PanikerC.K.J. (2009) Textbook ofMicrobiology.8th edition, University Press Publication	
Reference Books	1. Goering R., Dockrell H., Zuckerman M. andWakelinD. (2007)MIMS'MEDICALMICROBIOLOGY. 4THEDITION.ELSEVIER 2. Willey JM, Sherwood LM, and Woolverton CJ.(2013) 3. http://www.ppup.ac.in/e-Content/_edetails.php?id=2017 4. http://ecoursesonline.iasri.res.in/course/view.php?id=108	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forBL3403

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand theories and concepts of microorganisms	2	Emp
CO2	Students will be able to understand microscope, its components and maintenance.	2	Emp
CO3	Students will be able to learn to describe the morphology of eukaryotic and prokaryotic cells.	1	Emp
CO4	Students will be able to apply microscopy to study basic features of microorganisms.	3	Emp
CO5	Students will be able to analyze different stains and staining techniques	4	Emp

CO-PO Mapping for BL3403

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	3	2	2	1	3	3	2	2	3	2	2	3	2
CO 2	2	2	3	3	2	2	2	3	2	2	3	3	2	3
CO 3	3	1	3	2	3	3	3	2	3	3	3	3	1	2
CO 4	1	3	2	3	3	3	3	3	2	3	3	3	2	3
CO 5	3	2	3	2	3	1	2	3	3	3	2	2	2	3
Avg	2.4	2.2	2.6	2.4	2.4	2.4	2.6	2.6	2.4	2.8	2.6	2.6	2	2.6

BL3404	Title: Immunology and Serology Techniques-II	L T P C 4 0 0 4
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on that the students will learn scientific approaches/techniques that are used to investigate various diseases.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Historical background, general concepts of the immune system, innate and adaptive immunity; active and passive immunity; primary and secondary immune response. Cell and organs of immune system, Phagocytosis		
Unit II		7
Antigens and hatpins:Properties, foreignness, molecular size, heterogeneity, B and T cell epitopes; T dependent and T independent antigens. Antibodies: Historical perspective of antibody structure; structure, function and properties of the antibodies; different classes, subclasses and biological activities of antibodies; concepts of antibody diversity, isotype, allotype, Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody		
Unit III		6
Mechanism of humoral and cell mediated immune response. Introduction of Major Histocompatibility Complex, organization of MHC and inheritance in humans; Antigen presenting cells, antigen processing and presentation Complementsystem and complement fixation test.		
Unit IV		8
Laboratory tests for demonstration of antigen – antibody reaction such as agglutination, precipitation, ELISA, RIA, Immunofluorescence.		
Unit V		7
Rheumatological diseases, etiology and pathogenesis and lab investigations		
Textbooks	1 Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia. 2. Delves P, Martin S, Burton D, Routt IM. (2006). Routt's Essential Immunology.11th edition Wiley Blackwell Scientific Publication, Oxford.	
Reference Books	Goldsby RA, kind TJ, Osborne BA. (2007). Kubi's Immunology. 6th edition W.H. Freeman and Company, New York. 4. Murphy K, Travers p	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3404

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand Immune system.	2	Emp
CO2	Students will be able to understand Antigens and Antibody	2	Emp
CO3	Students will be able to learn to Body Immune Responses	2	Emp
CO4	Students will be able to apply Laboratory serology tests.	3	Emp
CO5	Students will be able to learn different rheumatological diseases	1	Emp

CO-PO Mapping for BL3404

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	2	2	1	1	2	3	1	3	2	3	3	2	3
CO 2	2	3	3	3	1	1	3	3	1	3	2	2	2	1
CO 3	3	2	1	2	3	3	3	2	3	3	3	3	3	3
CO 4	1	3	3	3	2	2	2	3	2	2	2	2	2	2
CO 5	3	1	2	1	3	3	2	2	3	2	3	3	3	3
Avg	2.4	2.2	2.2	2	2	2.2	2.6	2.2	2.4	2.4	2.6	2.6	2.4	2.4

BL3440	Title: Pathology & Allied Subject-II (Histopathology & Cytology Techniques) Lab	L T P C 0 0 21
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on Histopathology Procedures.	

List of Experiments

1. 1. To Demonstrate Microtome.
2. To Demonstrate handling of tissue specimens.
3. To Describe Tissue Processing.
4. To perform Tissue grossing.
5. To perform Tissue Embedding.
6. To perform Tissue H&E Staining
7. To perform PAP Staining.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome forBL3440

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn about Microtome, Tissue processing & handling of tissue specimens.	2	Emp
CO2	Students will be able to learn about Tissue grossing &embedding.	2	Emp
CO3	Students will be able to perform H&E staining and PAP staining.	3	Emp

CO-PO Mapping for BL3440

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	1	3	3	3	1	2	1	3	3	3	2	2	3
CO 2	1	3	3	3	3	3	2	3	2	3	2	3	3	2
CO 3	3	2	2	1	1	3	3	2	3	2	3	1	1	3
Avg	2.3	2	2.4	2.4	2.6	2.4	2	2	2.4	2.4	2.4	2.2	2.2	2.4

BL3441	Title: Clinical Biochemistry –II Lab	L T P C 0 0 2 1
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on learning about various Biochemistry parameters Estimations.	

