BLDE
(DEEMED TO BE UNIVERSITY)

Choice Based Credit System (CBCS)

Revised Curriculum

M.Sc. Medical Programme in Microbiology

2025-26

Published by
BLDE
(DEEMED TO BE UNIVERSITY)
Declared as Deemed to be University u/s 3 of UGC Act, 1956, vide notification No. F.9-37/2007-U.3 (A)
The Constituent College

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA
Smt. Bangaramma sajjan Campus, B. M. Patil Road (Sholapur Road), Vijayapura - 586103, Karnataka, India.
BLDE (DU) Phone: +9108352-262770, Fax : +918352-263303, Website : www.bldedu.ac.in, E-mail: office@bldedu.ac.in
College Phone : +918352-262770, Fax : +918352-263019, E-mail: bmpmc.principal@bldedu.ac.in

BLDE

(DEEMED TO BE UNIVERSITY)

Declared as Deemed to be University u/s 3 of UGC Act, 1956
Accredited A Grade by NAAC (Cycle-2)

BLDE(DU)/REG/M.Sc. Med. Curri./2025-26/ 5322 December 24, 2025

NOTIFICATION

Sub: Revision of Curriculum of M.Sc. Medical Programme in Anatomy, Physiology, Biochemistry, Microbiology & Pharmacology.

Ref: Approval of Hon'ble Vice-Chancellor vide no. 2245 dtd. 24.12.2025

On approval of the Hon'ble Vice-Chancellor, the revised curriculum for M.Sc. Medical Programme in Anatomy, Physiology, Biochemistry, Microbiology & Pharmacology by following the Choice Based Credit System (CBCS) offered under the Faculty of Medicine has been approved and is hereby notified.

The Curriculum shall be effective from the Academic Session 2025-26 onwards, for the M.Sc. Medical Programmes offered under the Shri. B. M. Patil Medical College Hospital & Research Centre.

REGISTRAR
REGISTRAR
BLDE(Deemed to be University)
Vijayapura-586103. Karnataka

Copy to:

- The Secretary, NMC, New Delhi
- The Secretary, UGC, New Delhi
- The Controller of Examinations
- The Principal, SBMPMCH&RC
- The Dean, Faculty of Medicine
- The HoD of Pre & Para Clinical Departments
- The Coordinator, M.Sc. Medical Programmes
- The Co-ordinator/ Director, IQAC
- The Assistant Registrar

Copy respectfully submitted to:

- The Hon'ble Pro-Chancellor
- The Hon'ble Vice-Chancellor

Vision:

- To be a Leader and be recognized as an Institution striving for maintenance and enhancement of Quality Medical Education and Healthcare"

Mission:

- To be committed to promote sustainable development of higher education including Health science education, consistent with the statutory and regulatory requirements.
- Reflect the needs of changing technology and make use of the academic autonomy to identify the academic programs that are dynamic.
- Adopt global concepts in education in the healthcare sector.

SEMESTER I								
Course Code	**Course Name Medical Anatomy**	**Credits**	**Teaching Hours pe week**			**Marks**		
			L	**SDL**	**P**	**Internal Assessment**	**Semester Exam**	**Total**
Theory								
MANA 1.1 T	Medical Anatomy	4	4	1		20	80	100
MPHY 1.2 T	Medical Physiology	4	4	1		20	80	100
MBCHM 1.3 T	Medical Biochemistry	4	4	1		20	80	100
Practical								
MANA 1.1 P	Medical Anatomy	3			6	20	80	100
MPHY1.2 P	Medical Physiology	3			6	20	80	100
MBCHM 1.3 P	Medical Biochemistry	3			6	20	80	100
Elective Course (Any One)								
1.4 GE	Introduction to Quality Patient & Safety	3	3			100	--	100
1.5 GE	Computer Application					100	--	100
Total		**24**	**36**			**220**	**480**	**700**

SEMESTER II								
Course Code	**Course Name**	**Credits**	**Teaching Hours Per week**			**Marks**		
			L	**SDL**	**P**	**Internal Assessment**	**Semester Exam**	**Total**
Theory								
MANA 2.1	Medical Anatomy	4	4	1		20	80	100
MPHY 2.2	Medical Physiology	4	4	1		20	80	100
MBCHM 2.3	Medical Biochemistry	4	4	1		20	80	100
MCOM 2.4	Research Methodology & Biostatistics	3	3			20	80	100
Practical								
MANA 2.1P	Medical Anatomy	3			6	20	80	100
MPHY 2.2 P	Medical Physiology	3			6	20	80	100
MBCHM 2.3 P	Medical Biochemistry	3			6	20	80	100
Total		**24**	**36**			**140**	**560**	**700**

SEMESTER III						
Course Code	**Course Name**	**Credits**	**Teaching Hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 3. 1	General Microbiology	4	4	20	80	100
MMB 3. 2	Immunology	4	4	20	80	100
Core Elective Course						
MMB 3.3	Molecular Biology	3	2	100	--	100
MMB 3.4	Nano Biotechnology					
MMB 3.5	Sterilization Posting	2	6	100	--	100
MMB 3.6	Media Preparation Posting	2	6	100	--	100
MMB 3.7	Serology Posting	2	6	100	--	100
Practical						
MMB 3.1 P	Geneal Microbiology	2	4	20	80	100
MMB 3.2 P	Immunology	2	4	20	80	100
	Total	**21**	**36**	**480**	**320**	**800**

SEMESTER IV						
Course Code	**Course Name**	**Credits**	**Teaching Hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 4.1	Systemic Bacterilogy - I	4	4	20	80	100
MMB 4.2	Systemic Bacterilogy - II	4	4	20	80	100
Elective Course						
MMB 4.3	IPR (Electives)	3	2	100	--	100
MMB 4.4	Bioinformatics (Electives)					
MMB 4.5	Media Preparation Postings	2	6	100	--	100
MMB 4.6	Bacteriology Posting	2	6	100	--	100
MMB 4.7	Central Research Laboratory Posting	2	6	100	--	100
Practical						
MMB 4.1 P	Systemic Bacterilogy - I	2	4	20	80	100
MMB 4.2 P	Systemic Bacterilogy - II	2	4	20	80	100
	Total	**21**	**36**	**480**	**320**	**800**

SEMESTER V						
Course Code	**Course Name**	**Credits**	**Teaching Hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 5.1	Virology	4	4	20	80	100
MMB 5.2	Mycology	4	4	20	80	100
Elective Course						
MMB 5.3	Library Module	3	2	100	--	100
MMB 5.4	Hospital Infection Control					
MMB 5.5	Virology Posting	2	6	100	--	100
MMB 5.6	Mycology Posting	2	6	100	--	100
MMB 5.7	Hospital Infection Control Posting	2	6	100	--	100
Practical						
MMB 5.1 P	Virology	2	4	20	80	100
MMB 5.2 P	Mycology	2	4	20	80	100
	Total	**21**	**36**	**480**	**320**	**800**

SEMESTER VI						
Course Code	**Course Name**	**Credits**	**Teaching Hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 6.1	Protozoalogy & Applied Microbiology	4	4	20	80	100
MMB 6.2	Helminthology	4	4	20	80	100
MMB 6.3	Protozoalogy Posting	2	6	100	--	100
MMB 6.4	Helminthology Posting	2	6	100	--	100
MMB 6.5	Biomedical Waste management & CSSD Posting	2	6	100	--	100
Practical						
MMB 6.1 P	Protozoalogy & Applied Microbiology	3	6	20	80	100
MMB 6.2 P	Helminthology	3	6	20	80	100
	Total	**21**	**38**	**380**	**320**	**700**

Rules and Regulations of Curriculum
M.Sc. Medical Microbiology

Definitions of Key Words:

1. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year. Choice Based Credit System (CBCS).
2. The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
3. **Course:** Usually referred to, as "papers" is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ outreach activities/ project work/ viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
4. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
5. **Credit:** A unit by which the course work is interpreted. It functions the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
6. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the sum total of the credit points obtained by the student in various courses in all semesters and the sum of the total credits of all courses in all the semesters.
7. **Grade Point:** It is a numerical marking allotted to each letter grade on a 10-point scale.
8. **Letter Grade:** It is an appreciated point of the student's performance in a selected course. Grades are denoted by letters O, A+, A, B, C and RA x. Programme: An educational programme leading to award of a degree certificate.
9. **Semester Grade Point Average (SGPA):** It is index of performance of all performance of work in a semester. Its total credit points obtained by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
10. **Semester:** Each semester will consist of minimum of 180 working days. The odd semester may be scheduled from June/ July to December and even semester from December/ January to June.

Duration of Study Programme:

The duration of the study for M.Sc. Medical Microbiology will be of 3 years.

Program pattern:

- First Semester: July
- Second Semester: January
- Third Semester: July
- Fourth Semester: January
- Fifth Semester- July
- Sixth Semester-January

Eligibility Criteria:

A candidate seeking admission into this course shall have one of the following qualifications

a) B.Sc. Degree with life sciences as one of the optional
b) M.B.B.S

Any of the following bachelor degree passing with not less than II class

a) B.Sc graduates of biological Sciences.
b) B.Sc. Zoology/Microbiology/Botany/Physiology
c) Other health sciences
d) BHMS
e) BAMS
f) B.Vsc

Medium of Instruction:

English shall be the Medium of Instruction for all the Subjects of study and for examinations.

