



Bundelkhand University, Jhansi
Institute of Biomedical Sciences

Minutes of the Meeting of Board of studies

The meeting of board of studies of Institute of Biomedical Sciences was held on 23.01.2021, 11.30 AM onwards in the committee hall of the Institute. The agenda of the meeting was to discuss about the B.Sc. Medical Laboratory Technology course proposed by the Institute with effect from academic session 2021-2022.

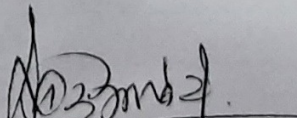
Following members were present (online/offline mode) in the meeting:

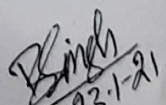
Sr. No.	Name & Designation	Mode of participation
1.	Prof. Anand Kar, School of Life Sciences, Devi Ahilya Vishwavidyalaya, Indore	Online Mode
2.	Prof. SP Singh Former Head, Department of Biochemistry, MLB Medical College, Jhansi	Online Mode
3.	Prof. Madhu Tripathi Former Head, Department of Zoology, Lucknow University, Lucknow	Online Mode
4.	Prof. Mayank Singh Department of Pathology, MLB Medical College, Jhansi	Offline Mode
5.	Dr. Rambir Singh Associate Professor & Head, Convener Institute of Biomedical Sciences, Bundelkhand University, Jhansi	Offline Mode
6.	Sh. Balbir Singh Assistant Professor, Institute of Biomedical Sciences, Bundelkhand University, Jhansi	Offline Mode
7.	Dr. Lavkush Dwivedi Assistant Professor, Institute of Biomedical Sciences, Bundelkhand University, Jhansi	Offline Mode

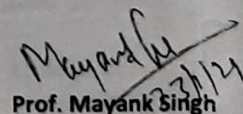
The minutes of the meeting are summarized as:

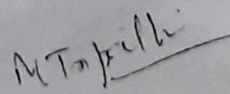
1. The committee approved the ordinance and course curriculum of B.Sc. Medical Laboratory Technology course proposed by the Institute of Biomedical Sciences.

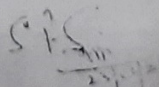
The meeting ended with vote of thanks by Dr. Rambir Singh, Head and Convener.

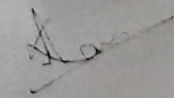

Dr. Lavkush Dwivedi

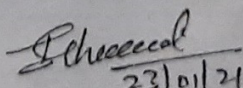

Balbir Singh


Prof. Mayank Singh


Prof. Madhu Tripathi


Prof. SP Singh


Prof. Anand Kar


Dr. Rambir Singh
Convener



बुन्देलखण्ड विश्वविद्यालय, झाँसी

पत्रांक-बु0वि0/एके0/2021/5688

दिनांक:- 24/2/2021

सेवा में,

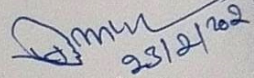
विभागाध्यक्ष,
बायोमेडिकल साइंस विभाग
बुन्देलखण्ड विश्वविद्यालय, झाँसी

महोदय,

विद्यापरिषद की बैठक दिनांक 28/01/2021 की कार्यवाही के मद संख्या 03 में निम्न निर्णय लिया गया।

निर्णय :- समिति ने सम्यक् विचारोपरान्त बायोमेडिकल साइंस विभाग की पाठ्यक्रम समिति की बैठक दिनांक 23/01/2021 की कार्यवाही का अनुमोदन किया एवं सत्र 2021-22 से **B.Sc. Medical Laboratory Technology (B.Sc. MLT)** पाठ्यक्रम संचालित किया जायेगा।

कृपया उपरोक्तानुसार निर्णय का अनुपालन कर कार्यवाही सुनिश्चित करने का कष्ट करें।


23/2/2021
सहाय कुलसचिव (एके0)
%



उत्तर प्रदेश स्टेट मेडिकल फैकल्टी

5, सर्वपल्ली, माल एवेन्यू रोड, लखनऊ - 226001

फोन : 0522 - 2238846, +91-9151024463

Website: www.upsmfac.org Email: affiliation@upsmfac.org



पत्रांक संख्या- 2218/22

दिनांक 10/3/2022

सेवा में,

कुलसचिव,

इन्स्टीट्यूट ऑफ बायोमेडिकल साइंसेस,
बुन्देलखण्ड यूनिवर्सिटी, झाँसी।

विषय- उ0प्र0 स्टेट मेडिकल फैकल्टी द्वारा पैरामेडिकल डिग्री प्रशिक्षण की सम्बद्धता/मान्यता प्रदान करने हेतु निरीक्षण किये जाने के संबंध में।

महोदय/महोदया,

उ0प्र0 शासन के शासनादेश सं0-42/71-4-2022-एन-4/2017टी0सी0 दिनांक 08 मार्च, 2022 (छायाप्रति) के द्वारा आपके संस्थान को बैचलर ऑफ फिजियोथिरेपी-40 सीट प्रशिक्षण हेतु अनापत्ति/अनिवार्यता, प्रमाण-पत्र में वर्णित शर्तों/प्रतिबन्धों के अधीन प्रदान की गयी है।

उक्त प्रशिक्षण में प्रवेश से पूर्व उ0प्र0 स्टेट मेडिकल फैकल्टी द्वारा द्वितीय निरीक्षण कराया जायेगा। इस हेतु उक्त प्रशिक्षण से संबंधित मानकानुसार टीचिंग फैकल्टी एवं उपकरण/उपस्कर की उपलब्धता की सूचना प्रमाण सहित कार्यालय को भेजने का कष्ट करें। जिससे कि आपके संस्थान में कार्यरत टीचिंग फैकल्टी एवं क्लिनिकल सुविधाओं का निरीक्षण कराकर अर्ह पाये जाने की दशा में उक्त प्रशिक्षण में छात्रों के प्रवेश लेने हेतु अनुमति/सम्बद्धता पत्र जारी किया जा सके।

अनुमति/सम्बद्धता पत्र जारी होने से पहले किसी भी दशा में छात्रों का उक्त प्रशिक्षण में प्रवेश न लिया जाये। उपरोक्त शर्तों की पूर्ति के पश्चात् ही अनुमति पत्र/सम्बद्धता पत्र जारी किया जायेगा।

भवदीय,

सचिव,

उ0प्र0 स्टेट मेडिकल फैकल्टी।



उत्तर प्रदेश स्टेट मेडिकल फैकल्टी

5, सर्वपल्ली, माल एवेन्यू रोड, लखनऊ - 226001

फोन : 0522 - 2235964, 2235965

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पत्रांक संख्या- 3074/22

दिनांक 04/04/22

सेवा में,

विभागाध्यक्ष,

इन्स्टीट्यूट ऑफ बायोमेडिकल साइंसेस,

(बुन्देलखण्ड विश्वविद्यालय) झाँसी उ0प्र0।

विषय-बैचलर ऑफ साइंस इन मेडिकल लेबोरेटरी टेक्नोलॉजी (टेक्नीक्स) प्रशिक्षण पाठ्यक्रम के संबंध में।

महोदय,

उ0प्र0 शासन के शासनादेश संख्या-42/71-4-2022-एन-4/2017टी0सी0 दिनांक 08 मार्च, 2022 एवं निर्धारित मानकों के अनुरूप उपलब्धता सुनिश्चित करने हेतु उ0प्र0 स्टेट मेडिकल फैकल्टी द्वारा कराये गये स्थलीय निरीक्षण दिनांक 01.04.2022 के आधार पर बैचलर ऑफ साइंस इन मेडिकल लेबोरेटरी टेक्नोलॉजी (टेक्नीक्स) में 40 छात्र का प्रशिक्षण संचालित किये जाने हेतु अनुमति प्रदान करने के लिए शासनादेश में वर्णित शर्तों के अधीन प्रदान की जाती है। उक्त प्रशिक्षण को संचालित करने हेतु अनुमति संस्थान द्वारा निरीक्षक दल को दर्शाये गये संसाधनों तथा उपलब्ध कराये गये प्रपत्रों के आधार पर निरीक्षक दल द्वारा की गई संस्तुति पर दी जा रही है। यदि उ0प्र0 स्टेट मेडिकल फैकल्टी किसी भी समय यह ज्ञात होता है कि आप द्वारा कोई तथ्य छुपाये गये हैं अथवा मान्यता हेतु प्रपत्रों, संसाधनों का सहारा लिया गया है तो नियमानुसार मान्यता/सम्बद्धता समाप्त करते हुए आप विरुद्ध यथोचित कार्यवाही की जायेगी।