List of Experiments

1 Demonstration of Bioanalyzer.
2 To perform Serum Glucose by GOD-POD Method.
3 To perform Serum Protein.
4 To perform Serum uric acid.
5 To perform Serum Urea.
6 To perform Ketone Bodies by Ring method.
7 To perform Serum Calcium.
8 To perform Serum protein

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3441

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to perform Glucose, Uric acid proteins.	3	Emp
CO2	Students should be able to perform urea, Ketone bodies.	3	Emp
CO3	Students should be able to perform Calcium, Serum protein.	3	Emp

CO-PO Mapping for BL3441

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO3
CO 1	3	1	2	3	2	3	2	3	3	3	3	1	3	3
CO 2	1	3	3	2	3	3	2	2	2	3	1	3	2	2
CO 3	3	2	3	2	3	2	3	3	3	2	3	2	3	3
Avg	2.3	2	2.6	2.3	2.6	2.6	2.3	2.6	2.4	2.4	2.4	2.4	2.6	2.4

BL3442	Title Medical Microbiology II Lab	L T P C 0 0 21
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on learning about Microscopy, Culture medias, as well as staining procedures.	

List of Experiments

1. To demonstrate Hot air oven.
2. To demonstrate working and handling of Microscope.
3. To perform Sterilization by using Autoclave.
4. To perform catalase test.
5. To prepare Blood agar media.
6. To prepare Chocolate agar media.
7. To perform ASO Titre.
8. To perform Gram staining.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3442

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to learn about Hot air oven Microscopy and Autoclaving.	2	Emp
CO2	Students should be able to perform catalase test as well as prepare Blood agar media & Chocolate agar media.	3	Emp
CO3	Students should be able to perform ASO titre and gram staining.	3	Emp

CO-PO Mapping for BL3442

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	3	2	3	2	3	3	3	3	1	3	3
CO 2	1	3	3	2	3	3	2	1	2	3	2	3	1	2
CO 3	3	2	2	3	1	2	3	3	3	2	3	2	3	3
Avg	2.3	2.6	2.3	2.6	2	2.6	2.3	2.4	2.4	2.4	2.6	2.4	2.4	2.4

BL3443	Title Immunology and Serology Techniques-II Lab	L T P C 0 0 21
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on learning about various staining as well as testing procedures under Immunology & Serology.	
List of Experiments		
1.To perform Gram staining 2 To perform Acid fast staining (ZeihlNeelsen staining) 3. To perform Indian ink staining 4. To perform Hanging drop method 5. Demonstration of capsule 6. Staining of bacterial spores 7. To demonstrate agglutination reaction 8. To perform RA test 9. To perform WIDAL test 10. To perform RPR test. 11. To perform CRP test.		
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3443

Unit-wise Course Outcome	Descriptions	BL Level	Employability (EmpSkill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students should be able to perform Gram staining, AFB India Ink & Hanging drop method.	3	Emp
CO2	Students should be able to learn capsule, Bacterial spores & Agglutination reactions.	2	Emp
CO3	Students should be able to perform RA, WIDAL, RPR& CRP tests.	3	Emp

CO-PO Mapping for BL3443

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO3
CO 1	3	1	2	3	2	3	2	3	3	3	3	1	3	3
CO 2	1	3	3	2	3	3	2	1	2	3	1	3	2	2
CO 3	3	2	1	2	1	2	3	3	3	2	3	2	3	3
Avg	2.3	2	2	2.3	2	2.6	2.3	2.3	2.4	2.4	2.4	2.4	2.6	2.4

SEMESTER 5 Year -3

BL3501	**Title: Immunohematology & Blood bank Technology**	**L T P C** **4 0 0 4**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	Students would understand the basics of transfusion medicine, laboratory testing, quality control and apheresis techniques.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Basic Principles of Blood Banking, Antigen, Antibody, naturally occurring antibody, Complement, ABO & Rh blood group system, Methods of blood group determination, Forward and Reverse grouping, Slide & Tube method, Gel method,		
Unit II		7
Other blood group system such as Lewis, MNS, Kell Duffy etc. Anticoagulants and preservative used in blood bank Donor selection criteria, Blood collection and processing		
Unit III		6
Transfusion transmissible infectious disease screen, Combest, Cross matching, Compatibility testing, Antibody Screening & Identification, Grading of Reaction/Agglutination		
Unit IV		8
Blood components and its preparation, preservation, storage and transportation Indications for different blood component transfusion, Blood transfusion reaction and its type, HDN Introduction of stem cell banking and bone marrow transplantation.		
Unit V		8
Apheresis, indications of hem apheresis, plasmapheresis, plateletpheresis, plasmapheresis Quality control of reagents, equipment, blood components used in transfusion medicine. Role of NACO, Indian Red Cross Society, DGHS and blood transfusion services.		
Textbooks	1. Godkar.B. Praful,(2016) Textbook of MLT,3rd edition, Bharani Publications 2. Ochei J & Kolhatkar A(2000),Medical Laboratory Science: Theory & Practice, 3rd edition, McGraw Hill Education 3. Mukherjee. L.K(2017), Medical Laboratory Technology,Vol.1-3,3rd edition, Tata McGraw Hill	
Reference Books	Sood Ramnik,(2015), Text book of Medical Laboratory Technology,2nd edition, Jaypee Publications	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3501