CBCS – Definition and benefits: Choice Based Credit System is a flexible system of learning. The distinguishing features of CBCS are the following:

- It permits students to learn at their own pace.
- The electives are selected from a wide range of elective courses offered by the other University Departments.
- Undergo additional courses and acquire more than the required number of credits.
- Adopt an inter-disciplinary and intra-disciplinary approach in learning.
- Make best use of the available expertise of the faculty across the departments or disciplines
- Has an inbuilt evaluation system to assess the analytical and creativity skills of students in addition to the conventional domain knowledge assessment pattern

Semester System and Choice Based Credit System:

The semester system initiates the teaching-learning process and screws longitudinal and latitudinal mobility of students in learning. The credit-based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice-based credit system provides a sun shone" type approach in which the students can take choice of courses, learn and adopt an interdisciplinary approach of learning.

Semesters:

An academic year consists of two semesters:

	PG
Odd Semester 1st, 3rd & 5th Semester	August - January
Even Semester 2nd, 4th & 6th Semester	February – July

Credits:

Credit defines the coefficient of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/ tutorial laboratory work and other forms of learning required, to complete the course contents in a 15–20-week schedule:

a) **1 credit** = 1 hour of lecture per week

b) **3 credits** = 3 hours of instruction per week

√ Credits will be assigned on the basis of the lectures (L) / tutorials (T) / Clinical Training (CR) / laboratory work (P) / Research Project (RP) and other forms of learning in a 15- 20 week schedule L - One credit for one hour lecture per week

c) **P/T** - One credit for every two hours of laboratory or practical

d) **CR** - One credit for every three hours of Clinical training/Clinical rotation/posting

e) **RP** - One credit for every two hours of Research Project per week – Max Credit 20- 25

	Lecture – L	**Tutorial – T**	**Practical – P**	**Clinical Training/ Rotation – CT/CR**	**Research Project – RP***
1 Credit	1 Hour	2 Hours	2 Hours	3 Hours	2 Hours
RP*	Maximum Credit 20-25/ Semester				

Types of Courses: Courses in a programme may be of three kinds:

- Core Course
- Elective Course
- Ability Enhancement Compulsory Courses

Core Course: A course, which should compulsorily be studied by a candidate as a basic requirement is termed as a Core course. There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a basic requirement to complete programme of respective study.

Elective Course: A course which can be chosen from a very specific or advanced the subject of study or which provides an extended scope or which enables an exposure to some other domain or expertise the candidate's ability is called an Elective Course.

Discipline Specific Elective (DSE) Course: Elective courses offered by the main subject of study are referred to as Discipline Specific Elective. The University / Institute may also offer discipline related Elective courses of interdisciplinary nature. An elective may be "Discipline Specific Electives (DSE)" gazing on those courses which add intellectual efficiency to the students.

Dissertation / Project: An Elective/Core course designed to acquire special / advanced knowledge, such as supplement study / support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher / faculty member is called dissertation / project.

Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa and such electives may also be referred to as Generic Elective.

Ability Enhancement Compulsory Courses: The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement

- Environmental Science and English/MIL Communication. These are mandatory for all disciplines.

Assigning Credit Hours per Course: While there is flexibility for the department's in allocation of credits to various courses offered, the general formula would be:

- All core course should be restricted to a maximum of 4 credits.
- All electives should be restricted to a maximum of 3 credits.
- All ability enhancement course should be restricted to a maximum of 2 credits.
- Projects should be restricted to a maximum of 20-25 credits.

Rules and Regulation for Examination of M.Sc. Medical Microbiology under CBCS Pattern

1. **Title of the Programme offered:** M.Sc. Medical Microbiology
2. **Duration of the Programme:** Three years.
3. **Medium of instruction:** The medium of instruction and examination shall be in English

Letter Grades and Grade Points:

Adopted the UGC recommended system of awarding grades and CGPA under Choice Based Credit Semester System.

4.1 Would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

4.2 The UGC recommended 10-point grading system with the following letter grades will be followed:

Table 1: Grades and Grade Points:

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B (Good)	7
C (Above Average)	6
F (Fail)/RA (Reappear)	0
Ab (Absent)	0
Not Completed (NC)	0
RC (< 50% in attendance or in Internal Assessment)	

4.3 A student obtaining Grade F/RA will be considered failed and will require reappearing in the examination.

4.4 Candidates with NC grading are those detained in a course (s); while RC indicate student not fulfilling the minimum criteria for academic progress or less than 50% attendance or less than 50% in internal assessments (IA). Registrations of such students for the respective courses shall be treated as cancelled. If the course is a core course, the candidate has to re- register and repeat the course when it is offered next time.

CBCS Grading System - Marks Equivalence Table

5.1 Table 2: Grades and Grade Points

Letter Grade	Grade	% of Marks
O (Outstanding)	10	86-100
A+ (Excellent)	9	70-85
A (Very Good)	8	60-69
B (Good)	7	55-59
C (Above Average) – **Passing Criteria for M.Sc. Medical Microbiology**	6	50-54
F (Fail) / RA (Reappear)	0	Less than 50
Ab (Absent)	0	-
NC - Not Completed	0	-
RC – Repeat the Course	0	0

Table 3: Cumulative Grades and Grade Points

Letter Grade	Grade	% of Marks
O (Outstanding)	10	9.01 – 10.00
A+ (Excellent)	9	8.01 – 9.00
A (Very Good)	8	7.01 – 8.00
B (Good)	7	6.00 – 7.00
C (Above Average)	6	5.01 – 6.00

Assessment of a Course: Evaluation for a course shall be done on a continuous basis. Uniform procedure will be adopted under the CBCS to conduct internal assessments (IA), followed by one end-semester university examination (ES) for each course.

6.1 For all category of courses offered (Theory, Practical, Discipline Specific Elective [DE]; Generic Elective [GE] and Ability Enhancement Courses [AE]; Skills Enhancement Courses [SE] Theory or P (Practical) & RP (Research Project), assessment will comprise of Internal Assessment (IA) in the form of continuous comprehensive evaluation and mid-semester exam, end–semester (ES) examination or college exam as applicable.

6.2 Courses in programs wherein Theory and Practical/Clinical are assessed jointly. The minimum passing head shall be 40% for theory and practical including internal assessment individually and 50% aggregate of theory, practical and internal assessment. RA grade in any one of the components will amount to reappearing in both components. i.e. theory and practical.

6.3 Evaluation for a course with clinical rotation or clinical training will be done on a continuous basis.

Eligibility to appear for the end-semester examinations for a course includes:

7.1 Candidates having ⩾ 75% attendance and obtaining the minimum 50% in internal assessment in each course to qualify for appearing in the end-semester university examinations.

7.2 The students desirous of appearing for university examination shall submit the application form duly filled along with the prescribed examination fee.

7.3 Incomplete application forms or application forms submitted without prescribed fee or application form submitted after due date will be rejected and student shall not be allowed to appear for examination.

Passing Heads

8.1 Courses where theory and practical are involved, the minimum passing head shall be 40% for theory and practical including internal assessment individually and 50% in total (theory + practical) including the internal assessment.

8.2 Elective subjects – the minimum prescribed marks for a pass in elective subject should be 50%. The marks obtained in elective subjects should be communicated to the university before the commencement of the university examination.

Detention: A student not meeting any of the above criteria maybe detained (NC) in that particular course for the semester. In the subsequent semester, such a candidate requires improvement in all, including attendance and/or IA minimum to become eligible for the next end-semester examination.

The maximum duration for completing the program will be 6 years (minimum duration of program x 2) i.e. (3x2) = 6 years, failing which his/her registration will be cancelled. Full fees of entire program of 3 years may be liable to be paid by the students.

Carry over benefit:

11.1 The candidate can carry forward for classes until final semester irrespective of the university examination result status.

11.2 However, a candidate shall clear all the courses of first semester to appear in the third semester end examination.

11.3 Similarly, second semester courses shall be cleared to appear in the fourth semester end examination.

11.4 Third semester courses shall be cleared to appear in the fifth semester end examination.

11.4 Fourth semester courses shall be cleared to appear in the sixth semester end examination.

Grace Marks for PG Courses:

12.1 A student shall be eligible for grace marks, provided he/she appeared in all the papers prescribed for the examination.

12.2 Maximum up to 5 grace marks may be allowed for passing, spread over between subjects.

12.3 No grace marks will be awarded in internal evaluation.

12.4 No grace marks shall be awarded for promotion to higher class, for example 2nd class to 1st class and 1st class to distinction etc.

University End-Semester Examinations

13.1 There will be one final university examination at the end of every semester.

13.2 A student must have minimum 75% attendance (Irrespective of the type of absence) in theory and practical in each subject to be eligible for appearing the University examination.

