

Mahatma Gandhi University
----- Of -----
Medical Sciences and Technology

Syllabus

M.Sc.(Medical)BIOCHEMISTRY

(6 SEMESTERS P.G. DEGREE PROGRAM)

2023-24

Recommended by Joint meeting of BOS Non clinical/ Para clinical / Clinical at its meeting held on 03/03/2023 and approved by Academic Council at its meeting held on 28/04/2023.

NOTICE

- 1. The university reserves the right to make changes in the syllabus /books/ guidelines, fee-structure or any other information at any time without prior notice the decision of the university shall be binding on all.**
- 2. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.**

M.Sc.(Medical)Biochemistry

(6 SEMESTERS P.G. DEGREE PROGRAM)

1. Introduction:

The Master of Science in Medical field provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in consultancy, education, research.

Programme specific outcome: M.SC. MEDICAL

POS 1. A post graduate student after undergoing the required training should be able to deal with the allied departments and render services in advanced laboratory investigations.

POS 2. The PG student should acquire basic skills in teaching medical/para-medical students

POS 3. The student should have knowledge about the principles of research methodology and self-directed learning for continuous professional development.

POS 4. The student should be able to carry out a research project from planning to publication and be able to pursue academic interests.

COURSE OUTCOME (CO) : At the end of the M.Sc. training programme in Biochemistry, the post graduate student should have acquired competencies in the following areas, as detailed below:

1. The student should be able to explain clearly concepts and principles of biochemistry and cell biology, including correlations of these with cellular and molecular processes involved in health and disease.
2. The student should be able to effectively teach undergraduate students in medicine and allied health science courses so they become competent health care professionals and able to contribute to training of postgraduate post graduate students.
3. The student should be able to set up/supervise/manage a diagnostic laboratory in Biochemistry in a hospital, ensuring quality control, and providing a reliable support service. The student should be able to provide

clinicians with consultationservices for diagnostic tests in biochemistry and in interpretation of laboratory results.

4. The student should be able to carry out a research project from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

2. TITLE OF THE COURSE:

M.Sc. (Medical) Biochemistry

3. DURATION OF THE COURSE:

Duration of the course: 3 Years (6 Semesters)

4. MEDIUM OF INSTRUCTION:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

5. ELIGIBILITY FOR ADMISSION:

MBBS/BDS/ B.Sc.& A.H./ BHMS/BAMS/ BUMS/ BPT/ BOT/B.Sc. Nursing/B. Pharmacy /B.Sc. Biotech/ B.Sc. in Life Sciences (Zoology, Botany, Biochemistry/ Chemistry) with at least 50% marks in the aggregate.

- B.Sc. with at least 50% marks in the aggregate and with Physics and Chemistry subjects are eligible for M.Sc. Medical (Biochemistry).
- B.Sc. (MLT) with at least 50% marks in aggregate are eligible for M.Sc. (Medical) Biochemistry and Microbiology courses only.

6. PROCESS OF ADMISSION:

Admission to M.Sc. (Medical) Biochemistry Program shall be made on the basis of written entrance examination conducted for the purpose

7. RESERVATION POLICY:

Reservation in admissions shall be applicable as per policy of the State Government.

8. ENROLLMENT:

Every candidate who is admitted to M.Sc.(Medical) Biochemistry Degree Program in Mahatma Gandhi medical college shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology (MGUMST) after paying the prescribed eligibility and enrolment fees.

A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, to the college Principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within

prescribed period then after he/she shall pay late fee applicable at that time. No student will be allowed to appear in the university examination without his/her enrollment.

9. ATTENDANCE:

Minimum 75 % attendance is required in each semester, both for theory and practical classes separately; student with deficient attendance will not be permitted to appear in university examination.

10. WORKING DAYS:

Each semester shall consist of not less than 120 working days including examination.

11. CONDUCTION OF THE UNIVERSITY EXAMINATION:

University semester examination shall be conducted twice in a year with an interval of six months. Even Semester examination shall be conducted after 6 months of odd semester examination

12. ELIGIBILITY TO APPEAR FOR UNIVERSITY EXAMINATION

Student is required to have minimum 75% attendance (in theory and practical separately) /to make him/her eligible to Candidates failing in one or more, subject in a semester will be required to appear in their failing subject in the next examination of the same semester next year.

A candidate will have to clear all the subjects of First to Fifth semester before appearing at sixth semester university examination.

13. APPOINTMENT OF EXAMINER & PAPER SETTER

- All the examiners - Paper setters, Theory examination answer books evaluators, External and internal Examiners for Practical examinations shall be appointed by the president of the University from the panel submitted by HOD/Convener of the respective COC through concerned dean of faculty.
- Paper setters shall be external. He shall also evaluate answers sheets of his paper.
- Practical examiner can be appointed to evaluate answers sheets.
- Professor/ Assoc. Professor /Assistant Professor/Lecturer/Allied Health Professional having PG qualification and 5 years' teaching experience after PG in respective field is eligible to act as Internal/External examiner of theory/practical examination.