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand Blood bank	2	Emp
CO2	Students will be able to understand Antigens and Antibody	2	Emp
CO3	Students will be able to learn to Body Immune Responses	1	Emp
CO4	Students will be able to apply Laboratory serology tests.	3	Emp
CO5	Students will be able to learn Blood Components.	1	Emp

CO-PO Mapping for BL3501

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	2	3	3	2	2	2	3	3	2	3
CO 2	2	2	2	3	3	2	3	2	3	3	1	3	1	2
CO 3	3	3	2	3	1	3	2	2	2	3	3	3	2	2
CO 4	3	1	3	3	2	2	3	3	3	3	3	2	3	3
CO 5	2	3	2	2	2	1	2	2	2	3	2	3	2	2
Avg	2.6	2.4	2.4	2.8	2	2.2	2.6	2.2	2.4	2.8	2.4	2.8	2	2.4

BL3502	Title: Clinical Biochemistry –I (Biostatics, Automation & Endocrinology)	L T P C 4 0 0 4
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn about the Biostatics, Quality control, Automation, Toxicology, &Endocrinology Screening in Biochemistry so that it is easy to diagnose many abnormalities if we know the causes behind that.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
Basic bio-statics for clinical quality control. Standard deviation, Standard error, Coefficient of variation, normal distribution, t-test and chi-square test.		
Unit II		8
Establishment and maintenance of quality control for laboratory tests based upon medical usefulness. Terminology of quality control and quality control charts.		
Unit III		8
Normal ranges of various bio-metabolites and their confidence limits.Automation: Handling of automatic analyzers, organization, and management of hospital laboratory.		
Unit IV		7
Toxicology:Alcohol, heavy metals (Zinc, Hg etc.) salicylate, drug abuse, screening and drug interference with laboratory findings.		
Unit V		6
Endocrinology: Estimation of growth hormone, ACTH, sex hormone binding globulin, aldosterone, parathormone, cortisol and 17-hydroxyprogestron and their clinical significance.		
Textbooks	1. Vasudevan DM, Sreekumar S, Vaidyanathan K. Textbook of biochemistry for medical students. JP Medical Ltd. 2. Satyanarayana. U, "Biochemistry" 5th Edition; Elsevier	
Reference Books	1. Hames BD, Hooper NM, Hames BD. Instant notes in biochemistry. Biochemical education. 2. Devlin TM, editor. Textbook of biochemistry: with clinical correlations.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3502

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about biostatistics	2	Emp
CO2	Students will be able to learn quality control	1	Emp
CO3	Students will be able to understand automation in biochemistry.	2	Emp
CO4	Students will be able to apply normal values of various biometabolites	3	Emp
CO5	Students will be able to describe toxicology and endocrinology	2	Emp

CO-PO Mapping for BL3502

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	2	3	3	3	3	3	3	2	3	3	2	3	3	3
CO 2	3	2	3	2	1	2	1	3	2	3	2	3	2	3
CO 3	2	3	2	3	3	3	3	2	3	2	3	3	3	3
CO 4	3	1	3	1	2	2	2	3	2	3	1	2	2	2
CO 5	3	3	1	3	3	3	3	3	3	3	3	3	3	3
Avg	2.6	2.4	2.4	2.4	2.4	2.6	2.4	2.6	2.6	2.8	2.2	2.8	2.6	2.8

BL3503	Title: Medical Microbiology-I(Pathogenic Viruses and Miscellaneous Microbes)	L T P C 4 0 0 4
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn Bacteriology, Virology as well as cell culturing.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Misc. Microbes: Actinomycetes, Nocardia, Donovan, Treponema, Chlamydia, rickettsia, Mycoplasma and Pathogenic fungi, Pathogenesis, Pathology and Lab diagnosis. Pox Viruses: Smallpox, Vaccinia, Molluscum Contagiosum.Herpes Viruses'Simplex, Chickenpox Zoster, CMV, IMN, and Burkitt's Lymphomas		
Unit II		8
Adenoviruses: Pharyngeal infections, Respiratory infections, and Conjunctival infections.Orthomyxoviruses (Influenza types A, BCetc.): Influenza.Paramyxovirus: Respiratory infections, mumps, and measles.		
Unit III		6
Miscellaneous Viruses: Rubella, Corona warrens Viruses Rubella common cold lymphocytic choriomeningitis.Picorna Viruses:EnterViruses, Poliomyelitis aseptic meningitis, andepidemic myalgia, Rhinoviruses: Common cold.		
Unit IV		8
Hepatitis viruses: Infections and serum hepatitis. Arbo viruses: Encephalitis yellow fever, Dengue fever.Rhabdo viruses: Rabies.		
Unit V		7
Slow and oncogenic viruses:Scrapie kuru and animal virus tumors.Cell culture and observation of effect of viruses on cell: Technique, procedure and interpretation of results.		
Text Books	1. Ananth NarayanR. and PanikerC.K.J. (2009) Textbook of 2. Microbiology.8th edition, University Press Publication	
Reference Books	1. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) MIMS'MEDICALMICROBIOLOGY. 4THEDITION.ELSEVIER 2. Willey JM, Sherwood LM, and Woolverton CJ.(2013) 3. http://www.ppup.ac.in/e-Content/_edetails.php?id=2017 4. http://ecoursesonline.iasri.res.in/course/view.php?id=108	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3503