13.3 The Principal / Director shall send to the university a certificate of completion of required attendance and other requirements of the applicant as prescribed by the university, two weeks before the date of commencement of the written examination.

13.4 A student shall be eligible to sit for the examination only, if she / he secure a minimum of 50% in internal assessment (individually in theory and practical as applicable). Internal examination will be conducted at college/department level.

13.5 Notwithstanding any circumstances, a deficiency of attendance at lectures or practical maximum to the extent of 10% - may be condoned by the Principal / Director.

13.6 If a student fails either in theory or in practical, he/ she have to re-appear for both.

13.7 There shall be no provision of re-evaluation of answer sheets. Student may apply to the university following due procedure for recounting of theory marks in the presence of the subject experts.

13.8 Internal assessment shall be submitted by the Head of the Department to the University through Dean at least two weeks before commencement of University theory examination.

Supplementary examination:

The supplementary examination will be held in the next semester. Eligibility to appear for supplementary examination will be as per rule number 11.1-11.5.

Re-Verification

There shall be provision of re-totaling of the answer sheets; candidate shall be permitted to apply for recounting/re-totaling of theory papers within 8 days from the date of declaration of results.

Scheme of University Exam Theory PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, for PG program are given in the following tables. Changes may be incorporated as per requirements of specific courses.

Dissertation work:

During the course of study every candidate has to prepare a dissertation work on a selected topic under the guidance of a recognized post-graduate teacher. The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, and comparison of results and drawing conclusions.

Every candidate shall submit to the Registrar (Academics) of the University in the prescribed proforma, a synopsis containing particulars of proposed dissertation work within six months from the date of commencement of the II year on or before the dates notified by the University. The synopsis shall be sent through the proper channel. Such synopsis will be reviewed and the dissertation topic will be registered by the University. No change in the dissertation topic or guide shall be made without prior approval of the University.

The dissertation should be written under the following headings

1. Introduction
2. Aims or Objectives of study
3. Review of Literature
4. Material and Methods
5. Results
6. Discussion
7. Conclusion
8. Summary
9. References
10. Tables
11. Annexure

Six copies of dissertation thus prepared shall be submitted to the Controller of Examinations six months before final examination on or before the dates notified by the University.

The dissertation shall be valued by examiners appointed by the University. Approval of dissertation work is an essential precondition for a candidate to appear in the University examination.

A Co-guide may be included provided the work requires substantial contribution from a sister department or from another medical institution recognized for teaching/training. The co-guide shall be a recognized post graduate teacher of the University.

Change of guide: In the event of a registered guide leaving the college for any reason or in any other event, guide may be changed with prior permission from the university.

Eligibility for award of degree

18.1 A candidate shall have passed in all the Courses of all semester's I-VI and submitted research project report to be eligible for award of M.Sc. Medical Microbiology degree.

18.2 The performance of a candidate in a course will be indicated as a letter grade, whereas grade point will indicate the position of the candidate in that batch of candidates. A student is considered to have completed a course successfully and earned the prescribed credits if he/she secures a letter grade other than F/RA. A letter grade RA in any course implies he/she has to Re-appear for the examination to complete the course.

18.3 The RA grade once awarded in the grade card of the student is not deleted even when he/she completes the course successfully later. The grade acquired later by the student will be indicated in the grade sheet of the subsequent semester in which the candidate has appeared for clearance in supplementary exams.

If a student secures RA grade in the Project Work/Dissertation, he/she shall improve it and resubmit it, if it involves only rewriting / incorporating the revisions suggested by the evaluators. If the assessment indicates lack of student performance or data collection then the student maybe permitted to re-register by paying the prescribed re-registration fee and complete the same in the subsequent semesters.

A candidate shall be declared to have passed the examination if he/she obtains the following minimum qualifying grade / marks:

a) For Core courses CT (Core Theory), CL (Core Lab), DE (Discipline centric Electives), clinical rotation shall obtain Grade B (50 % of marks) in the University End Semester Examination (ES) and in aggregate in each course which includes both Internal Assessment and End Semester Examination.

b) For Generic Electives (GE), Ability Enhancement (AE) and Skill Enhancement (SE) courses student shall obtain Grade C (50 % of marks) in the College Examination.

Computation of SGPA and CGPA

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone & earned by a student, i.e.,

$SGPA\,(Si) = \sum(Ci \times Gi) / \sum Ci$

Where Ci is the number of credits of the course and Gi is the grade point scored by the student in the course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone & earned by a student over all the semesters of a programme, i.e.

$CGPA = \sum(Ci \times Si) / \sum Ci$

Where Si is the SGPA of the semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			139
Illustration for SGPA				

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit: 20	Credit: 22	Credit: 25	Credit: 26
Semester 5	**Semester 6**		
Credit: 26	Credit: 25		
Illustration for SGPA			

Thus,

$$\text{CGPA} = \frac{20 \times 6.9 + 22 \times 6.8 + 25 \times 6.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0}{144} = 6.75/\text{B+}$$

Transcript: Based on the above recommendations on Letter grades, grade points and SGPA and CGPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters may be issued.

Course Registration

17.1. After admission to a Program, a student identity number is generated. This PRN number may be used in the process of registration for a course.

17.2 The registration process is a registration for the courses in a semester. The registration card is generated after a student completes the choice of electives. Every student shall register for the stipulated number of Courses/Credits semester wise even if electives are not prescribed in their regulations for the said semester. Every student must register for Elective/Ability Enhancement Courses semester-wise for the courses he/she intends to undergo in that semester within two weeks of commencement of the semester.

The list of students registered for each elective will be communicated to the HoDs/ Course Chairpersons. Students will be requested to authenticate the chosen electives by appending their signature in acceptance with approval by the HoDs/ Course Chairpersons. A soft copy of the registered students will be submitted to the elective course offering departments for their official use.

Re - Entry after Break of Study:

The University regulations for readmission are applicable for a candidate seeking re-entry to a program.

a) Students admitted the program and absenting for more than 3 months must seek readmission into the appropriate semester as per university norms.

b) The student shall follow the syllabus in vogue (currently approved / is being followed) for the program.

c) All re-admissions of students are subject to the approval of the Vice-Chancellor.

Ranking

The first two ranks of the programme will be decided on the basis of grades of CGPA in the courses (core and DE courses only). In case of a tie, marks % [of core and DE courses only] will be taken into account.

Classification of Successful Candidates

Overall Performance in a Program and Ranking of a candidate is in accordance with the University regulations.

Consolidated Grade Card– M. Sc. Medical Microbiology			
Letter Grade	**% Marks Range**	**Grade Point**	**CGPA Range**
O	80 & above	10	9.01 – 10
A+	75 – 80	9	8.01 – 9.00
A	60 -74	8	7.01 – 8.00
B+	55 – 59	7	6.01 – 7.00
B	50 – 54	6	5.01 – 6.00
F/RA (Reappear)	Less than 50	0	4.51 – 5.00
Ab (Absent)		0	
Not completed (NC)		0	
Repeat the Course (RC = < 50% in attendance or Internal Assessment		0	

A successful candidate will be:

i. Who secures not less than O grade with a CGPA of 9.01 – 10.00 shall be declared to have secured 'OUTSTANDING' provided he/she passes the whole examination in the FIRST ATTEMPT;

ii. Who secures not less than A+ grade with a CGPA of 8.01 – 9.00 shall be declared to have secured 'EXCELLENT' provided he/she passes the whole examination in the FIRST ATTEMPT;

iii. Who secures not less than A grade with a CGPA of 7.01 –8.00 and completes the course within the stipulated course period shall be declared to have passed the examinations with 'Very Good'.

iv. All other candidates (with grade B and above) shall be declared to have passed the examinations.

SEMESTER I ANATOMY
Course Content: ANATOMY THEORY

General Anatomy Overview

Introduction to Anatomy and Anatomical terms

Basic principles of tissues, Human cell & types of cells.