अतः बुन्देलखण्ड यूनिवर्सिटी द्वारा प्रस्तावित इन्स्टीट्यूट ऑफ बायोमेडिकल साइंसेस, झाँसी प्रशिक्षण केन्द्र में 40 सीट प्रतिवर्ष भर्ती क्षमता के बैचलर ऑफ साइंस इन मेडिकल लेबोरेटरी टेक्नोलॉजी (टेक्नीक्स) प्रशिक्षण केन्द्र की अनुमति प्रदान की जाती है, के क्रम में अपने संस्थान पर प्रवेश प्रक्रिया प्रारम्भ करते हुए संबंधित विश्वविद्यालय से सम्बद्धता संबंधी कार्यवाही सुनिश्चित करने का कष्ट करें। बैच उत्तीर्ण होने के पश्चात् उ0प्र0 स्टेट मेडिकल फैकल्टी द्वारा उत्तीर्ण अभ्यर्थियों का पंजीकरण किया जायेगा।

भवदीय,

सचिव,

उ0प्र0 स्टेट मेडिकल फैकल्टी।

दिनांक-

पत्र संख्या-

प्रतिलिपि-कुलसचिव, बुन्देलखण्ड विश्वविद्यालय, झाँसी को सूचनार्थ एवं आवश्यक कार्य हेतु प्रेषित।

सचिव,

उ0प्र0 स्टेट मेडिकल फैकल्टी।



संख्या- 42/71-4-2022-एन-4/2017टी0सी0

प्रेषक,

आलोक कुमार,
प्रमुख सचिव,
उ0प्र0 शासन।

सेवा मे,

सचिव,
उ0प्र0 स्टेट मेडिकल फैकल्टी,
लखनऊ।

चिकित्सा शिक्षा अनुभाग-4

लखनऊ : दिनांक 08 फरवरी, 2022

विषय:- बुन्देलखण्ड यूनिवर्सिटी द्वारा प्रस्तावित इन्स्टीट्यूट ऑफ बायोमेडिकल साइंसेस, झाँसी में स्नातक स्तरीय पैरामेडिकल प्रशिक्षण कोर्स प्रारम्भ करने हेतु अनिवार्यता/अनापत्ति प्रदान किये जाने के संबंध में।

महोदय,

उपर्युक्त विषयक आपके पत्र संख्या-1/22, दिनांक 03.01.2022 के संदर्भ में मुझे यह कहने का निदेश हुआ है कि सम्यक् बुन्देलखण्ड यूनिवर्सिटी द्वारा प्रस्तावित इन्स्टीट्यूट ऑफ बायोमेडिकल साइंसेस, झाँसी में बैचलर ऑफ साइंस इन मेडिकल लेबोरेटरी टेक्नोलॉजी (टेक्नीक्स) पाठ्यक्रम में 40 सीट प्रतिवर्ष प्रवेश क्षमता का प्रशिक्षण केन्द्र खोलने हेतु अनिवार्यता/अनापत्ति निम्नलिखित शर्तों/प्रतिबन्धों के अधीन प्रदान की जाती है:-

- (1) संस्था द्वारा प्रशिक्षण हेतु सभी मानक/औपचारिकताएं पूर्ण कर उ0प्र0 स्टेट मेडिकल फैकल्टी से निरीक्षण कराकर अनुमति/मान्यता प्राप्त कर प्रशिक्षण केन्द्र के संचालन की कार्यवाही की जायेगी।
 - (2) संस्था द्वारा राज्य सरकार/उ0प्र0 स्टेट मेडिकल फैकल्टी तथा संबंधित विश्वविद्यालय द्वारा प्रशिक्षण के संबंध में समय-समय पर जारी किये गये समस्त निर्देशों, मानकों एवं चयन प्रक्रिया का पूर्णतः अनुपालन सुनिश्चित किया जायेगा।
 - (3) संस्था द्वारा शासनादेश संख्या-4447/71-3-05-141/05 दिनांक 14.10.2005 यथा संशोधित शासनादेश दिनांक 15.01.2007 तथा 23.01.2008 में निहित प्राविधानों का पूर्णतः अनुपालन सुनिश्चित किया जायेगा।
 - (4) उ0प्र0 स्टेट मेडिकल फैकल्टी द्वारा एक नीति बनाकर मानकों के अनुपालन हेतु संस्था का निरीक्षण कराया जायेगा। संस्था द्वारा राज्य सरकार/उ0प्र0 स्टेट मेडिकल फैकल्टी/संबंधित विश्वविद्यालय के किसी भी दिशा-निर्देशों/मानकों का उल्लंघन करने पर संस्था की अनापत्ति/मान्यता समाप्त कर दी जायेगी।
- 2- कृपया उक्तानुसार कार्यवाही सुनिश्चित करने का कष्ट करें।

भवदीय,

(आलोक कुमार)
प्रमुख सचिव

संख्या- 47 (1)/71-4-2022-तददिनांक-

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित:-

1. सचिव, इण्डियन नर्सिंग काउंसिल, नई दिल्ली।
2. महानिदेशक, चिकित्सा शिक्षा एवं प्रशिक्षण, उ0प्र0 लखनऊ।
3. कुलसचिव, अटल बिहारी वाजपेयी चिकित्सा विश्वविद्यालय, उ0प्र0 लखनऊ।
4. प्रबन्धक, बुन्देलखण्ड यूनिवर्सिटी द्वारा प्रस्तावित इन्स्टीट्यूट ऑफ बायोमेडिकल साइंसेस, झाँसी।
5. गार्ड फाइल।

आज्ञा से,

(अनिल कुमार सिंह)
संयुक्त सचिव

स्टेट मेडिकल फैकल्टी एवं कोर्स

उक्त प्राप्ति संख्या 42/71/22

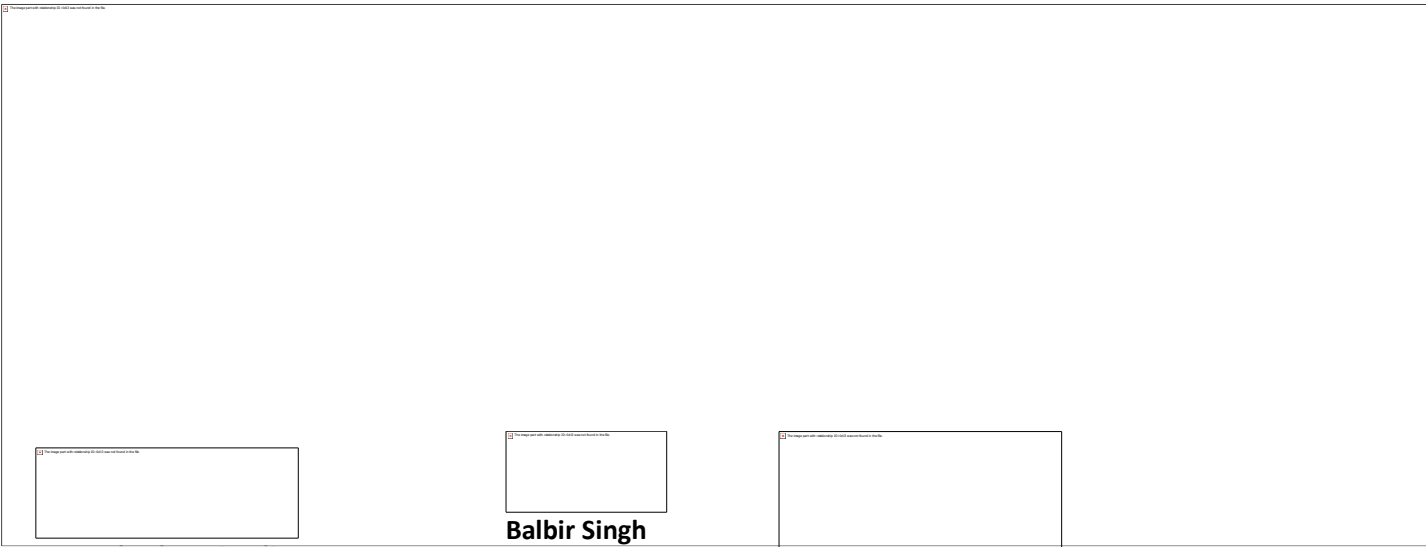
दिनांक: 09/03/2022

समय:

Mr. Nishant
10/3



(B.Sc.-MLT)



Dr. Lavkush Dwivedi



Balbir Singh



Prof. Madhu Tripathi



Prof. SP Singh



Prof. Anand Kar



**Dr. Rambir Singh
Convener**



COURSE ORDINANCE

1. Nomenclature of Course

There shall be a **B.Sc. in Medical Laboratory Technology (B.Sc. MLT)** offered by the Department of Biomedical Sciences at the Institute of Biomedical Sciences, Bundelkhand University Campus, Jhansi.