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand theories and concepts of microorganisms	2	Emp
CO2	Students will be able to understand microscope, its components and maintenance	2	Emp
CO3	Students will be able to learn to describe the morphology of viruses	1	Emp
CO4	Students will be able to apply microscopy to study basic features of viruses	3	Emp
CO5	Students will be able to identify different viruses.	4	Emp

CO-PO Mapping for BL3503

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	2	2	3	2	3	1	2	3	3	3	3	3	3	2
CO 2	3	3	2	2	2	3	3	2	3	3	2	2	2	2
CO 3	3	2	3	3	1	3	3	3	2	2	3	3	3	3
CO 4	2	3	2	2	3	2	1	2	3	2	2	1	2	2
CO 5	3	2	3	3	3	3	3	3	2	3	3	3	3	3
Avg	2.6	2.4	2.6	2.4	2.4	2.2	2.4	2.6	2.6	2.6	2.6	2.4	2.6	2.4

BL3504	Title: Clinical Biochemistry –II (Diagnostic Enzymology)	L T P C 4 0 0 4
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn about the Variety of Enzymes with their diagnostic values.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Principles of enzyme activity determination. Units of expressing enzyme activity. Factors affecting enzyme activity. Mechanism responsible for abnormal enzyme levels. Isoenzymes: serum CPK, CK-MB, LDH, SGOT(AST), SGPT(ALT), cholinesterase,HBDH, amylase,alpha amylase, lipase, aldolase, and myoglobin.		
Unit II		8
Serum leucine,amino peptidase, alkaline and acid phosphatases,Fructosamine test in semen. Analysis of renal biliary and prostatic stones, test for fetal well-being by amniotic fluids.Analysis of alpha foeto protein and lactogen and their clinical significance.		
Unit III		8
Gastric analysis, free and total acidity, Penta gastrin test, Histamine, and caffeine stimulation		
Unit IV		7
Thyroid function test: T3,T4 and TSH,free T3 free T4, protein bound iodine (PBI).Thyroglobulin, LATES.		
Unit V		6
Infertility profile: TSH, FSH,LH, testosterone, estrogen, prolactin, DHEAA sulphate		
Textbooks	1. Vasudevan DM, Sreekumar S, Vaidyanathan K. Textbook of biochemistry for medical students. JP Medical Ltd. 2. Satyanarayana. U, "Biochemistry" 5th Edition; Elsevier	
Reference Books	3. Hames BD, Hooper NM, Hames BD. Instant notes in biochemistry. Biochemical Educa Devlin TM, editor. Textbook of biochemistry: with clinical correlations.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3504

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about enzyme activities.	2	Emp
CO2	Students will be able to learn different kinds of isoenzymes.	1	Emp
CO3	Students will be able to understand various kinds of Lithiasis.	2	Emp
CO4	Students will be able to apply of technique for gastric analysis.	3	Emp
CO5	Students will be able to describe thyroid function test as well as Infertility profile.	2	Emp

CO-PO Mapping for BL3504

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	2	3	3	3	3	3	3	3	3	3	2	3	2	3
CO 2	3	3	3	2	3	3	3	3	2	3	3	3	3	2
CO 3	3	3	3	3	3	2	3	3	3	3	2	2	3	3
CO 4	3	3	3	2	3	3	3	2	2	3	3	3	3	3
CO 5	2	2	2	3	3	3	2	3	3	2	3	2	3	2
Avg	2.6	2.8	2.8	2.6	3	2.8	2.8	2.8	2.6	2.8	2.6	2.6	2.8	2.6