Skin	:	Thick Skin & Thin Skin
Fascia	:	Superficial Fascia & Deep Fascia
Connective tissue	:	Types of connective tissue Cells of connective tissue loose areolar tissue White fibrous tissue Adipose tissue Collagen fibers Reticular fibers Elastic fibers
Cartilage	:	Types of cartilage: White fibro cartilage, Elastic cartilage and Hyaline cartilage
Bones	:	Long bones, Short bones, Short long bones, Pneumatic bones, Sesamoid bones, Compact bone & Spongy Bone
Joints	:	General classification of Joints–Fibrous Cartilagenous, Synovial
Muscles	:	Skeletal Muscles, Cardiac Muscles, Smooth muscles
Nervous tissue	:	Neurons & Nerve fibers Introduction to Central and Peripheral Nervous system Autonomic nervous system in brief -Sympathetic nervous system -Parasympathetic nervous system
Blood vessels	:	Arteries, Veins, Capillaries and Sinusoids
Lymphatic system	:	Types of lymphocytes, Circulation of lymph Cysterna chyli Lymphoid tissues

General Histology-

Introduction to Histology and Microscopes

Epitheliu	:	Simple epithelium Pseudo stratified epithelium, Stratified epithelium
Connective tissue	:	Cells of connective tissue
		Loose areolar tissue
		White fibrous tissue
		Adipose tissue
		Collagen fibers
		Reticular fibers Elastic fibers
Cartilages	:	Hyaline cartilage
		Elastic cartilage
		White fibro cartilage.
Bone	:	Cells of bone
		Compact bone
		Spongy bone
Nervous tissue	:	Neurons & types
		Nerve fibers
Ganglia	:	Spinal ganglion,
		Autonomic ganglion
Muscle	:	Cardiac Muscle Skeletal
		Muscle Smooth Muscle
Vascular system	:	Large sized artery
		Medium sized artery
		Large sized vein
		Medium sized vein
Lymphatic system	:	Thymus, Lymph nodes,
		Spleen, Palatine tonsil
Skin & Appendages	:	Thick skin & Thin skin

General Embryology:

- Cell division
- Gametogenesis
- Ovarian cycle and Uterine/ Menstrual cycle
- Fertilization, Cleavage, Blastocyst, Implantation
- Formation of fetal membranes, Chorion, Amnion, Chorionic villi, Placenta and Umbilical cord
- Phases of embryonic development, Primitive streak, Notochord , Bilaminar germ disc, Trilaminar germ disc
- Formation and Fate of germ layers and Derivatives
- Folding of embryo
- Formation of body cavities
- Genetics-Chromosomes, classification of chromosomes, modes of inheritance and gene disorders

Gross Anatomy:

Upper Extremity: Mammary gland, Pectoral region, Muscles of back, muscles of upper limb, vessels and nerves of upper limb. Joints of upper limb, movements and muscles producing movements.

Thorax: Introduction to Respiratory system, Thoracic cage and diaphragm, Lung & Pleura, Trachea & Bronchopulmonary segments, Mediastinum, Heart& Pericardium, Coronary Circulation.

SEMESTER I ANATOMY
ANATOMY PRACTICALS

Gross anatomy:

- Osteology: Spotters Identification of Bones of Axial and Appendicular skeleton identify parts of bones
- Types of Joints with examples.
- General Embryology models for spotters & discussion
  Histology: General Histology slides for spotters and disc

SEMESTER I PHYSIOLOGY
Course Code: MPHY 1.2
Course Contents
Physiology Theory

MPHY 1.2 Theory 60 Hrs

GENERAL PHYSIOLOGY **07 Hrs**

1. Homeostasis –definition & feedback mechanisms
2. Cell organelles, Structure of cell membrane
3. Transport Mechanisms- active and passive transport
4. Intercellular communications
5. Body fluids –compartments & measurement.

BLOOD AND BODY FLUIDS **15 Hrs**

1. Introduction, Fluid, compartments, composition of body fluids. Homeostasis - Definition, Composition and functions of blood.
2. Plasma Proteins - Types, Normal values, Origin, Functions, Variations in health and disease.
3. Red Blood cells. - Erythropoiesis, Definition. Sites and stages of Erythropoiesis: Regulation
4. Morphology of RBC, Functions, Normal values, variations, PCV and ESR, Determination. Normal values, Anemia, Clinical significance.
5. Haemoglobin - Structure, Functions, Types, Derivatives. Methods of estimatio Normal values, Anemia, Types and features.
6. Life span and destruction of RBC, RE system. Functions, Jaundice, Types.
7. Leucocytes - Leucopoiesis, Sites of Granulopoiesis, Lymphopoiesis and Monocytopoiesis.
8. Morphology of different types of leucocytes, Functions, Variations, Immunity, Transplantation of tissues and organs.
9. Platelets - Thrombopoiesis, Sites, Stages, Morphology, Functions, Normal values, Variations.
10. Homeostasis and Blood coagulation - Definition Clotting factors Mechanist of clotting.
11. Clot retraction, Fibrinolysis. Bleeding disorders Tests for clotting. Anticoagulants, Actions and uses.
12. Blood groups - ABO system and Rh factor. Blood Typing. Significance.
13. Blood transfusion - Indications, Types, Reactions, Lymph - Origin. Circulation, Functions of lymph and Lymph nodes.

NERVE MUSCLE PHYSIOLOGY: **08 Hrs**

1. Types of neurons, Glia, with examples.
2. Structure of multipolar neuron and functions of each part
3. Types of nerve injuries, Wallerian degeneration. Retrograde degeneration, Chromatolysis, Regeneration of nerve fiber, factors affecting regeneration, Reaction of degeneration.
4. Properties of Nerve fiber :

a) Excitability. Electronic potentials, RMP Monophasic action potential, Ionic basis of RMP and AP, All or None Law, strength duration curve. Compound action potential.
b) Conduction - Classification of nerve fibers. Mechanism of conduction in myelinated and non-myelinated nerve fiber. Factors affecting conduction Orthodromic and antridromic conduction Susceptibility of Nerve fiber to various conduction blockers
5. Differences between 3 types of muscles Light microscopic and Electron microscopic structure of skeletal muscle. Sarcotubular system — Sarcomere.
6. Excitation contraction coupling.
7. Properties of skeletal muscle, factors affecting excitability and contractility. Treppe, Isometric and Isotonic contraction, Summation (wave and quanta!, tetanus, clonus). Energy sources for muscle contraction. Types of skeletal muscle, occurrence and differences.
8. N.M.J. structure, (electron microscopic). Transmission of impulse across the NMJ.

CARDIO VASCULAR SYSTEM: 15 Hrs

1. Functional anatomy of heart, blood vessels. Conducting system, systemic and pulmonary circulation.
2. Innervation of the heart and Blood vessels, VMC.
3. Hemodynamics.
4. Properties of cardiac muscle.
5. Cardiac cycle.
6. Heart rate and regulation of heart rate.
7. Cardiac output definitions, variations. Method of determination, Regulation.
8. Blood pressure.
9. Shock
10. Regional circulation
11. Cardio vascular changes during muscular exercise.

RESPIRATORY SYSTEM: 15 Hrs

1. Introduction - Functional anatomy of respiratory tract. Pulmonary ventilation Mechanism of ventilation. Muscles, pressure changes, Pressure volume inter relationship, compliance. Airway resistance.
2. Surfactant - Source. Chemical nature. Functions. Lung volumes and capacities Definition. Determination. Normal values. Significance
3. Alveolar ventilation - Dead space. Significance. Pulmonary circulation Ventilation, Perfusion Ratio & its significance
4. Respiratory membrane. Partial pressure of gases. Diffusion of gases. Discussion capacity. Factors affecting diffusion of gas.
5. Oxygen transport – Forms of transport O2, Oxygen Hemoglobin dissociation, Factors affecting it Myoglobin.
6. CO2 Transport – forms of transport. CO2 dissociation curve. Chloride shift. Haldane effect.
7. Regulation of respiration - Organization of respiratory centers. Neural regulation. Chemical regulation.

8. Non-chemical regulation. Respiration and Acid Base balance.
9. Hypoxia types, effects, voluntary Hyperventilation, Periodic breathing.
10. Dyspnoea, Asphyxia, Cyanosis Decompression sickness. Artificial Respiration, Methods.
11. Pulmonary function tests. Respiratory adjustments during muscular exercise.

SDL – 15 Hrs

1. SDL - Hemostasis
2. SDL- Sarcomere & Sarcotubler System
3. SDL Hemoglobin & its variants
4. SDL RMP & AP
5. SDL- N M Junction
6. SDL - Immunity
7. SDL- Properties of Cardiac Muscle
8. SDL Regulation of Respiration
9. SDL – Anemia
10. SDL- Hemophilia
11. SDL – Shock
12. SDL- Heart Blocks
13. SDL- Arrhythmia
14. SDL- Hypoxia
15. SDL – High altitude Physiology

Semester I Physiology
Course Code: MPHY 1.2 P
Physiology Practical

I. Hematology - 60 hrs

1. Study of the Microscope
2. Estimation of Hemoglobin
3. Study of haemocytometer and determination of red blood cell count
4. Determination of blood group
5. Determination of White Blood cell count
6. Erythrocyte sedimentation rate & packed cell volume. (Demonstration)
7. Osmotic fragility (Demonstration)
8. Blood indices.
9. Preparation and staining of a peripheral smear; differential leucocyte count.
10. Bleeding time & Clotting time.

Semester - I Biochemistry
Course Contents
Biochemistry Theory

I. Introduction and Scope of Biochemistry.

1. Biomolecules

Biomolecules and forces that stabilize the biomolecules, Principles of Thermodynamics and Donnan membrane equilibrium.

2. Cell and subcellular structures:

Structure and functions of - Mitochondria, Endoplasmic Reticulum, Golgi complex, Peroxisomes, Lysosome, Ribosome, Nucleolus, Centrosome, chromosomes, Nucleosomes, Histones.

3. Biological membranes:

Membranes Structure and function; composition of Cell Membrane-Fluid Mosaic Model, specialized membrane structures- liposomes, etc. Transport across biological membranes: Passive diffusion, Facilitated diffusion, Ionchannels, Ligand-gated channels, Voltage-gated channels, Ionophores, Active transport, Uniport, Symport, Antiport, Exocytosis, Endocytosis, Pinocytosis, Phagocytosis.