2. Operation of the course

- 2.1 The course shall be an annual program run on regular mode.
- 2.2 With overall control of University Academic Council, B.Sc. Medical Lab Technology will be administered by a course committee consisting of the Head/Coordinator and all faculty members of the department.
- 2.3 The course committee shall
 - a) Counsel to the candidates and make admissions in the course.
 - b) Design, update the course, and prepare syllabi for the same.
 - c) Organize lectures, Seminars, Group Discussions, Laboratory works, and supervise the Internship/dissertation works.
 - d) Constitute Board of Studies for the department.
 - e) Arrange and conduct theory and practical examinations including seminars, tests, viva-voce, etc. as per Board of Studies (BoS) guidelines.

3. Duration of the Course

- 3.1 The duration of B.Sc. Medical Lab Technology Program will be of three and half years (03 calendar years + 06-month internship) including compulsory Rotatory internship of six (06) months in a suitable hospital/institute.
- 3.2 However, the maximum allowed duration for completing the course will be six years.
- 3.3 Students undergoing for six-month compulsory rotatory internship shall be required to complete the internship within nine (09) months from the date of completion of the course for being eligible to be awarded the internship completion and course completion certificate. Failing which shall normally be not allowed to continue further studies unless permission is granted by the Vice-Chancellor for the same.

4. Eligibility Criteria

A candidate seeking admission in B.Sc. MLT Program must have passed SSC/Intermediate or equivalent to 10+2 system of education (from a recognized board) in Science with Biology paper with min. 50% marks in aggregate (5% relaxation in case of OBC & SC/ST candidate).



5. Admission

- 5.1 Admission to B.Sc. MLT will be made as per rules prescribed by the Academic council of Bundelkhand University, Jhansi time to time.
- 5.2 The students will be admitted to B.Sc. Medical Lab Technology (B.Sc. MLT) on merit basis through Direct Admission (DA) duly prepared by the University Admission Cell according to the weightage and reservation applicable as per the University/ State Government rules/norms.

6. Normal Intake

The maximum intake in B.Sc. Medical Lab Technology (B.Sc. MLT) will be Forty (40)/Academic year. However, University may modify the normal intake on approval of the respective body as per needs. Applicable statutory reservation shall be given as per University/ State Government rules/norms.

7. Medium of Instruction

The medium of instruction and examination shall be English.

8. Method of teaching

Method of teaching in the academic programme will consist of class lectures by the regular faculty of the department, faculty members from other departments of the University, visiting/guest faculty from Maharani Laxmi Bai Medical College, Jhansi, and other medical colleges of Uttar Pradesh and other states. Seminars, training in other Institutions, project works shall be an essential component of the curriculum. Quality study materials will also be supplied besides computer-aided instruction and audio-visual teaching methods. Educational tours to various academic and research institutions shall be organized once in every academic year.

9. Attendance

- 9.1 A minimum 75% attendance will be required for being eligible to appear in the examinations.
- 9.2 In case a student is short of attendance due to illness, participation in sports, extracurricular activities, etc. the following rules shall be applied.
 - 9.2.1 A shortage of attendance up to 10% can be condoned by the Head/Coordinator on the specific recommendation of the subject teacher.
 - 9.2.2 A shortage of attendance up to 25% can be condoned by the Hon'ble Vice-Chancellor on the recommendations of the Head/Coordinator for a valid reason.
 - 9.2.3 Attendance on account of participation in prescribed functions of NCC, NSS, Inter-University Sports, or Education tour shall be considered on the production of a valid certificate of the same from a competent authority. However, students shall be required to take prior approval from the Head/Coordinator before participating in the above programs.



- 9.2.4 Students who are failing to obtain the minimum attendance after considering all the above clauses will have to re-register for that particular paper in which they are short of the minimum required attendance as and when the paper is offered by the department.

10. Examination

B.Sc. MLT will be constituting the following examinations for successful completion of the course.

10.1 Theory Examinations

10.1.1 Annual Examinations

They shall be conducted by the University as per the academic calendar. The question papers will be set by examiners duly appointed by Hon'ble Vice-Chancellor based on the recommendation of the Board of Studies. The question paper pattern shall be as decided by the University. However, the weightage of this examination will be 70%, and the duration of each theory examination will be 03 hours.

10.1.2 Sessionals (Internal assessment)

- Sessional examinations shall be conducted by the department at regular intervals during the whole session. The number of sessional examinations to be conducted per session and policy for averaging the marks, providing grace marks shall be decided by the Departmental Committee (constituting all teachers of the department).
- The weightage of this examination will be 30 % (30 marks out of 100) of each paper. Out of 30 marks, each sessional examination will be conducted for 15 marks only. The remaining 15 marks shall be trifurcated into 5-5 marks each for a) Class Seminar b) Group Discussion (GD) and c) Punctuality Discipline and Sincerity (PDS) of the student.
- The question paper pattern of the sessional examination shall be MCQ type or as decided by the DC/University.
- In case of readmission, the student shall have to go through all the internal process afresh and shall retain nothing of the previous year.

10.1.3 Practical Examinations

Practical examinations will be conducted in those papers, where it is given in the course structure. The examiners for the same will be appointed by Hon'ble VC based on recommendations of the Board of Studies. The maximum marks for each practical examination will be 100 marks.

10.1.4 Maximum marks



Maximum marks for each theory and practical paper of B.Sc. will be 100 marks.

10.1.5 Minimum passing marks:

Minimum passing marks will be 40% (separately in sessionals and annual examinations i.e theory & practicals both) or as decided by the University for Under Graduate programmes in unified ordinances. Overall, 50% of papers shall be required to pass by the student for being eligible to promote in next year.

10.1.6 Back Paper Examination and Improvement

- In case a candidate fails to pass 50% of papers, he/she will be declared failed and will have to reappear with a subsequent annual examination as an ex-student.
- Students having back paper in one or two papers may appear in back paper examination in subsequent annual examination with junior batch.
- The candidate may also be allowed to improve his/her marks in a maximum of 02 papers of previous years, the examinations of which shall be conducted along with subsequent annual examination with junior batch.
- A student will have to clear all the papers (theory & practical both) by the end of the final year to be eligible for the award of a relevant degree by the University.
- The maximum time allowed for passing all paper required for the award of the degree shall be a double time of the duration of the course i.e. 06 years.
- In case students are unable to clear all the papers by the end of the last year, he/she may be allowed to reappear in subsequent examinations, as an ex-student, without undergoing a repeat of the regular academic program. A special back paper examination may also be conducted for such final year students to save their year for further studies/jobs. The date of such examinations will be decided by the University on the recommendations of the Head/Coordinator of the department/programme.

11. Results and Divisions for Theory & Practical

A student shall be declared passed if he/she secures the minimum 40% passing marks in all theory and practical examinations separately.



The aggregate marks obtained will be counted for the award of divisions as follows:

11.1 **Second Division:** 50% or more but less than 60%

11.2 **First Division:** 60% or more but less than 75%

11.3 **Distinction:** (75% or above)

12. Internship

- A student completing the final year B.Sc.-MLT examination shall be allowed to do a six-month compulsory rotatory internship from a Govt. or non-Govt. multidisciplinary Hospital/Centre having all modern pathology laboratory facilities which fulfill the norms decided by the University.
- The internship should be rotatory and cover Hematology, Biochemistry, Microbiology, and other Pathology related areas.
- **No student shall be awarded a degree certificate without successful completion of a six-month rotatory internship.**
- The student shall be required to submit a six-month internship certificate from the hospital, duly signed by the HOD/lab In-charge (where the internship is undertaken) or a notarized self-declaration regarding the same to the department for being eligible to issue '**Certificate of Internship Completion**' by the department and award of a degree certificate by the University.