BL3505	Title: Diagnostic Cytology	L T P C 4 0 0 4
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to learn about the Cellular Structures as well as their Activities by understanding staining procedures we could identify the morphology of abnormal cells easily.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Cell: basic structure and function, cell organelles, cell cycle, Benign and Malignant tumors, Instruments used in cytology, preparation of buffers, stains Microscopy: Light, compound, phase contrast, fluorescence.		
Unit II		8
Instruments and equipment used in cytology Fixation and Fixatives used in cytology, Adhesive and mounting media, Cell block and cytosine technique, Staining such as PAP, Diff-quick, MGG, H&E, Shor staining, significance of PAP-HPV, Distaining and restaining of slides, Cover slipping		
Unit III		8
Aspiration and exfoliative cytology, Patient preparation, Sample collection, Fixation, Processing andStaining FNAC, collection, processing of sample and staining, on site quick staining procedure		
Unit IV		7
Pap staining, Progressive & Regressive, Hormonal cytology in different age groups, Collection and processing of sputum, BAL, CSF, Pleural, peritoneal, and pericardial fluid, Gynecologic sample		
Unit V		6
Sex chromatin demonstration, Introduction of Immunocytochemistry, different markers and its applications, Automation in cytology, Liquid based preparation & automated screening device		
Textbooks	1. Vasudevan DM, Sreekumar S, Vaidyanathan K. Textbook of biochemistry for medical students. JP Medical Ltd. 2. Satyanarayana. U, "Biochemistry" 5th Edition; Elsevier	
Reference Books	1. Hames BD, Hooper NM, Hames BD. Instant notes in biochemistry. Biochemical Educa Devlin TM, editor. Textbook of biochemistry: with clinical correlations.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3505

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about cell.	2	Emp
CO2	Students will be able to learn different kinds of instruments.	1	Emp
CO3	Students will be able to understand various kinds of cytology techniques.	2	Emp
CO4	Students will be able to apply of technique staining's in cytology.	3	Emp
CO5	Students will be able to describe FNAC.	2	Emp

CO-PO Mapping for BL3505

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO3
CO 1	2	3	3	3	3	3	3	3	3	1	2	1	2	3
CO 2	3	1	1	2	3	1	1	1	2	1	3	3	3	2
CO 3	1	3	3	3	3	2	1	3	3	1	2	2	3	3
CO 4	3	3	1	2	3	3	3	2	2	3	3	3	3	3
CO 5	2	2	2	3	3	1	1	3	3	1	3	2	3	2
Avg	2.2	2.4	2	2.6	3	2	1.8	2.4	2.6	1.4	2.6	2.2	2.8	2.6

BL3540	Title: Immunohematology & Blood bank Technology Lab	L T P C 0 0 2 1
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on Immunology & Blood banking Investigations.	

List of Experiments

1. Demonstration of apparatus and equipment used in blood banking.
2. To prepare different percent of cell suspension.
3. To perform ABO & Rh blood grouping by slide and tube method.
4. To perform forward & reverse grouping.
5. To perform Cross match.
6. To perform Comb's test.
7. To perform Rh titre
8. To perform Transfusion transmissible marker.
9. Preparation of various blood components and their quality control

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3540

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to learn aboutEquipment's, Cell suspension, & Blood grouping.	2	Emp
CO2	Students will be able to perform Reverse grouping, cross match &Comb's test,	3	Emp
CO3	Students will be able to perform Rh titre, transfusible marker & preparation of various Blood components in Blood bank.	3	Emp

CO-PO Mapping for BL3540

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate-2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	1	2	3	1	3	3	3	3	3	3	2
CO 2	2	3	2	3	2	3	3	3	3	2	3	3	2	2
CO 3	3	1	3	2	3	2	3	2	3	2	3	2	3	2
Avg	2.6	2	2.3	2	2.3	2.6	2.3	2.6	3	2.3	3	2.6	2.6	2

BL3541	Title: Clinical Biochemistry –I(Clinical Enzymology and Automation)Lab	L T P C 0 0 2 1
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on performing various Lab testing procedures in Clinical Biochemistry those parametersinvolves having diagnostic Significance.	

List of Experiments

1. To perform enzyme estimation of LFT
2. To perform enzyme estimation of Cardiac profile
3. Determination of Troponin I
4. To perform enzyme estimation of KFT.
5. To perform protein.
7. Estimation of Glucose.
8. Arterial blood gas analysis
9. Determination of Calcium
10. Creatinine and urea clearance test

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3541

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students may be able to perform LFT, Troponin I & Cardiac profile.	3	Emp
CO2	Students may be able to perform KFT, Protein & Glucose	3	Emp
CO3	Students may be able to perform ABG, Calcium & Urea clearance test.	3	Emp

CO-PO Mapping for BL3541

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	3	2	3	2	3	2	3	3	3	3	2
CO 2	2	3	2	3	2	3	3	3	3	2	3	3	2	3
CO 3	3	2	3	2	3	2	3	2	2	2	3	2	3	2
Avg	2.6	2.3	2.3	2.6	2.3	2.6	2.6	2.6	2.3	2.3	3	2.6	2.6	2.3

BL3542	Title: Medical Microbiology- I Lab	L T P C 0 0 2 1
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea on Culture media, Antibiotic sensitivity Test as well as Biochemical so that we could identify the Microbes.	