4. pH and buffers:

Definition of Acids, Bases, Buffers, pH, pH of biological fluids, Henderson-Hasselbalch equation: Derivation and Applications.

5. Chemistry of Carbohydrates:

Definition, functions, and classification of Carbohydrates.

Monosaccharides: Glucose, Fructose, Mannose, Galactose, Physical Properties & Chemical reactions of Monosaccharides.

Disaccharides: Sucrose, Lactose, Maltose. Physical Properties & Chemical reactions of Disaccharides.

Polysaccharides: Structure, Chemistry and Functions of Homopolysaccharides and Heteropolysaccharides/Mucopolysaccharides.

6. Chemistry of Amino Acids, Peptides, and Proteins

Definition and Classification of amino acids, properties of amino acids. Peptide bond-Properties and formation. Color reactions of amino acids. Proteins. -Definition, Classification and properties. Structural organization of proteins and their determination. Insulin – Primary structure and Structure-function relationship. Biologically important peptides.

7. Chemistry of Lipids.

Lipids.-Definition, classification and function.

Classification of fatty acids, properties of fatty acids, essential fatty acids. Triglycerides: properties and their reactions.

Phospholipids, Glycolipids, and Lipoproteins: Sub-Classification and its functions. Derived Lipids: Steroids and cholesterol.

8. Chemistry of Nucleic Acids.

Definition of nucleosides, nucleotides, and nucleic acids. Nucleotides: Structure, nomenclature, and functions of nucleotides.

DNA: Structure of DNA (Watson and Crick Model), Chargaff's rule, Organization of DNA, Genes, and chromosomes.

RNA: Types and functions of RNA.

Semester I Biochemistry
Biochemistry Practical

1. Reactions of Monosaccharides: Glucose and fructose
2. Reactions of Disaccharides: Lactose, maltose and sucrose
3. Reactions of Polysaccharides: Starch
4. Identification of unknown carbohydrate
5. Precipitation and coagulation reactions of proteins
6. Colour reactions of proteins
7. Reactions of Albumin and Casein Identification of unknown solution.

Semester I
Elective Course Name: Introduction to Quality and Patient safety
Course Code: MMB 1.4
Course Content

Sr. No.	Topics	No. of Hrs
1	**Quality assurance and management** – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guideline	7
2	**Basics of emergency care and life support skills** - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag -valve-masks (BVMs), Choking, rescue breathing methods, One and Two -rescuer CPR	7
3	**Bio medical waste management and environment safety** -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/ Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use o f Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)	8
4	**Infection prevention and control** - Evidence -based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],Prevention & control of common healthcare associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control	8
5	**Antibiotic Resistance** - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance - Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibi otic resistance	8
6	**Disaster preparedness and management** - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms	7

Semester I
Elective Course Name: Computer Applications
Course Code: MMB 1.4
Course Content

Unit-I

Computer fundamentals, Introduction to digital computers, Organization, Number system, I/O devices, Storage devices, MS-Windows basics, MS-office, MS-Word-Meaning of word Processing, Creating, Saving, Printing Documents, Page Setup, Formatting, Spell-Check, Adding page numbers, Header and Footer, Macros, Creating tables, Converting table to text and vice versa, Mail Merge Ms-Excel-spreadsheets, Using different types of formulae, Creating graphs and charts, Exporting charts to MS-Word, MS-Power Point, Creating presentations, Formatting, Adding effects and timings

Unit-II

Introduction to Data, Information, Database, DBMS (Advantages and disadvantages), MS Access, Basics of MS Access, Introduction to SQL (Data retrieval) Data analysis and database-Brief description and tabulation of data Measure of central tendency and dispersion-Mean, Median, Mode, Range, Standard Deviation, Variance and Correlation coefficient using SPSS. Types of errors and level of significance, Tests of significance, (F and t-test); Chi-square tests

Unit-III

Internet basics, Introduction to internet and its applications-www, email, ftp. Virtual library and some useful sites on Internet-Searching MEDLINE on the Pubmed system from National Centre for Biotechnology and Information, Assessing full text journals on the internet and printing articles using End Note Databases (Genes Bank), search tools and software at http://www.ncbi.nlm.nih.gov. Restriction enzyme site digestion web cutter2.0 at http://www.firsmarket.com/cutter/cut2.html PCR and multiplex PCR guide and troubleshooting at http://www.med.yale.edu/genetics/ward/tavi/Trblesht.html Image analysis program at http//www.scioncorp.com

Books Recommended:

- Sinha, P.K. (2004). Computer Fundamentals
- Peter Norton's Introduction to Computers, 6th.Ed.
- Windows Based Computer Courses, Sumit Kumar, Maalti, Sandeep Sood JBD Publishers.
- Gupta, S.C. (2008).Fundamentals of Statistics. Himalaya Publishing Ho

ANATOMY II SEM
Theory

Basic overview of the Gross Anatomy and Applied Anatomy and Systemic Histology of all related organs of the following systems

- Gastrointestinal System: Introduction, Digestive Tract with all related organs, Major Digestive Glands.
- Respiratory System: -Introduction, Components of Respiratory System, Conducting & Respiratory portions of the Respiratory system, Lungs
- Cardio-vascular system: Introduction, Functions of CVS, Components of CVS, Anastomosis, Circulation of Blood.
- Genitourinary system: - Introduction, Kidney, Ureters, Urinary bladder, Urethra, Male reproductive system, Female reproductive system
- Nervous System: Introduction, Subdivision of Nervous System, structural organization of Nervous System, Nerve Fibres, Autonomic Nervous system.
- Endocrine System: Introduction, Components of Endocrine system, scattered masses of endocrine cells in exocrine glands, Diffuse neuroendocrine cells
- Lower extremity: Gluteal region, femoral triangle, Muscles of lower limb, popliteal fossa, nerves and vessels of lower limb, joints of lower limb with movements and muscles producing movements.

Osteology: Lumbar vertebrae, Pelvis, Hip bone, Sacrum, Femur, Tibia, Fibula and Skelton of foot

Genetics: karyotyping, sex chromatin and lyon hypothesis, Prenatal diagnosis, structural and numerical anamolies of chromosomes

Systemic Embryology- Gastro-intestinal, Genito-urinary, Endocrine systems

SEMESTER II ANATOMY
Course Code: MANA 2.1P
ANATOMY PRACTICAL

Medical Anatomy Practical:

- Gross Anatomy: Demonstration of all important Prosected organs of Gastro- intestinal, Genito-urinary, Nervous, Endocrine systems.
- Related osteology
- Systemic Histology slides: Gastro-intestinal, Respiratory, Nervous, Genito-urinary, Endocrine systems.

Semester II Physiology
Course Name: Medical Physiology Practical
Course Code: MPHY 2.2 P

Practical's – 60 Hrs
Human Physiology Experiments – 30 hrs

1. Spirometry, PEFR
2. Ergography
3. Artificial Respiration
4. Arterial Pulse
5. Recording Blood Pressure a. Normal & Effect posture
   b. Effect of Exercise
6. ECG – Demo
7. Perimetery
8. Determination of MVV, DI, BMI, Body fat percentage

CLINICAL EXAMINATION. – 30 hrs

1. General physical examination
2. Introduction to clinical examination
3. Interpretation of charts, problems & case histories.

Semester II Biochemistry
Course Code: MBCHM
2.3 Course Contents
Medical Biochemistry Theory

Enzymology, Hormones and Nutrition

1. **Enzymes:**
   Definition and IUBMB Classification of enzymes. Holoenzyme, Apoenzyme, coenzymes. Enzymology: General Concepts and Enzyme Kinetics- Classification, Enzyme structure, Co- enzymes, Active center
   Mechanism of action of enzymes: Lock and key model, induced fit theory, substrate strain theory, covalent catalysis, acid base catalysis and entropy effect.
   Enzyme Kinetics:
   Factors affecting enzyme activity: concentration of enzyme, substrate, product, effect of temperature and pH. Michaelis constant, double reciprocal plot.
   Enzyme regulation:
   Competitive inhibition, Noncompetitive inhibition and uncompetitive inhibition. Allosteric inhibition, Key enzymes, Feedback inhibition, Covalent modification, Repression, Induction, zymogen activation, Specificity of enzymes, Iso-enzymes.
   Clinical Enzymology and Biomarkers

Enzyme units, Plasma specific and non-specific enzymes, enzymes of clinical significance, enzymes as therapeutic agents, enzymes as laboratory reagents, non-protein enzymes, immobilized enzymes.

2. Mechanisms of Action of Hormones

G proteins, Cyclic AMP, Protein kinases, Phosphatidyl inositol biphosphate, Inositol triphosphate, Diacyl glycerol, Cyclic GMP, Steroid receptors, Insulin Signaling pathway, mTOR, Jak-STAT pathway, NFkB

Hypothalamic and Pituitary Hormones

Anti-diuretichormone, Oxytocin, Hypothalamic releasing factors, Growth hormone, Adrenocorticotropic hormone, Endorphins, Glycoprotein hormones, Thyroid stimulating hormone, Gonadotropins.