13. Discontinuation

A candidate who has discontinued the academic programme during any year with permission from the Head/Coordinator may be permitted by Hon'ble Vice-Chancellor to take readmission at beginning of the concerned year of study with subsequent batch. Fee once paid shall not be refunded or adjusted during readmission. Also, any marks of internal assessment shall not retain. The student has to face all internal assessment and obtain fresh marks on each paper.

14. Fees

The course and examination fee shall be decided by the University from time to time and have to be deposited by the candidate, as and when asked for.

15. Academic Collaboration

The B.Sc.-MLT programme will be conducted in academic collaboration with Maharani Laxmi Bai Medical College, Jhansi/similar hospitals in Jhansi for teaching & training purposes to the enrolled students. Other than Biomedical department teachers, faculty members of various departments of MLB Medical College, Jhansi/ similar medical college, Jhansi and/or other Medical Colleges as Biochemistry, Pathology, Microbiology, Physiology, Pharmacology, Haematology, Histopathology, Radiation Biology, etc. will be involved for teaching the relevant theory & practical papers of the course as per the requirement.

16. Amendment of rules



The above rules are subjected to change by appropriate authorities of the University from time to time, as and when deemed necessary.

17. Revision of course structure

The Board of Studies (BoS) shall be empowered to update the course structure as per requirements.

18. The final award of the degree

The degree of B.Sc. in Medical Laboratory Technology (B.Sc.-MLT) course shall be conferred on the candidate who has passed all the theory & practical papers examinations in the prescribed manner of the study programme in not less than three academic years and completed a six-month compulsory rotatory internship.



COURSE CURRICULUM
B.Sc. Medical Laboratory Technology (B.Sc.- MLT)

I year

Paper no.	Paper Code	Paper title	Max. Marks
Paper-I	BMLT-101	Cytology	(70 Ext. + 30 Int.)=100
Paper-II	BMLT-102	Biochemistry	(70 Ext. + 30 Int.)=100
Paper-III	BMLT-103	Blood Banking & Haematology	(70 Ext. + 30 Int.)=100
Paper-IV	BMLT-104	Health Education & Biomedical Waste Management	(70 Ext. + 30 Int.)=100
Paper-V	BMLT-105	Practical-I (Blood Banking and Haematology & Biochemistry)	100
Paper-VI	BMLT-106	Practical-II (Cytology & Biomedical Waste Management)	100

Max. Marks- 600

II Year

Paper no.	Paper Code	Paper title	Max. Marks
Paper-VII	BMLT-201	Medical Microbiology	(70 Ext. + 30 Int.)=100
Paper-VIII	BMLT-202	Immunology & Immunodiagnosics	(70 Ext. + 30 Int.)=100
Paper-IX	BMLT-203	Biomedical Techniques	(70 Ext. + 30 Int.)=100
Paper-X	BMLT-204	Medical Biochemistry	(70 Ext. + 30 Int.)=100
Paper-XI	BMLT-205	Practical-III (Medical Microbiology and Immunology)	100
Paper-XII	BMLT-206	Practical-IV (Biomedical Techniques and Medical Biochemistry)	100

Max. Marks- 600

III Year

Paper no.	Paper code	Paper title	Max. Marks
Paper-XIII	BMLT-301	Human Physiology & Anatomy	(70 Ext. + 30 Int.)=100
Paper-XIV	BMLT-302	Clinical Pathology	(70 Ext. + 30 Int.)=100
Paper-XV	BMLT-303	Community Medicine	(70 Ext. + 30 Int.)=100
Paper-XVI	BMLT-304	Principles of Lab Management & Medical Ethics	(70 Ext. + 30 Int.)=100



Paper-XVII	BMLT-305	Practical-V (Human Physiology, Anatomy and Clinical Pathology)	100
Paper-XVIII	BMLT-306	Practical-VI (Community Medicine & Principles of Lab Management and Medical Ethics)	100

Max. Marks- 600

Total Max. Marks-

I Year 600+II Year 600+ III Year 600 = 1800



Suggested Norms for Credit Assignment

Teaching: Annual System – 180 Days

Lectures/Tutorials: 1 Credit = 15 Hours

(If 45 hours teaching is assigned for a course of study/paper during a semester, the same will stand for 3 credits)

Practical/Lab Work: 1 Credit = 2 Hours' Practical for 15 days

Field Study/Study Tour (Study Tour Report based on Field Study/Study Tour): 1 Credit = 3 Hours × 15 days (+1 Credit for Viva Voce/Presentation)

Summer Training/Industrial Training including Training Report): 1 Credit = 3 Hours × 15 days (+1 Credit for Viva Voce/Presentation)

Dissertation: 6 Credits (1 Hours × 90 days/ 15) + Viva Voce: 2 Credits = 6+2 = 8 Credits

Proposed Structure for Choice Based Credit System (CBCS)

Courses/Papers		First Year Credit	Second Year Credit	Third Year Credit
Core Papers	Theory (4 papers/year) <i>Calculated for 90 Hrs lectures per paper @ 1 Credit = 15Hsr. Lectures/Tutorial</i>	6x4= 24	6x4= 24	6x4= 24
	Practical (2 papers/ year) <i>Calculated for 30 days, 3 Hrs. practical per paper @ 1 Credit =2 Hr. practical for 15 days</i>	6x2=12	6x4= 24	6x4= 24
Elective/Optional Papers		NA	NA	NA
Self-Study Courses		NA	NA	NA
Total Credits		36	36	36



Detailed Syllabus of B.Sc. (MLT) I Year

Paper-I	BMLT-101	Cytology
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The Cell: Historical background, significant landmarks, cell theory. Eukaryotes and Prokaryotes.

Cellular Chemistry: Inorganic and organic constituents, macromolecules of life, sugars, amino acids, types of bonding.

Cell Membrane: Organization, composition, movement of substances, junction complexes.

Cell Organelles: Study of various cell organelles, structure, and their functional significance.

Nucleus: Nuclear membrane, Nucleolus, chromatin material, Nucleocytoplasmic interaction.

Chromosome structure: Organization, morphology, differentiation, polytene, and lampbrush chromosomes, sex chromosomes, and sex determination.

Cytoskeletal elements: Microtubules, microfilaments, intermediate filaments.

Artificial Membrane: Liposomes.

Microscopy: Principles of different types of optical systems, basics of electron microscopy.

Cytochemistry: Chemistry of fixation, staining, cytochemistry of cellular constituents, tissue culture method, autoradiography, cell fractionation.

Cell Division: Mitosis, Meiosis, movement of chromosomes and their significance.

Cell Cycle and its regulation

Cell Physiology: Cellular respiration, endocytosis, the role of endosomes, lysosomes, exocytosis, cellular motility, aging, and death.

Books Recommended:

1. *Cell Biology by De Robertes*
2. *Cell Biology by Bruce Albert.*
3. *Cell Biology by C.B.Powar.*



Paper-II BMLT-102 Biochemistry

Ionic equilibrium: Physical properties and structure of water, solvent properties of water, the fitness of the aqueous environment for living organisms, ionic product of water, and the pH scale. Acid-base indicators, buffer solutions, physiological buffers.

Carbohydrates: Structure of monosaccharide- reactions of aldehyde and ketone groups, ring structure and anomeric forms, mutarotation, the reaction of sugar due to hydroxyl groups, important derivatives of monosaccharide, and their biological importance. Oligosaccharides- disaccharides and trisaccharides, structure, occurrence, and biological importance of oligosaccharides. Polysaccharides e.g. Cellulose, chitin, agar, alginic acids, pectin, proteoglycans, sialic acids, glycogen, and starch. Glycoproteins.

Lipids: Definition and classification. Fatty acids: introduction, classification, nomenclature, structure, and properties of saturated and unsaturated fatty acids, essential and non-essential fatty acids. Triacylglycerol: nomenclature, physical properties, chemical properties. Characterization of fats-hydrolysis, saponification value, rancidity of fats. The biological significance of fats. Glycerophospholipids (lecithins, lysolecithins, cephalins, phosphatidylserine, phosphatidylinositol, plasmalogens), sphingomyelins, glycolipids- cerebrosides and gangliosides. Properties and function of phospholipids.