List of Experiments

1 Collection and processing of various specimens such as urine, blood for culture
2. Preparation of culture media- Nutrient agar, Mac conkeyagar, Blood agar media and Chocolate agar
3. Demonstration of culture methods- Streaking method and Spreading method
4. Cultivation of anaerobic bacteria
5. Antibiotic sensitivity test
6. Processing of culture growth for biochemical tests and identification of microorganisms.
7. Biochemical tests for species identification

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3542

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students may be able to understand about specimen collection, culture media, isolation of pure culture.	2	Emp
CO2	Students may be able to learn about Antibiotic sensitivity test, bacterial cultivation.	1	Emp
CO3	Students may be able to perform Biochemical tests for identification of organisms.	3	Emp

CO-PO Mapping for BL3542

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	2	2	3	2	3	2	3	3	2	3	2	3	2
CO 2	2	3	2	3	2	3	3	3	3	2	3	3	2	2
CO 3	3	2	3	2	3	2	3	2	3	3	3	2	3	2
Avg	2.6	2.3	2.3	2.6	2.3	2.6	2.6	2.6	3	2.3	3	2.3	2.6	2

SEMESTER 6 Year -3

BL3601	**Title: Pathology and allied Subject –II (Histopathology and Cytology)**	**L T P C** **4 0 0 4**
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn about the tissues as well Cells including their morphological changes during diseases.	
Unit No.		**No. of hours (per Unit)**
Unit: I		8
Types of tissues seen in histopathology i.e. Connective tissues,epethelial tissue, glandular, bennign, malignant tumor tissue, bone tissue, etc. Handling of fresh histological specimen (tissues) cryo /frozen sections of fresh and fixed tissues, freeze drying. Lipids ,identifications and demonstration. Microorganisms in the tissues various staining techniquesfor their demonstrationj and identifications.		
Unit II		6
Nucleic acids,DNA< and RNA special stains and procedures.Cytoplasm constituents and their dEmonstration.Tissues requiring special treatment i.e.eye ball,B.M biopsy, under calcified bones.		
Unit III		8
Neuropathological Techniques.Enzyme histochEmistry dEmonstration of phosphatases, dehhydrogenases, oxidase and perioxidases.Electron microscope, working principles , components, and allied techniques for electron icroscopy, ultra microtomy.		
Unit IV		8
ImmunohistochEmistry .Cervical cytology basis of detection of malignant and pre malignant lesions. Hormonal assessment with cytological techniques.		
Unit V		7
Demontration of sex chromatin.Aspiration cytology principles indication and utility of the techniques with special Emphasis on role of cytotechnician in FNAC clinics.		
Textbooks	1. Textbook of Medical lab Technology, Praful B Godkar, IIIrdedition 2. Textbook of Medical Lab Technology, RamnikSood,Jaypee Publishers	
Reference Books	3. PracticalHaematology, Dacie&Lewis,11th edition 4. https://www.Emjreviews.com/innovations/article/e-learning-in-pathology-education-a-narrative-review-and-personal-perspective	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3601

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand about Histology of Specimens.	2	S
CO2	Students will be able to learn different Procedures of Tissue Staining.	1	S
CO3	Students will be able to understand Histological tissue processing procedures	2	S
CO4	Students will be able to understand Microtomes.	2	S
CO5	Students will be able to describe Dyes used in Cytology procedures.	3	S

CO-PO Mapping for BL3601

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO3
CO 1	3	3	3	3	3	2	3	3	3	3	3	3	3	2
CO 2	2	3	3	3	3	3	2	3	3	2	3	3	2	3
CO 3	3	2	3	1	3	3	2	2	3	1	3	2	3	3
CO 4	3	3	2	2	3	2	2	1	2	2	3	3	2	3
CO 5	3	2	3	3	1	3	3	3	3	3	2	2	1	2
Avg	**2.8**	**2.6**	**2.8**	**2.4**	**2.6**	**2.6**	**2.4**	**2.4**	**2.8**	**2.2**	**2.8**	**2.6**	**2.2**	**2.6**

BL3602	Title:Medical Microbiology-II(Applied Microbiology and Advance Techniques)	L T P C 4 00 4
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to learn about Parasitology, Nosocomial infections, culture, Advance diagnosis in Microbiology.	
Unit No.		**No. of hours (Per Unit)**
Unit: I		**8**
Preparation of containers and wabs for collection of specimens for microbial examination. Portal regulation and transport of specimen. Flowchart of lab diagnostic procedures. Documentation of specimen in laboratory. Preservation of microorganisms: periodic subculture method, cold storage, freezing, deep freezing, lyophilization methods, Total and viable counts of bacteria.		
Unit II		8
Human parasitology: protozoa, Rhizopoda and helminth.Immunology n ad serodiagnosis. Prophylactic mass immunization.		
Unit III		8
Nasocombial and sterility testing of IV fluids and processing of various samples for various hospital infections. Pathology lab diagnosis and control of common infections and infestations.		
Unit IV		8
Cell tissue and organ culture.Specific serological methods of diagnosis. Test for bacterial sensitivity to antimicrobial and their interpretation.		
Unit-V		7
Specific culture and drug sensitivity in methods.Advance diagnostic techniques in Medical Microbiology: Torch profile, myco, dot, IgG, IgA,IgM, and IgE testing Australia Ag (HbsAg) etc.		
Textbooks	**1.** Ananth NarayanR. and PanikerC.K.J. (2009) Textbook of **2.** Microbiology.8th edition, University Press Publication	
Reference Books	**1.** Goering R., Dockrell H., Zuckerman M. andWakelinD. (2007)MIMS'MEDICALMICROBIOLOGY. 4THEDITION.ELSEVIER **2.** Willey JM, Sherwood LM, and Woolverton CJ.(2013) **3.** http://www.ppup.ac.in/e-Content/_edetails.php?id=2017 **4.** http://ecoursesonline.iasri.res.in/course/view.php?id=108	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL**3602**