Steroid Hormones

Adrenal cortical hormones, Synthesis of steroid hormones,17-ketosteroids, Assessment of glucocorticoid secretion, Assessment of mineralo corticoid function, Adrenal hyperfunction, Adrenal hypofunction, Primary hyperaldosteronism, Adrenogenital syndrome, Ovarian hormones, Testicular hormones.

Thyroid Hormones

Thyroid hormones, Synthesis, Secretion, Mechanism of action, Metabolic effects, Assessment of thyroid function, Hyperthyroidism, Hypothyroidism.

Signal Molecules and Growth Factors

Adiponectin, Cadherins C-Jun, EGFR, Erythropoietin, ERK, Gastrin, GSK3, HSP, HIF, ICAM, IGF, IGFR, IR, IRS, Interferons, JNKs, MMP, Osteocalcin, Osteoprotogerin, p38, p53, Pancreatic polypeptide, PDGF, ProteinC, Rb,, Secretin, Selectins, STAT, TGF, TNF.

3. Vitamins:

Fat Soluble Vitamins (A, D, E, K)

Chemistry, sources, RDA, biochemical functions and deficiency manifestations, and metabolism of fat-soluble vitamins. hypervitaminosis

Vitamin A: Role in vision, Vitamin D, Vitamin E, Vitamin K. Water Soluble Vitamins

Thiamine(B1), Beriberi, Riboflavin(B2), Niacin, Pyridoxine(B6), Pantothenic acid, Acetyl CoA, Succinyl CoA, Biotin, Folic acid, Folate antagonists, Folate trap, Vitamin B12, Choline, Inositol, Ascorbic acid (Vitamin C), Scurvy.

4. Minerals

Sources, RDA, Functions and deficiency manifestations of Calcium, Phosphorus, Iron, Zinc, Copper, Iodine, Selenium and Fluoride. Calcium-Homeostasis, Parathyroid hormone, Calcitonin, Hypercalcemia, Hypocalcemia, Bone metabolism; Markers of bone metabolism; Phosphorus, Magnesium, Sulphur, Iron, Absorption, Iron deficiency, Hemochromatosis, Copper, Ceruloplasmin, Iodine, Zinc, Fluoride, Selenium, Manganese, Molybdenum, Cobalt, Nickel, Chromium, Lith

5. **Nutrition and energy metabolism**

- Calorific value of foods - Calorific value and nutritional importance of Carbohydrates, Lipids, Proteins and Dietary fibers. Respiratory quotient, Basic Metabolic Rate-definition, normal values.
- Principles of Nutrition

  BMR (Basal Metabolic Rate)- Definition, Normal values and Factors affecting BMR. Factors affecting BMR and measurement of BMR. Specific dynamic action, nutritional importance of carbohydrates, dietary fibre lipids and proteins, Nitrogen balance, biological value of proteins, net protein utilization, mixed diet, Balanced Diet. Principles of Diet prescription for healthy individuals. Specialized diets-Diabetic, diet for hypertension, diet in renal and liver diseases. Diet prescription for obesity and under nutrition. Total parenteral nutrition.

Nutritional value of different foods Nutrition in health and diseases Protein energy malnutrition (PEM), Marasmus, Kwashiorkor, Obesity. **Prescription of diet.**

Special diets: Mediterranean diet, Diabetic diet, Diet for renal disease, Diet for liver disease. Food exchange system, Glycemic index, Total parenteral nutrition Research

Semester II Biochemistry
Course Code: MBCHM
2.3 P Medical Biochemistry
Practical

1. **Basics calculations:** Calculation of Normality, Molarity, and preparation of Normal and Molar solutions, Preparation of Buffers, Factors affecting enzyme activity (temperature and pH)

2. **Equipment and Instrumentation**

A. Principles, Types, and Application of
   a) Weighing Balances,
   b) Centrifuges and ultracentrifuges
   c) Hot air Ovens.
   d) Water Baths,
   e) Distillation plants,
   f) Automatic dispensers, and Diluters.

B. Principles, Types, Application and Standard operating procedure
   a) pH meter and flame photometry.
   b) Colorimeter and spectrophotometer. (Measurement of the region of maximal absorption of a colored solution)
   c) Electrophoresis
   d) Chromatography.

Semester II
Name of the Course: Research Methodology & Biostatistics
Course Code: MCOM 2.4
Course Content

Teaching Objectives	To teach the basic principles of research methodology To teach the basic aspects of biostatistics
Learning Outcome	The course will make students capable of choosing an appropriate study design and apply required statistical tests toderive inferences.

S. No	Topics	No of Hours
1	Introduction to research methodology : Purpose of research, Meaning & objectives of research, Types & approaches of research, Criteria for good research	2 hours
2	Research Designs: Need of study designs, Features of good design, Types of research designs - Descriptive, Analytical & Experimental study designs; Concept of Confounding & Bias	10 hours
3	Measurement & Scaling: Types of data, Measurement scales, Scaling techniques, Sources of error	5 hours
4	Data Collection: Primary & Secondary data; Methods for data collection; Data preparation	3 hours
5	Descriptive statistics: Measures of central tendency & dispersion.	5 hours
6	Sampling: Types of samples; Sample size estimation	5 hours
7	Testing of Hypothesis: Concept oh null hypothesis, Inferential statistics; Parametric & Non parametric Tests	10 hours
8	Interpretation & Report Writing	5 hours
	TOTAL	**45 hours**

References:

- K. Park. Textbook of Preventive & Social Medicine. 26th Edition. Bhanot Publishers
- Dr. J.V. Dixit. Principles & Practices of Biostatistics. 2nd Edition. Bhanot Publishers
- C. R. Kothari & Gaurav Garg. Research Methodology Methods & Techniques. 4th Edition New Age International Publisher.

1st Semester & 2nd Semester
Scheme of Examination

SEMESTER I						
Course Code	**Course Name Medical Anatomy**	**Credits**	**Teaching Hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 1.1	Medical Anatomy	4	4	20	80	100
MMB 1.2	Medical Physiology	4	4	20	80	100
MMB 1.3	Medical Biochemistry	4	4	20	80	100
Practical						
MMB 1.1	Medical Anatomy	2	4	20	80	100
MMB 1.2	Medical Physiology	2	4	20	80	100
MMB 1.3	Medical Biochemistry	2	4	20	80	100
Elective Course (Any One)						
MMB 1.4	Introduction to Quality & Patient Safety	3	3	100	--	100
MMB 1.5	Computer Application					
Total		**21**	**27**	**220**	**480**	**700**

SEMESTER II						
Course Code	**Course Name**	**Credits**	**Teaching Hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 2.1	Medical Anatomy	4	4	20	80	100
MMB 2.2	Medical Physiology	4	4	20	80	100
MMB 2.3	Medical Biochemistry	4	4	20	80	100
MMB 2.4	Research Methodology & Biostatistics (Core Course)	3	3	20	80	100
Practical						
MMB 2.1 P	Medical Anatomy	2	4	20	80	100
MMB 2.2 P	Medical Physiology	2	4	20	80	100
MMB 2.3 P	Medical Biochemistry	2	4	20	80	100
Total		**21**	**27**	**140**	**560**	**700**

Type of questions and distribution of Marks for Theory Examination

Type of Questions	No of Questions	Marks for each Question	Total
Long Essay	03	10	30
Short Essay	10	05	50
Total			**80**

Note: Internal Assessment 20 Marks add to the theory paper

Practical – 100 Marks

1st & 2nd Semester Anatomy, Physiology & Biochemistry Practical – 100 Marks

Type of questions for Practical	Marks
Practical	40
Viva	40
Internal Assessment Marks	20
Total	**100**

Semester-III Microbiology
Theory
Course Content

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB 3.1	**General Bacteriology :** History of Microbiology, Morphology of bacteria Microscopy Physiology of the bacteria Sterilization and Disinfection of bacteria, Bacterial taxonomy and genetics.	60 Hours
MMB 3.2	**Immunology :** Infection, Normal immune system. Innate immunity, Antigens, Immunogloblins, Complement. Antige-Antibody reactions, Cell mediated and Humoral immunity. Hypersensitivity, Immunodeficiency diseases, Auto-immunity. Immune tolerance, Tumour immunology. Prophylaxis and immunity. Measurement of immunity. Immunohematology.	60 Hours

Semester-III Microbiology Practical
Course Content

Course Code	Course Name & Course Content	No. of Teaching Hours
MMB 3.1 P MMB 3.2 P	**General Bacteriology and Immunology** **1. Microscopy -Types of microscope, maintenance** 2. Sterilization techniques Sterilization of instruments, media, endoscopes, surface disinfection and Sterilization, chemical Sterilization, OT Sterilization, newer techniques in Sterilization 3. Preparation of various stains 4. Culture media preparation and uses 5. Inoculation o f culture media 6. Processing protocols of various samples 7. Principals and procedures of various diagnostic serological tests 8. Antigen extraction techniques 9. Molecular techniques 10. Preparation of antibiotic solution 11. Performing and interpreting Antibiotic sensitivi ty testing 12. Quality assurance in microbiology	120 Hours

Semester III
Elective Course Name: Molecular Biology
Course Code: MMB 3.3
Molecular Biology Course Content

Unit 1 **12 hrs**

Physical basis of Heredity: Introduction, concepts and theories of Mendelian genetics, chromosome theory of inheritance, Unit of Heredity - Genes, Alleles, Multiple alleles, Cis and Trans test. Extra chromosomal inheritance. Nucleic acids as genetic material

Unit 2 **4hrs**

DNA Replication:

Prokaryotic and Eukaryotic DNA replication. Mechanism of DNA replication, enzymes and accessory proteins involved in DNA replication and proof-reading mechanism.