Proteins: Introduction, classification based on solubility, shape, composition, and functions. Amino acids: common structural features, classification, and structures of standard amino acids as zwitterion in aqueous solution, physical and chemical properties. Structure and formation of peptide bonds. Protein structure: primary structure of proteins, the secondary structure of proteins- helix and pleated sheets, the tertiary structure of proteins, forces stabilizing the tertiary structure and quaternary structure of proteins. Denaturation and renaturation of proteins. The behavior of proteins in solutions- salting-in and salting-out of proteins. Structure and biological functions of hemoglobin and myoglobin.

Enzymes: History, general characteristics, nomenclature, IUB enzyme classification (rationale, overview, and specific examples). Significance of the numbering system. Definitions with examples of holoenzyme, apoenzyme, coenzymes, cofactors, activators, inhibitors, active site (identification of groups excluded), metalloenzymes, specific enzymes, isoenzymes, monomeric enzymes, oligomeric enzymes, and multi-enzyme complexes. Units of enzyme activity. Enzyme specificity. Basic concepts of enzyme catalysis.

Nucleic acids: Nature of genetic material; evidence that DNA is the genetic material, Composition of RNA and DNA, features of DNA double helix. Denaturation and annealing of DNA structure. Different types of RNA and DNA.

BOOKS RECOMMENDED:

Text Book of Biochemistry: AN Singh and SP Singh



Paper-III

BMLT-103

Blood Banking & Haematology

Blood Banking:

- **Unit-I:** 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. Other blood group systems such as Lewis, MNS, Kell Duffy, etc. Anticoagulants and preservative used in the blood bank, Donor selection criteria, Blood collection, and processing
- **Unit-II:** Transfusion transmissible infectious disease screen, Coomb's test, Cross-matching, Compatibility testing, Antibody Screening & Identification, Grading of Reaction/Agglutination
- **Unit-III:** Blood components and their 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-IV:** Apheresis, indications of hemapheresis, plasmapheresis, plateletpheresis, plasmapheresis Quality control of reagents, equipments, blood components used in transfusion medicine. Role of NACO, Indian Red Cross Society, DGHS, and blood transfusion services.

Haematology

- **Unit -I:**
 - ✓ *Erythropoiesis*- RBCs formation, Morphology, cytoskeleton,
 - ✓ *Morphological and Etiological pathogenesis*- Staining, Aplastic anemia, anemia of chronic disorders, Sideroblastic anemia, Hemolytic Anemia, etiology, pathogenesis, clinical features, laboratory investigations, Bone marrow examination, composition & functions, aspiration techniques, processing and, laboratory investigations and management.
- **Unit-II:**
 - ✓ *Haemoglobin*- Synthesis, types, and functions.
 - ✓ *Haemoglobinopathies*- Sickle cell anemia and Thalassemia (laboratory investigations, Disease management, and prognosis).
- **Unit -III:**
 - ✓ *Leukopoiesis*- Stages of Leukocyte Maturation, Features of Cell Identification
 - ✓ *Leukocytopathies*- leukemia, diagnosis of various types of leukemia and leukocytopenia, neutrophilia, eosinophilia, basophilia, monocytosis, lymphocytosis, neutropenia, lymphopenia.
- **Unit-IV:**
 - ✓ *Thrombopoiesis*- Stages of platelets development, hemostasis, and Blood coagulation.
 - ✓ *Thrombocytopathies*- Hypercoagulable test, Disorders of secondary hemostasis, hemophilia and its lab diagnosis, Von-Willebrand disease, disseminated intravascular coagulation, thrombosis, Disorder of fibrinogen, test for bleeding & coagulation disorders, correction studies for factor deficiency, quantitative factor assay.
- **Unit-V:** LE cells, its demonstration, and significance, lupus anticoagulants, Blood parasites, Malaria, Trypanosomes, Filariasis, Leishmania

Reference Books: 1. *Text Book of Medical Physiology by Guyton & Hall.*



Paper-IV

BMLT-104

Health Education & Biomedical Waste Management

Health Education

Unit 1:

- *Health Education:* Principles & Objectives, Levels of Health Education, Educational Methods, Evaluation & Practice of Health Education in India.
- *Health Counseling:* Introduction, Theories, Process & Techniques.
- Health Care Reporting, Role of NIC & Other Bodies, Research in Health Education

Unit 2:

- *Health Communication:* Basic Concept & Principles of Communication, Definition, Purpose, Types of Communication
- Communication Process, Directions of Communication: Upward, Downward, Lateral, Factors influencing communication, Barriers of Effective Communication, How to Overcome the Barriers
- *Models of communication:* Aristotle Model, Shannon and Weaver model, Schramm Model, Laegans Model, Fano Model, Litterer's Model, Westly Maclean's Model.

Unit 3:

- Mass communication & Role of Media in health education
- Information Communication Technologies (ICT) in health care and awareness. (Telemedicine & e-health, community radio)
- Future trends in information and communications systems :

Biomedical Waste Management

Unit 1:

- Present Scenario of Bio-medical wastes – Concepts and Perceptions,
- Waste Generation, Segregation, methods of Disposal

Unit 2:

- Planning and Objectives of BMW Management,
- Survey, Policies, and Perspectives of BMW Management

Unit 3:

- Record Keeping,
- Management of Bio-medical Waste,
- Technologies for Treatment for BMW,
- Criteria for selecting appropriate Medical Waste Technologies

Unit 4:

- Training, Occupational Safety, and Health Issues

Unit 5:

- Legal Aspects and Environment Concern,
- Implementation of Action Plan, Approaches to Common Regional facility

Reference Books:

1. The Book of Hospital Waste Management: Dr. D.B. Acharya & Dr. Meeta Singh (Minerva Press, New Delhi)
2. Hospital Waste Management & its Monitoring: Madhuri Sharma (Jaypee Brothers, Medical Publishers (P) Ltd. New Delhi)



Paper-V BMLT-105 Practical-I (Blood Banking, Haematology & Biochemistry)

Blood Banking & Haematology:

1. Determination of haemoglobin by various methods.
2. Determination of Total RBC count.
3. Determination of PCV
4. Demonstration of a hypochromic microcytic slide.
5. Differential Leucocyte Count.
6. Absolute leucocyte count
7. To perform PT and Calculate INR
8. To perform APTT
9. To perform sickling test
10. Determination of Plasma Hemoglobin
11. To perform reticulocyte count
12. To perform Heinz bodies
13. Demonstration of leukemic slides
14. To perform thrombin time.
15. To perform a D-dimer test.
16. General blood Picture
17. To demonstrate malarial slide
18. Demonstration of hemoparasites like trypanosomes, Filaria, Malaria

Biochemistry

1. Preparation of molar, molal, and percentage solution
2. Preparation of w/w, w/v, and v/v solutions.
3. Preparation of buffer solution and measurement of pH by pH strip.
4. Detection of starch in potatoes by the color reaction.
5. Estimation of carbohydrates by a colorimeter.
6. Estimation of proteins by a colorimeter.
7. The activity of salivary amylase enzyme.