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand theories and concepts of microorganisms.	2	Emp
CO2	Students will be able to understand microscope, its components and maintenance.	2	Emp
CO3	Students will be able to learn to describe the morphology of viruses	1	Emp
CO4	Students will be able to apply microscopy to study basic features of viruses.	3	Emp
CO5	Students will be able to identify different viruses.	4	Emp

CO-PO Mapping for BL3602

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO 2	2	3	3	3	1	3	2	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	2	3	3	2	2	3
CO 4	3	3	3	3	2	3	3	3	3	2	2	3	3	2
CO 5	3	2	1	2	3	2	2	3	3	3	3	1	3	3
Avg	**2.8**	**2.8**	**2.4**	**2.6**	**2.4**	**2.8**	**2.6**	**3**	**2.6**	**2.8**	**2.8**	**2.4**	**2.8**	**2.6**

BL3603	Title: Clinical Virology	L T P C 2 2 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	Students would be able to identify various viruses with latest biomedical techniques and can demonstrate the diseases associated with them.	
Unit No.		No. of hours (per Unit)
Unit: I		8
Nature and Properties of Viruses Introduction: Discovery of viruses, nature and definition of viruses, general properties, concept of viroid's, virusoids, satellite viruses and Prions. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses		
Unit II		8
Isolation, purification and cultivation of viruses' Viral taxonomy: Classification and nomenclature of different groups of viruses		
Unit III		8
Modes of viral transmission: Persistent, non-persistent, vertical and horizontal Viral multiplication and replication strategies: Interaction of viruses with cellular receptors and entry of viruses. Assembly, maturation and release of virions		
Unit 1V		8
Poxviruses, Herpesviruses, hepatitis viruses, retroviruses-HIV, Picorna viruses, rhabdoviruses, orthomyxoviruses and paramyxo viruses, TORCH profile, Symptoms, mode of transmission, prophylaxis and control of Polio, Herpes, Hepatitis, Rabies, Dengue, HIV, Influenza with brief description of swine flu, Ebola, Chikungunya, Japanese Encephalitis		
Unit V		7
Introduction to oncogenic viruses, Types of oncogenic DNA and RNA viruses, concepts of oncogenes and proto-oncogenes, prevention & control of viral diseases, antiviral compounds and their mode of action, interferon and their mode of action, General principles of viral vaccination		
Textbooks	1. Ananth NarayanR. and PanikerC.K.J. (2009) Textbook of 2. Microbiology.8th edition, University Press Publication	
Reference Books	3. Goering R., Dockrell H., Zuckerman M. andWakelinD. (2007) MIMS'MEDICALMICROBIOLOGY. 4THEDITION.ELSEVIER 4. 2.Willey JM, Sherwood LM, and Woolverton CJ.(2013) 5. 3.http://www.ppup.ac.in/e-Content/_edetails.php?id=2017 6. 4.http://ecoursesonline.iasri.res.in/course/view.php?id=108	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome for BL3603

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand Viruses	2	Emp
CO2	Students will be able to understand Isolation, cultivation of viruses.	2	Emp
CO3	Students will be able to learn to describe the morphology of viruses	1	Emp
CO4	Students will be able to apply microscopy to study basic features of viruses.	3	Emp
CO5	Students will be able to identify different viruses.	4	Emp

CO-PO Mapping for BL3603

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	2	3	3	3	2	3	2	3	3	3	3
CO 2	2	3	2	3	3	3	2	3	3	3	3	3	3	3
CO 3	3	3	2	3	2	2	1	3	3	3	1	2	2	3
CO 4	3	3	2	1	3	3	2	3	3	2	3	3	1	3
CO 5	3	3	2	3	3	3	3	3	2	3	3	3	2	3
Avg	**2.8**	**3**	**2.2**	**2.4**	**2.8**	**2.8**	**2.2**	**2.8**	**2.8**	**2.6**	**2.6**	**2.8**	**2.2**	**3**