Unit 3 **4 hrs**

Mutation:

Causes of DNA damage, types of DNA damage, types of DNA repair and molecular mechanism of recombination.

Unit 4 **8 hrs**

Transcription:

Central dogma, general feature of RNA synthesis, RNA polymerase, mechanism of transcription in Prokaryotic and eukaryotic. Introns and exons, Post transcriptional modification of RNA – capping, polyadenylation, Introns splicing. Reverse transcription.

Unit 5 **8 hrs**

Translation: Genetic code and its elucidation - properties of genetic code, ribosome structure, wobble hypothesis, structure and composition, of Prokaryotic and eukaryotic ribosome, structure of mRNA and tRNA, aminoacyl t-RNA synthases. Events of Protein synthesis, (Amino acid activation, initiation, elongation and termination) in Prokaryotic and Eukaryotic. Post -Translation modification of proteins, inhibitors of translation.

Unit 6 **6 hrs**

Regulation of Gene expression:

The Operon concepts, Lactose Operon, Tryptophan Operon and catabolic repression, steroid induced gene expression.

Unit 7 **10 hrs**

Molecular Mapping of Genome: Physical maps - Physical Mapping and map Based cloning, choice of mapping, simple sequence repeats loci, and florescence in situ hybridization for genome analysis, RFLP, RAPD, AFLP analysis and applications.

Unit 8 **8 hrs**

Genome sequencing: Genome - Organelle genomes, Genomic library, YAC, BAC Libraries, strategies of genome sequencing. Human Genome Project. Application of sequence information for identification of defective genes.

Semester III

Elective Course Name: Nanobiotechnology

Course Code: MMB 3.4

Nanobiotechnology Course Content

UNIT I: Introduction, History & Applications

Various definitions and Concept of Nano-biotechnology & Historical background. Fundamental sciences and broad areas of Nanobiotechnology. Various applications of Nano-biotechnology. Cell – Nanostructure interactions

Unit II: Protein-based Nanostructures, Nanobio- machines & Signalling

Overview, chemistry and structure, Genetics & Secondary cell-wall polymers, Self-assembly in suspension, Re-crystallization at solid supports, Formation of regularly arranged Nano-particles, Cell as Nanobio-machine, link between the signaling pathways & molecular movements as well as neuron function, Concepts in nanobio-machines for information processing and communications

UNIT III: Microbial Nanoparticle Production

Overview and concept of microbial nano-particle production, Methods of microbial nano-particle production, Applications of microbial nano-particles , Bacteriorhodopsin and its potential in technical applications – overview, structure, photoelectric

Unit IV: DNA-Protein Nanostructures

Overview and introduction, Oligonucleotide-Enzyme conjugates, DNA conjugates of binding proteins, Non-covalent DNA-Streptavidin conjugates, DNA-Protein conjugates in microarray technology.

Unit V: Biomaterials & Bio-electronic

Biomaterials- types, properties and applications, Biomaterial nano-particle systems for bio-electronic & biosensing applications, Biomaterial-based Nano-circuitry, Protein-based Nano-circuitry, DNA as functional template for Nano-circuitry

Semester IV Microbiology
Theory
Course Content

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB 4.1	**Systemic Bacteriology -I** GPC-Gram Positive cocci, GNC - Gram Negative cocci, GPG- Gram Positive Bacilli Staphylococcus and Microc occus Streptococcus, Neisseria, Branhamella, & Moraxella, Clostridia, Mycobacteria, Corynebacteria, Bacillus, Antinomyces, Nocardia, Antinobacillus.	60 Hours
MMB 4.2	**Systemic Bacteriology -II** All GNB: Gram Negative Bacilli E. Coli, Klebsiella, Citrobacter, Proteus, Salmonella & Shigella Vibrios, Aeromonas, Plesiomonas, Campylobacter, Spirillum, Haemophilus, Bordetella, Pasteurella, Francisella, Brucella, Pseudomonas, Spirochaetes, Chlamydiae, Rickettsiae, Non sporing Anaerobes, Mycoplsama, Ureaplasma, Acholeplasma, Erysipelothrix, Listeria, Chromobacterium, Flavobacterium, Acinetobacter& Alkaligens.	60 Hours

Semester IV
Practical
Course Content

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB 4.1 P, MMB 4.2 P	**Systemic Bacteriology** GPC- Gram Positive Cocci; GNC -Gram Negative Cocci; GPB-Gram Positive Bacilli and All GNB - Gram Negative Bacilli 1. Biochemical reaction principles and performing various tests 2. Processing protocol of various samples 3. Isolation and Identification of bacteria to species level 4. Performing and interpretation of diagnostics 5. Designing of serological tests 6. Performing antibiotic sensitivity testing 7. Good laboratory practices	120 Hours

Semester IV
Elective Course Name: Intellectual Property Rights
Course Code: MMB 4.3
Intellectual Property Rights Course Content

Learning Objectives:
This subject seeks to equip students with a broad understanding of the international intellectual property rights system, the main forms of intellectual property rights and the relevant international
Institutional framework. Its specificity is to provide students with a broad understanding of intellectual property in the context of sustainable development. Overall, it seeks to equip students with the necessary analytical tools to understand intellectual property in its broader environment, with particular emphasis on the situation of developing countries.

The objectives of this subject are to:

1. Acquaint the learners with the basic concepts of Intellectual Property Rights
2. Develop expertise in the learners in IPR related issues
3. Sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR.

Learning outcomes
At the end of the course, students would be able to

1. Understand the implications of Patents, Copyrights and Designs, Trademarks and Geographical Indications.
2. Understand the relevance and impact of IP Law on academic/scientific works/studies.
3. Recognize the intellectual property likely to be produced in the academic and professional environment.
4. Understand the different forms of infringement of intellectual property rights.
5. Demonstrate appreciation and critical awareness of pertinent IP issues in the academic and professional lives.
6. Demonstrate and develop basic skills of legal reasoning, individual critical thinking and group interaction, as well as interpretative, analytical and argumentative skills in oral and written forms of communication.

Syllabus
Theory (45 Hours) Credit-3

Unit 1: Concepts of Intellectual Property (9 Hours)
Concept, Theories, Types of Intellectual Property Rights- An Overview,
Role of International Institutions: World Intellectual Property Organization (WIPO), WTO.

Unit 2: Patent Law and Act (9 Hours)
Introduction to Patent Law, Paris Convention, Patent Cooperation Treaty, WTO- TRIPS, The Patents Act, 1970, Amendments to the Patents Act

Unit 3: Patentability Criteria (9 Hours)
Patentable Subject Matter, Procedure for Filing Patent Applications, Patent Granting Procedure, Revocation, Patent Infringement and Remedies, Access and Benefit Sharing Issues

Unit 4: Types of IPR (10 Hours)
Patents, Copyright, Trademarks, Trade secrets, Industrial Design, Geographical Indications, Layout designs of Integrated Circuits and Protection of Plant Varieties and Farmers' Rights, Biodiversity and traditional Knowledge

Unit 5: IPR in different sectors (8 Hours)
IPR in Cyber space, IPR in Pharma sector, IP licensing, IP insurance, Securitization of IP.

REFERENCES:

Compulsory Reading:

1. Managing IPR by Vinod D.Sople
2. Law relating to Intellectual Property by Dr. B. L.Wadhera.
3. The Indian Patent Act 1970.

Suggested Reading:

1. The Gazette of India. The Patent act 1970 and its latest amendments.
2. Mittal, B.M., A Textbook of Forensic Pharmacy.
3. Patent Law Essentials: A Concise Guide by Alan L. Durham

Online Reading:

1. http://www.uspto.gov/patent
2. www.wipo.org
3. www.wto.org

Semester IV
Elective Course Name: Bioinformatics
Course Code: MMB 4.4

Bioinformatics

Learning Objectives

- To know the importance of computers in biology
- To understand software tools for biological sequence analysis
- To learn the concepts associated to Genomics and apply the same in various fields

Course Content

UNIT I Computer Fundamentals

Characteristics of computer, history, generations, types, classification – Hardware, Software; Operating System - Linux, Windows. Internet and search engines, Office Packages - MS Word, MS Excel, MS PowerPoint, internet.