Paper-VI	BMLT-106	Practical-II (Cytology & Biomedical Waste Management)
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Cytology

- Study of various parts of dissecting and compound microscope.
- Microscopic identification of plant and animal cells.
- Measurement of cell size using ocular and stage micrometer.
- Microscopic examination of the bacterial cell using suitable stain.
- To perform plasmolysis and deplasmolysis in a plant cell.
- Mitotic squash preparation of root tip of onion and identification of various divisional stages.
- Study of permanent slides.
- Preparation of various cytological fixatives
- Preparation of various stains used in cytology
- Preparation of smear
- To perform PAP staining
- To perform Giemsa staining on the fluid sample
- To prepare a cell suspension
- Processing of various fluid samples



Detailed Syllabus of B.Sc. MLT II Year

Paper-VII	BMLT-201	Medical Microbiology
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1. **General Microbiology:** History of Microbiology, Classification of Microorganism, Microscopic Methods for observing Microorganisms, Culture and Nutrient of Microorganisms, Sterilization, and Disinfection.
2. **Microbial Biology:**
 - a) **Viruses:** Introduction, Historical Background, Classification, Isolation, Origin, Nature, Structure, Morphology, Composition, Animal, Plant and Bacterial Virus, Bacteriophages, Multiplication Cycles, Interferon, Physical Properties.
 - b) **Bacteria:** Classification, Morphology, Structure, Chemical Composition, Plasmids, Microsomes, Cytoplasmic Inclusion, Growth and Reproduction, Microbial Ecology.
 - c) **Algae, Fungi, and Protozoa:** Growth, Structure, Function, Reproduction, Classification and Economic Importance.
3. **Applied Microbiology:**
 - a) **Microbes in economic use:** Beneficial activities in Antibiotics, Vitamins, Pesticides, Petroleum, Fermentation Industry, and in Environment Protection.
 - b) **Microbial Diversity:** Microorganisms in Soil, Water, Air and Food. Normal Human Micro Flora. Microbial Role in Cycling of Nitrogen, Phosphorus, Sulphur, and Carbon.
 - c) **Microbial Diseases:** Anthrax, Whooping Cough, Botulism, Tetanus, Diphtheria, Tuberculosis, Dysentery, Leprosy, Diarrhea, Pneumonia, Malaria, Leishmaniasis, Sleeping Sickness, AIDS, Cholera, Dengue, Hepatitis, Measles.
 - d) **Microbes in therapeutic uses- Probiotics, Prebiotics, General Gut flora, etc.**

Books Referred:

1. *Textbook of Microbiology – by Anant Narayan & Paniker*
2. *Textbook of Microbiology – by Prescott*
3. *Textbook of Microbiology – by Pelzar*



Paper-VIII BMLT-202 Immunology & Immunodiagnostics

UNIT I- Introduction of Immunology

- History of immunology,
- *Immunity*–Antigen, antibody, immunogen, pathogen, allergen, Haptens, Adjuvants, Superantigens, epitope, paratope, Antigenicity and Immunogenicity, Innate and Adaptive Immunity and Characteristics, Primary and Secondary Immune Response,
- *Vaccines* – Active and passive immunization, Types of vaccines and their mechanism of action
- *Anatomical organization of immune system* – Lymphocytes (T & B Cells), Primary and secondary lymphoid organs, lymphocyte traffic. Hematopoiesis, Properties of T and B cells, TCR, BCR

UNIT II- Complement System

- Complement System Components,
- Activation pathways and their regulation,
- role of the complement system in the immune response
- Complement deficiencies

UNIT III- Humoral Immunity

- Mechanism of action of B-Cells, Role of B-Cells as APC
- Immunoglobulins – structure and functions,
- Organization and expression of immunoglobulin genes.
- Mechanisms of antibody diversity, Class switching, Immunoglobulin Superfamily.

UNIT IV- Cell-Mediated Immunity Major Histocompatibility Complex

- Mechanism of action of T-cells,
- MHC Restriction, MHC I and II molecules, Role of MHC in tissue transplantation.
- Antigen Processing & Presentation of Endogenous & Exogenous antigens
- Cytokines, structure, types, functions, and cytokine receptors

UNIT V- Hypersensitivity

Definition, Type I, II, III, and IV type hypersensitivity, delayed type of hypersensitivity.

UNIT VI- Immune Imbalances

- Autoimmunity – Organ-specific and systemic diseases, mechanisms of autoimmunity and therapeutic approaches,
- Immunodeficiency Syndromes – Primary and secondary immunodeficiencies, their diagnosis and therapeutic approach

UNIT VII- Immunodiagnostic & Therapeutics

- Antigen and Antibody interactions – Affinity, Avidity, Cross-reactivity, RIA, ELISA, Immunoprecipitation, Immunodiffusion, Double diffusion, Agglutination, Ab therapy.

Recommended Books:

1. Kuby Immunology. Goldsby, R.A., Thomas J Kindt, Barbara, A Osborne, and Kuby, Janis. W.H



Paper-IX	BMLT-203	Biomedical Techniques
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Water, Acids, and Bases

Physical properties and structure of water, solvent properties of water, ionic product of water and the pH scale, ionization of acids and bases, salt hydrolysis, pH changes in acid-base titrations (weak and strong), Hasselbach-Henderson equation, buffer solutions, buffer index, buffer capacity. Principles of glass and reference electrodes, types of electrodes.

Microscopy

Basic principles and application of light, phase contrast, darkfield, fluorescence, interference, polarizing scanning, and transmission electron microscopy, Freeze fracture, fixation, and staining.

Centrifugation

Basic Principles of sedimentation different types of centrifuges and their use of subcellular fractions.

Chromatography

The general principle of separation and classification of Chromatography. Principles of adsorption, partition, size exclusion and ion-exchange chromatography. A thin layer, Gas, supercritical and High-performance liquid chromatography.

Spectroscopy

Basic concepts and application of UV-Visible, fluorescence, IR, NMR, X-ray diffraction, CD, ORD spectroscopy, mass spectrometry in structure determination of biomolecules.

Electrophoresis

Basic principles, instrumentation and applications, moving boundary and zonal electrophoresis including paper and gel (SDS PAGE and Agarose) electrophoresis, isoelectric focusing, PFGE, and Capillary electrophoresis

Radioisotopic techniques

Principles and application of tracer techniques in biology, radioactive isotopes and half-life of isotopes, liquid scintillation, GM counter. Effect of radiation on biological system, radio-active labeling of biological macromolecules, autoradiography and radiation dosimetry.

Books referred:

1. *Biophysical Chemistry, Principles and Techniques* by Upadhyay, Upadhyay & Nath
2. *Principles and Techniques of Biochemistry and Molecular Biology* by Wilson & Walker.



Paper-X BMLT-204 Medical Biochemistry

Metabolism & Metabolic disorders

- **Carbohydrate Metabolism** (Glycolysis, Aerobic Respiration, Krebs's Cycle, Oxidative phosphorylation, Glyoxylate Pathway, Pentose Phosphate Pathway, Gluconeogenesis, Glycogenesis, Glycogenolysis) and related diseases i.e. Diabetes Mellitus, Galactosuria, Fructosuria, Hunter's Syndrome and Glucose Tolerance Test, Glucose Storage Diseases.
- **Lipid Metabolism** (Lipogenesis, Fatty Acid Synthesis, Fatty Acid Oxidation, Biosynthesis and Degradation of Cholesterol, Formation of Ketone Bodies) and related diseases i.e. Gaucher's disease, Tay-Sacch's disease, Hypercholesterolemia, Fatty Liver, Obesity, Atherosclerosis.
- **Protein Metabolism** (Biosynthesis of Amino Acids, Amino Acids Catabolism, Nitrogen Excretion and Urea Cycle) and related diseases. e. Albinism, Phenylketonuria, Alkaptonuria, Maple-Syrup Urine Disease (MSUD).
- **Nucleic Acid Metabolism** (*Nucleotide Synthesis- Salvage Pathway and de novo Pathway, Nucleotide Degradation- Formation of Uric Acid*) and related diseases i.e. Lesch-Nyhan Syndrome, Van-Gierke's disease, Gout). **Cut**
- **Porphyrin metabolism** (Biosynthesis and Degradation of Heme) and related diseases- i.e. Jaundice-types, diagnosis and treatment, Porphyrias.
- **Mineral Metabolism** (Macroelements and Microelements) and related diseases. e. Anemia, Cushing's syndrome, Rickets, Osteoporosis, Menke's disease, Wilson's disease, Fluorosis.

Biochemical changes in body fluids-

- Blood-** composition, alteration in pathological conditions.
- Urine-** composition, alteration in pathological conditions.
- Cerebrospinal Fluid-** composition, alteration in pathological conditions.

Organ function tests:

- Renal function tests
- Liver function tests.
- Gastric function tests.

Cancer Biochemistry-

Benign and Malignant Tumor, Properties of Tumor Cells, Molecular basis of Cancer, Carcinogens, Oncovirus, Tumor Markers, Treatment and Prevention of Cancer.