BL3605	Title: Seminars	L T P C 3 0 0 3
Version No.	1.0	
Course Prerequisites	NIL	
Objectives	The objective is to expertise the student in presenting seminars for improvement of self-confidence.	
Each student will be assigned topics for presentations as seminars, will explore recent innovations in MLT for presenting topics during journal clubs and shall be holding group discussions along with in the presence of faculty.		
Reference Journals	1. Brandon AN, Hill DR. Selected list of books and journals for the small medical library. Bulletin of the Medical Library Association. 1981Apr;69(2):185. 2. Recent Research topics in Medical Lab Technology . Elsevier Health Sciences.	
Mode of Evaluation	Internal and External Examinations	
Recommendation by Board of Studies on	24/07/2021	
Date of approval by the Academic Council	14/11/2021	

Course Outcome forBL3605

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO	A student will be able to present seminar under concerned topic in places like conferences, workshops, meets etc.	3	S

CO-PO Mapping for BL3605

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO	3	2	3	3	3	3	2	3	3	3	2	3	3	3

BL3640	Title: Pathology & allied subject-II (Histopathology & Cytology) Lab	L T P C 0 0 2 1
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea for handling a tissue specimen.	

List of Experiments

1 To Demonstrate Microtome.
2 To Demonstrate handling of tissue specimen.
3 To Describe Tissue Processing.
4 To perform Tissue grossing.
5 To perform Tissue Embedding.
6 To perform Tissue H&E Staining.
7 To perform PAP Staining

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3640

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to understand Microtomy, handling of tissues specimen and Tissue processing.	2	Emp
CO2	Students will be able to perform tissue grossing &embedding.	3	Emp
CO3	Students will be able to perform H&E staining and PAP staining.	3	S

CO-PO Mapping for BL3640

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	3	3	3	3	2	3	3	3	3	2	2
CO 2	2	3	2	3	1	2	2	3	2	3	2	3	2	3
CO 3	3	3	3	2	3	3	3	2	3	2	3	3	3	2
Avg	2.6	2.6	2.3	2.6	2.3	2.6	2.6	2.3	2.6	2.6	2.6	3	2.3	2.3

BL3641	Title: Medical Microbiology -II Lab	L T P C 0 0 2 1
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea for microbiology.	

List of Experiments

1. Staining of given sample for identification of microorganisms- Gram staining, ZN staining, Indian Ink staining, Albert staining
2. Preparation of Media, nutrient agar, MacConkey agar, blood agar, chocolate agar, Robertson cooked meat medium, Muller Hilton agar
3. Culturing of various sample
4. AST and reporting
5. Biochemical test to differentiate between Staphylococcus and Streptococcus
6. KOH preparation
7. LPCB moun

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3641

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students will be able to perform staining procedures in microbiology	3	Emp
CO2	Students will be able to perform preparation of Culture media.	3	Emp
CO3	Students will be able to perform Biochemicaltesting's	3	S

CO-PO Mapping for BL3641

Course Outcomes	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO3
CO 1	3	2	2	2	3	3	3	2	3	3	3	3	2	1
CO 2	2	3	2	3	1	2	2	3	2	1	2	1	2	3
CO 3	3	3	3	2	3	3	3	2	3	2	3	3	3	2
Avg	**2.6**	**2.2**	**2.3**	**2.3**	**2.3**	**2.6**	**2.6**	**2.3**	**2.6**	**2**	**2.6**	**2.3**	**2.3**	**2**

BL3642	Title Clinical Biochemistry-II Lab	L T P C 0 0 2 1
Version No.	**1.0**	
Course Prerequisites	NIL	
Objectives	The objective is to induce idea for various Hormonal Investigations in Biochemistry.	

List of Experiments

1. To determine T3 conc. in serum sample.
2. To determine T4 conc. in serum sample.
3. To determine TSH conc. in serum sample
4. To determine LH conc. in serum sample.
5. To determine FSH conc. in serum sample.
6. To determine Prolactin conc. in serum sample
7. To determine TSH conc. in serum sample.
8. To perform TRIPLE test.
9. Demonstration of male and female infertility test.

Mode of Evaluation	Internal and External Examinations
Recommendation by Board of Studies on	24/07/2021
Date of approval by the Academic Council	14/11/2021

Course Outcome for BL3642

Unit-wise Course Outcome	Descriptions	BL Level	Employability (Emp)/Skill(S)/ Entrepreneurship (Ent)/ None (*Use, for more than one*)
CO1	Students may be able to perform Thyroid estimations.	3	Emp
CO2	Students may be able to understand LH, FSH& Prolactin.	2	Emp
CO3	Students may be able to learn about the Triple test & Infertility test.	1	S

CO-PO Mapping for BL3642

Course Outcome s	Program Outcomes (Course Articulation Matrix (Highly Mapped- 3, Moderate- 2, Low-1, Not related-0)											Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	2	3	3	3	2	3	3	3	3	2	2
CO 2	2	3	2	3	2	2	2	3	2	2	2	2	2	3
CO 3	3	3	2	2	3	3	3	2	3	2	3	3	3	2
Avg	2.6	2.6	2	2.3	2.6	2.6	2.6	2.3	2.6	2.3	2.6	2.6	2.3	2.3