UNIT II Biological Databases

Bioinformatics and its relation with molecular biology, Molecular Resources, Primary & Secondary databases, Public databases - NCBI, EBI, DDBJ, PDB, KEEG Database File formats, Submission & retrieval tools

UNIT III

Sequence Alignment

Introduction, Sequence similarity, identity and homology, Dot matrix analysis, Local and global alignments, Sequence based searches; BLAST– Introduction, Definition, Types, Scoring matrices

UNIT IV

Multiple Sequence Alignment & Phylogeny

Introduction, Progressive alignment method - Crustal, Phylogenetic trees - types & topology, Methods - Maximum Parsimony, Distance methods, Maximum Likelihood approach

UNIT V Genomics

Introduction – Evolution – Genome Organization of Prokaryotes, Eukaryotes & Organelles – Human Genome Project − Genome Annotation – SNPs & Mutation – Gene & Genome Duplication – Gene Loss

UNIT VI

Proteomics Components – Protein Structure Prediction – Mass Spectrophotometer - Analysis in Proteomics – Disease link

UNIT VII Computer Aided Drug Design

Principles - Molecular Modelling – docking – QSAR – Applications

PRACTICAL: 30 HOURS

1. MS Office Packages
2. Submission & Retrieval tools
3. Sequence Editing & Alignment
4. BLAST
5. Phylogenetic analysis
6. Genome Browsers
7. Model Organism Databases
8. Mutation Databases
9. Proteomics & Str. Bioinformatics (Demo only)

LEARNING OUTCOMES

- Get to know effective use of Office package
- Understand the biological sequence analysis
- The student will be able to understand the concepts associated to Genomics and apply the same in various fields

REFERENCES

1. Introduction to computers & Data processing – Shelly, Gray. B2. Mastering Microsoft office 2007 – Alison Balter's
2. Bioinformatics sequence and Genome analysis – David W. Mount, 2004, 2ed
3. BLAST. The Definitive Guide. Basic Local Alignment Search Tool – Korf, Yandell, Bedell
4. Introduction to Bioinformatics - Attwood, Smith, Parry-Smith
5. Introduction to Genomics, Arthur M. Lesk, 2007, Oxford University Press.
6. Handbook of Comparative Genomics – Principles & Methodology 2003 Saccone & G.Pesole (Publication) Wiley-Liss
7. Microbial Functional Genomics – 2004 Jizhong Zhou, Dorothea K.Thompson, Ying Xu & James.M.Tiedje (Publication) Wiley-Liss

Semester V Microbiology
Course Content
Theory

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB5.1	Virology Morphology, Cultivation techniques, Replication, Classification of viruses, Bacteriophage, Laboratory diagnosis of infections. DNA Viruses Herpetoviridae, Poxviridae, Adenoviridae, Papovaviridae Parvoviridae. RNA Viruses; Picornaviridae, Myxoviridae, Arboviridae, Retroviridae, Hepatitis, Oncogenic, Slow, Teratogenic Viruses. Miscellaneous Viruses.	60 Hours
MMB5.2	Mycology Classification & Morphology and Reproduction in fungi Contaminant and opportunistic fungi. Superficial mycotic infections. Subcutaneous mycotic infections. Systemic mycotic infections. Mycotoxins & Antifungal agents	60 Hours

Semester V Practical
Course Content

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB 5.1 P, MMB 5.2 P	**Virology and Mycology** 1. Viral serological techniques 2. Identification protocols of virus 3. Staining techniques used in diagnosis of - Viral infection - Fungal infection 4. Identification protocols of fungi 5. Antifungal susceptibility testing	120 Hours

Semester V
Elective Course Name: Library Module
Course Code: MMB 5.3
Course Content

Sl. No	Topic
1	Smart Searching andReview Tools for Researchers
2	Google Applications
3	Similarity/ Plagiarism check
4	Digital Writing applications
5	Basic Statistical Tools
6	Research Data Management (Mendeley or Zotero)
7	Academic Profile Creation
8	QR Code and UsefulApplications
9	How to publish a paper

Elective Course Name: Hospital Infection Control

Course Code: MMB 5.4

Course Content

Sr. No.	Topics
1	Hand Hygiene Practices
2	Universal Precautions– Personal Protective Equipment (Practical on Donning & Doffing)
3	Spill Management of Blood and Body Fluids
4	Needle Stick Injury
5	Transmission Based Precautions
6	HAI Surveillance - Surveillance of CA- UTI, CLABSI, SSI, VAP
7	Prevention of Majortype of HAI-Care Bundle Approach for CA-UTI, CLABSI, SSI, VAP
8	Environmental Surveillance-1) Air Surveillance for OT 2) Water Surveillance 3) Surface Surveillance
9	Screening of Health Care Workers and patients for Multidrug resistant organisms
10	Disinfection for instruments & scopes
11	CDC guidelines forOutbreak Investigations
12	CSSD Infection Control Policy 1) Decontamination and Packing 2) Sterilization and Monitoring
13	Antimicrobial Stewardship Programme

Semester VI Microbiology
Course Content
Theory

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB 6.1	**Protozoology & Applied Microbiology** Entamoeba, Free living Amoebae, Giardia, Trichomonas, Leishmania, Tryoanosoma, Plasmodia, Toxoplasma, Sarcocystis, Cryptosporidia, Cylospora, Isospora, Babesia, Balantidium & Other protozoa Applied Microbiology Recent Advances in Microbiology Biomedical waste Management Air sampling Water Testing Food testing	60 Hours
MMB 6.2	Helminthology Cestode: Diphyllobothrium, Taenia, Echinococus, Hymeonolepis, Dipylidium, Multiceps Trematode: Schistosoma, Fasciola, Gastrodiscoides, Paragonimus, Clonarchis, Opisthorchis, Nematodes: Trichuris, Trichinella, Strongyloides, Ancylostoma, Ascaris, Enterobius, Filarial worms, Dracuncculus & Other parasites	60 Hours

Semester VI
Practical
Course Content

Course Code	Course Name & Course Content	No, of Teaching Hours
MMB 6.1 P, MMB 6.2 P	**Parasitology & Applied Microbiology** 1. Stool sample Examination – Wet mount Staining technique 2. Peripheral smear preparation and staining for parasitic infestations. 3. Stool concentration techniques. 4. Collection of sample for various parasitic infestation 5. Recent diagnostic techniques in diagnostic Parasitology 6. Air sampling 7. Water sampling 8. Food testing	120 Hours

REFERENCE BOOKS:

- Textbook of Microbiology - Ananthnarayan &
- Paniker Textbook of Microbiology- C.P. Baveja
- Practical & Applied Microbiology - Anuradha De

Semester III
General Microbiology
Practical – 100 Marks

Types of Questions	Marks
Staining Techniques	20
Inoculation Techniques	20
Viva	40
Total	**80**
Internal Assessment Mark	**20**
Grand Total	**100**

Immunology
Practical – 100 Marks

Types of Questions	Marks
Serology Exercise – I	20
Serology Exercise – II	20
Viva	40
Total	**80**
Internal Assessment Mark	**20**
Grand Total	**100**

Semester IV
Systemic Bacteriology -I
Practical – 100 Marks

Types of Questions	Marks
Pure Culture	20
Mixed Culture	20
Viva	40
Total	**80**
Internal Assessment Mark	**20**
Grand Total	**100**

Systemic Bacteriology -II
Practical – 100 Marks

Types of Questions	Marks
Pure Culture	20
Mixed Culture	20
Viva	40
Total	**80**
Internal Assessment Mark	**20**
Grand Total	**100**

SEMESTER – VI						
Course code	**Course Name**	**Credits**	**Teaching hours**	**Marks**		
				Internal Assessment	**Semester Exam**	**Total**
Theory						
MMB 6.1	Protozoology & Applied Microbiology	4	4	20	80	100
MMB 6.2	Helminthology	4	4	20	80	100
MMB 6.3	Protozoology Posting	4	7	100	--	100
MMB 6.4	Helminthology Posting	4	7	100	--	100
MMB 6.5	Biomedical waste management & CSSD Posting	4	6	100	--	100
Practical						
MMB 6.1 P	Protozoology & Applied Microbiology	2	4	20	80	100
MMB 6.2 P	Helminthology	2	4	20	80	100
Total		**24**	**36**	**380**	**320**	**700**

Type of questions and distribution of marks for Theory examination

Type of Questions	No of Questions	Marks for each Question	Total
Long Essay	03	10	30
Short Essay	10	05	50
Total			**80**

Note: Internal Assessment 20 Marks add to the theory paper

Semester VI

Protozoology & Applied Microbiology

Practical – 100 Marks

Types of Questions	Marks
Wet mount preparation	20
Peripheral smear examination	20
Viva	40
Total	**80**
Internal Assessment Mark	**20**
Grand Total	**100**

Practical – 100 Marks

Helminthology

Types of Questions	Marks
Stool Examination and Concentration Techniques	20
Identification of Helminths	20
Viva	40
Total	**80**
Internal Assessment Mark	**20**
Grand Total	**100**