Books:

1. Text Book of Biochemistry with clinical Correlation by: Thomas M Devlin
2. Lecture Notes on Clinical Biochemistry by Beckett, Walker, Rae and Ashby
3. Principle of Biochemistry: Lehninger by Nelson & Cox



Paper-XI BMLT-205 Practical-III (Medical Microbiology and Immunology)

Medical Microbiology

1. Demonstration of various sterilization techniques used in the laboratory.
2. Aseptic culture preparation.
3. Microscopic examination and identification of bacteria
4. Microscopic examination and identification of the fungus.
5. Identification of fruiting bodies of *mucor*, *penicillium*, and *rhizopus*.
6. Staining of *conidia*.
7. Preparation of minimal media for culture of bacteria.
8. Culture of bacteria and development of the bacterial colony
9. Permanent slides.
10. Agglutination test

Immunology & Immunodiagnosics

Demonstration of Immunological techniques

- a) Cell Adhesion Assay, Phagocytosis Assay
- b) Indirect Haemagglutination
- c) Dot ELISA technique
- d) RIA (Radio Immunoassay)
- e) Single Immunodiffusion technique
- f) Double Diffusion Immuno technique
- g) Immunoprecipitation technique
- h) Lymphocyte Separation
- i) Immunoelectrophoresis
- j) Blood Group Analysis



Paper-XII	BMLT-206	Practical-IV (Biomedical Techniques and Medical Biochemistry)
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Biochemical Techniques

1. Calibration of pH meter and measurement of a given solution.
2. Measurement of pH of different water samples collected from various water reservoirs of Jhansi.
3. Measurement of pKa of acetic acid.
4. To analyze different amino acids by paper chromatography and TLC
5. Separation of pigments from leaves by paper chromatography and TLC
6. Demonstration of a centrifuge machine.
7. Centrifugation of RBCs from the blood.
8. Demonstration of Agarose Gel Electrophoresis.
9. Demonstration of SDS-PAGE.
10. Extraction and estimation of chlorophyll by spectrophotometer

Medical Biochemistry

1. Introduction Aim, basis, interpretation, safety in Medical Biochemistry Laboratory
2. Laboratory organization Instruments, glassware, sample collection & specimen labeling, routine tests, anticoagulants, reagents, cleaning of glassware, isotonic solution, standardization of methods, preparation of solution & interpretation of the result, normal values.
3. Collection of the blood sample by finger prick method for a blood test.
4. Identification of Carbohydrates (qualitative tests).
5. Identification of Proteins (qualitative tests). Measurement of total protein from the blood
6. To study general properties of the enzyme (Urease) & Achromatic time of Salivary amylase.
7. Urine analysis – normal & abnormal constituents of urine. Detection of protein amount in the urine sample, Estimation of urine sugar. Detection of pus cells in a urine sample
8. CSF & Semen Analysis - Gross & Microscopic.
9. Colorimetric measurement of blood sugar, Glucose tolerance test & Glycosylated haemoglobin.
10. Uses, Care and Maintenance of various instruments of the laboratory.
11. Preparation and study of charts of different metabolic disorders.



Detailed Syllabus of B.Sc. MLT III Year

Paper-XIII	BMLT- 301	Human Physiology & Anatomy
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Digestive System: Antinomy of Alimentary Canal, Movement of Food and Secretary Functions, Digestion, Absorption, Regulation of Secretions and Motility, Basal Metabolic Rate, Nutrition, Dietary Balances.

Body Fluids: ECF, ICF, TCF, Composition & functions of different types of body fluids, Blood, Blood Cells, Lymph, Composition and functions, Erythropoiesis, Blood Groups, Rh factors, Blood Coagulation, Blood Pressure, Regulation of Blood Pressure.

Cardiovascular System: Physiology of Cardiac Muscle, Anatomical Structure and Functions of Heart, Circulation, Origin and Conduction of Cardiac Impulses, Cardiac Cycle, Cardiac Output, ECG, Heart Sounds, Cardiac disorders as Arrhythmia, Myocardial infarction, Coronary Artery blockage, Angiography, Angioplasty.

Nervous System: Nervous system, Structure of nerve cells, Origin and conduction of Membrane Potential, Excitation of nerve fiber, Basic functions of Synapses, Saltatory Nerve Transmission.

Sensory System: General & Special Senses, Sensory Receptors, Anatomy & Physiology of Eye and Ear, Physiology of Vision, Hearing, Taste, Smell, and Touch, Regulation of Body Temperature.

Respiratory System: Anatomical Structure of Lungs, Mechanism of Breathing, Transport of Gases, Regulatory Mechanism, O₂ Dissociation Curves, Chloride Shift, Bohr Effect, Haldane Effect, Artificial Respiration.

Excretory System: Physiology & Anatomy of Excretory Organs, Urine Formation, Counter Current Principle, Controlling Factors, Micturition, Regulation of Body Fluids and Acid Base Balance.

Muscular System: Physiology and Anatomy of Skeletal Muscle, Molecular Mechanism of Muscle Contraction, Excitation-Contraction Coupling, Abnormalities.

Endocrine System: Anatomy and Physiology of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal, Pineal Gland, Gonads and Hypothalamus, Feedback Mechanism, Control of Endocrine Secretion.

Reproductive System: Anatomy and Physiology of reproductive organs, Hormonal Regulation of Ovulation, Fertilization, Implantation, Gestation, Parturition and Lactation, Oogenesis, Spermatogenesis.

Books Referred:

1. *Instant Notes of Human Physiology by Dr. Lavkush Dwivedi*
2. *TextBook of Medical Physiology by Guyton and Hall*
3. *Textbook of Physiology by Ganong and by Tortora*



Historical background, important discoveries, general aspects, pathogenicity.

- **Disorders of cells and tissues:** Hypoplasia, Hyperplasia, Hypertrophy, Metaplasia Neoplasia.
- **Disorders of blood cells and heart:** WBC and RBC disorders, Hemorrhagic diseases, Abnormal Hemoglobin, Arteriosclerosis, Embolism, Heart diseases, Hypertension, Hemorrhage, and Hemorrhage Shock.
- **Disorders of the respiratory tract:** Tonsillitis, Bronchitis, Asthma, Emphysema, Cough, CO poisoning, Hypoxia.
- **Disorders of the digestive tract:** Gastritis, Ulcers, diseases of pancreas and liver, Constipation and Diarrhea.
- **Disorders of excretory system:** Nephritis, Acidosis, and Disorders of Urination.
- **Disorders of the nervous system:** Sclerosis, Migraine, Depression, Schizophrenia, Neurosis, Epilepsy, Parkinsonism.
- **Disorders of the reproductive system:** Impotency, Infertility, Abortions, Menopause and other abnormalities.
- Disorders of bones, joints and cartilages.
- Autoimmune Disorders
- Cancer

Books referred:

1. *Text Book of Pathology by Harsh Mohan*
2. *Text Book with clinical Correlation by Thomas M Devlin*



Paper-XV	BMLT-303	Community Medicine
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- 1. Natural History of Disease:** Determinants of health, multifactorial causation of disease host, agent, and environment relationship primary, secondary and tertiary levels of prevention with examples related to few diseases of national importance.
- 2. Mode of Transmission of Disease:** Airborne, vector and vehicle transmission; Methods of control with examples for control of each mode.
- 3. Disinfection:** Disinfection of the infective materials received in the Laboratory by using the appropriate disinfection methods, at the health center level.
- 4. Health Services:** Brief description of the organization of health services at the center and state levels; Primary Health Care - Definition, components and principles of primary health care; Health for all indicators; Primary Health Centre - The functions, staffing pattern and the role of laboratory technicians in Primary Health Centre.
- 5. National Programmes of Health and Disease Eradication /Control:** Health Programmes, Family Welfare Programme, National Programme for water supply and sanitation, Nutritional Programmes, Immunization, and universal immunization programme; Disease Eradication programme - Leprosy & Guinea worm; Disease control programmes - Tuberculosis, Malaria, Filariasis, S.T.D, Goitre, Cholera and other diarrhoeal diseases and National Programme for prevention of blindness including trachoma.
- 6. Demography & Population Control:** The factors influencing population growth, death rate, birth rate and methods of contraception.
- 7. Biostatistics:** Application of statistical principles in history; Presentation of data, calculation of mean, median and mode, range and standard deviation and their significance; Significance of 'T' test, Chi-square values.
- 8. Environmental Sanitation:** Methods of water purification and disinfection, collection of water samples, their transport and bacteriological analysis; Methods of excreta disposal.



Paper-XVI BMLT-304 Principles of Lab Management & Medical Ethics

Unit-I

Ethical Principles and standards for a clinical laboratory professional duty to the patient, the duty to colleagues and other professionals, Good Laboratory Practice (GLP), Introduction to Basics of GLP and Accreditation, Aims of GLP and Accreditation, Advantages of Accreditation, Brief knowledge about National and International Agencies for clinical laboratory accreditation

Unit-II

Awareness/Safety in a clinical laboratory, General safety precautions. HIV: pre-and post-exposure guidelines, Hepatitis B & C: pre-and post-exposure guidelines, Drug-Resistant Tuberculosis Patient management for clinical samples collection, transportation and preservation, Sample accountability, Purpose of accountability, Methods of accountability

Unit-III

Sample analysis: Introduction, factors affecting sample analysis, reporting results, the basic format of a test report, reported reference range, clinical alerts, abnormal results, results from referral laboratories, the release of examination results, alteration in reports

Unit-IV

Quality Management system: Introduction, Quality assurance, Quality control system, Internal and External quality control, quality control chart Biomedical Introduction and importance of calibration and Validation of Clinical Laboratory instrument Ethics in Medical laboratory Practice, Ethics concerning to Pre-Examination procedures, Examination procedures, reporting of results, preserving medical records Procurement of equipment and Inventory Control,

Unit-V

Audit in a Medical Laboratory, Introduction and Importance, NABL & CAP, Responsibility, Planning, Horizontal, Vertical and Test audit, Frequency of audit, Documentation



Human Physiology & Anatomy

1. Study of the different human systems using torso model.
2. Blood group detection.
3. Measurement clotting time and Bleeding time (CT&BT) of blood by duke method.
4. To perform Total Leukocyte Count (TLC).
5. To perform Total RBC Count.
6. Measurement of blood pressure.
7. Measurement of body temperature.
8. Preparation of haemin crystals.
9. To perform Pulmonary Function Tests.
10. To perform cardiac Efficiency Test.



Paper-XVIII BMLT-306 Practical-VI (Clinical Pathology)

Clinical Pathology

1. Estimation of ESR by wintrob’s method.
2. Estimation from blood.
 - a. Sugar
 - b. Urea
 - c. Creatinine
 - d. Cholesterol
 - e. Billrubin
3. Estimation from urine
 - a. Urea
 - b. Bacterial contamination
 - c. Ketone bodies
 - d. Blood
 - e. Bile pigment
 - f. Creatinine
 - g. Urobilinogen

Program Outcomes (POs)

Programme Outcomes (POs): It represents the knowledge, skills and attitudes the students should have at the end of B.Sc. M.L.T.

PO1	Domain Knowledge	Develop and strengthen theoretical, conceptual and applied knowledge of Medical Laboratory Technology.
PO2	Problem Analysis	Enable use of critical, logical and reflective thinking to construct reasonable arguments and analyze complex phenomenon with strategic decision-making process.
PO3	Design/Development Solutions	Construct and design effective solutions by applying recent and advanced Medical Laboratory Technology in disease diagnosis.



PO4	Conduct Investigation of Complex Problems	Developing and applying new techniques and tools of optimization and diagnosis of diseases, which were difficult to diagnose through conventional diagnostic tools and techniques.
PO5	Modern Tool Usage	Develop the ability to apply and implement quantitative and qualitative tools and techniques of advance diagnosis to detect and diagnose diseases.
PO6	The Citizen and the Society	Enable students to become informed and responsible citizens by inculcating the practice of rational, ethical thinking and optimal decision-making to minimize resource wastage.
PO7	Environment and Sustainability	Enhance practical insights towards energy efficiency and sustainable development models by demonstrating solutions from environmentally friendly techniques.
PO8	Ethics	Apply the existing ethical guidelines in research thinking and community development
PO9	Individual and Team Work	Manage and build high performance teams by understanding the role of incentives, scientific virtue, decent work and pillars of organization efficiency.
P10	Communication	Practice effective oral and written communication to be able to convey advanced



		disease diagnostic theories and models in a pragmatic manner to the stakeholders of the society.
PO11	Project Management	Predict and analyze the role of new diagnostic techniques and policies on overall medical issues of society.
PO12	Life-Long Learning	Raise awareness on the importance of constant upskilling in the wake of diseases diagnosis and education along with effective demonstration of usage of existing resources.

Programme Specific Outcome: (PSO's):

Programme specific Outcomes (PSO's): are statements that describe what the students of BMLT should be able to do.

PSO1: To impart in-depth knowledge to student about different diagnostic techniques associated with the diseases and its factors, in human body

PSO2: To develop student understandings about the cellular functioning and the metabolism/synthesis of biomolecules.

PSO3: To give students in depth knowledge into special field of choice like Microbiology, Blood Banking, Biochemistry, Immunology etc.

PSO4: To make student familiar with different advance Medical Diagnostic Laboratory Techniques for the diagnosis of different diseases and symptoms.

PSO5: Students would know how to analyse biological specimens and other body fluids; their analysis can help to guide medical professionals for decision making.

PSO6: Student would development the knowledge about the laboratory management and working ethics along with the biomedical waste management.

PSO7: To sensitize student, allowed to play a integral role in the health care system without being in the spotlight.



Course Outcome:

Following are the course outcome for of B.Sc. Medical Laboratory Technology

Ist Year			
S. No.	Course Code	Course Name	Course Outcome
1.	BMLT-101	Cytology	<ul style="list-style-type: none">• To understand about the living cell and its organelles.• To understand the functioning and structure of the cell organelles.
2.	BMLT-102	Biochemistry	<ul style="list-style-type: none">• To understand about role of biomolecules and their importance in living cells.• To understand about the structure and functioning of biomolecules in living cell.
3.	BMLT-103	Blood Banking & Hematology	<ul style="list-style-type: none">• To understand the blood components and the factors associated with blood• To understand the parameters of blood grouping, detection.
4.	BMLT-104	Health Education & Biomedical Waste Management	<ul style="list-style-type: none">• To understand the importance of health education for society.• To manage biomedical waste product and its safe remediation.
IInd Year			
S. No.	Course Code	Course Name	Course Outcome
1.	BMLT-201	Medical Microbiology	<ul style="list-style-type: none">• To understand the micro-organisms and their mode of action against human body.• To understand the diseases caused by micro-organisms.• To understand the role and usage of micro-organisms for economic benefits such as production of vitamins, antibiotics and biopesticides.
2.	BMLT-202	Immunology & Immunodiagnostics	<ul style="list-style-type: none">• To understand the factors associated with immune



			<p>system and its functioning against any infection.</p> <ul style="list-style-type: none">• To understand the immunological diagnostic approaches against different infections.
3.	BMLT-203	Biomedical Techniques	<ul style="list-style-type: none">• To understand the techniques associated with biomedical research and diagnostics.• To understand the new approaches and techniques associated with biomedical sciences.
4.	BMLT-204	Medical Biochemistry	<ul style="list-style-type: none">• To understand the role in metabolism & synthesis of biomolecules in living cells.• To understand the mode of action of biomolecules and their pathways.
IIIrd Year			
S. No.	Course Code	Course Name	Course Outcome
1	BMLT-301	Human Physiology and Anatomy	<ul style="list-style-type: none">• To help in understanding the health status of patients• It helps in assessing ,evaluating ,diagnosis and tracking a patient's health/human health
2	BMLT-302	Clinical Pathology	<ul style="list-style-type: none">• To identify the cause of uneasiness in human body• To diagnose and manage disease by use of every component of laboratory medicine and every diagnostic technique.
3	BMLT-303	Community Medicine	<ul style="list-style-type: none">• To protect and promote the health and well-being of communities and populations through Primary Health care approach.• To improve health by addressing the structures and system that define a place
4	BMLT-304	Principle of Lab Management & Medical Ethics	<ul style="list-style-type: none">• To understand the management of laboratory and working ethics



			<ul style="list-style-type: none">To understand the practices associated with GLP (Good Laboratory Practices)
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Dr. Lavkush Dwivedi



Balbir Singh



Prof. Madhu Tripathi

Prof. SP Singh

Prof. Anand Kar



**Dr. Rambir Singh
Convener**