14. SCHEME OF EXAMINATION

The University examination for the Course shall be conducted semester wise at the end of every semester.

I. Theory

- (a) There shall be five Theory papers in each semester of the study.
- (b) Each Theory paper examination shall be of 3 hours duration and of maximum 70 marks.
- (c) Continuous assessment (CA) shall be of 30 marks for each Theory Paper.
- (d) The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council. Pattern of question papers (Annexure 1)
- (e) Passing Marks: A candidate will have to obtain at least 50% marks including internal assessment in each theory paper to pass.

II. Practical and Viva-Voce Examination

- (a) At the end of semester III, IV, V and VI there shall be practical and viva-voce examination of 200 marks. It shall be conducted after the Theory examination is over. A candidate will have to obtain at least 50% marks in practical and viva-voce examination
- (b) End of Semester Examination (EOSE) practical and viva-voce examination shall be of 140 marks (Practical 100 marks + viva voce 40 marks) and internal assessment of sixty marks.
- (c) The pattern of practical examination shall be as follows –

Semester	Practical Marks					Practical Examiners
	University Exam			Total Marks	Min. Pass Marks	
	Practical	viva-voce	IA			
I to VI Each	100	40	60	200	100	One Internal & one External Examiner

III Result

1. A candidate will have to obtain at least 50% marks separately in each Theory paper including internal assessment and a minimum of 50% marks in the practical examination including viva-voce for him to be declared pass.
2. A Candidate who has failed in a subject(s) will reappear in respective paper(s) in next examination of the same semester next year.

3. Candidate who has failed in Practical examination will reappear in practical examination only.

IV. Supplementary/Remanded Examination

- (a) There shall be a supplementary examination of VI semester only within two months of the declaration of the result of the main examination of VI Semester.
- (b) Internal assessment marks obtained in main examination in the concerned failed paper(s) / practical shall be carried forward for working out the result of next Theory paper(s) and/or practical examination.
- (c) A failing candidate, if opt for improvement his/her internal assessment marks shall be allow to do so. In case he does appear for improvement or gets lesser marks in internal assessment, his earlier marks will be considered for working out the result of the failing subject.

V. Promotion to Next Semester

1. A candidate who has passed or failed in one or more subjects shall be promoted to respective next semester.
2. A candidate will be allowed to appear for the VI semester examination only when the backlog of all papers (theory papers and practical) of I semester to V semester exams including elective papers (if any) is cleared.
3. The student is required to clear all the University examination within 6 years from the joining of the course otherwise he/she will not to be allowed to join internship program and he/she will have to leave the course.

M.Sc.(Medical) Biochemistry Marks Distribution of Semester – I Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Anatomy	MSCM0223S101T	8	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Physiology	MSCM0223S102T	8	70	30	100	
Biochemistry	MSCM0223S103T	8	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Health care Services and its Application	MSCM0223S104T	6	70	30	100	
Basics of Computer	MSCM0223S105T	6	70	30	100	
Basics of Healthcare IT	MSCM0223S106T	6	70	30	100	
TOTAL	05 (05 Theory Paper 01 Practical)	36	350	150	500	

M.Sc.(Medical) Biochemistry Marks Distribution of Semester – II Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Pathology	MSCM0223S201T	8	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Microbiology	MSCM0223S202T	8	70	30	100	
Basic Instrumentation & Lab Practices	MSCM0223S203T	8	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Internet Technology	MSCM0223S204T	6	70	30	100	
Genetic Engineering	MSCM0223S205T	6	70	30	100	
Organisational Behaviour	MSCM0223S206T	6	70	30	100	
TOTAL	05 (05 Theory Paper 01 Practical)	36	350	150	500	

M.Sc.(Medical) Biochemistry Marks Distribution of Semester – III Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Chemistry & Metabolism of Proteins & Lipids	MSCM0223S301T	7	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Chemistry & Metabolism of Carbohydrates & Nucleotides	MSCM0223S302T	7	70	30	100	
Biostatistics & Research Methodology	MSCM0223S303T	7	70	30	100	
ELECTIVE COURSES (ANY TWO)						
Legal and Medical Issues in Hospitals	MSCM0223S304T	5	70	30	100	
Patient Care Management	MSCM0223S305T	5	70	30	100	
Sports Nutrition	MSCM0223S306T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0223S307P	5	140	60	200	
TOTAL	06 (05 Theory Paper 01 Practical)	36	490	210	700	

M.Sc.(Medical) Biochemistry Marks Distribution of Semester – IV Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Bioenergetics & Intermediary Metabolism	MSCM0223S401T	7	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Enzymology	MSCM0223S402T	7	70	30	100	
Nutritional Biochemistry	MSCM0223S403T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Hospital Information System	MSCM0223S404T	5	70	30	100	
Constitution of India	MSCM0223S405T	5	70	30	100	
Environment and Ecology	MSCM0223S406T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0223S407T	5	140	60	200	
TOTAL	06 (05 Theory Paper 01 Practical)	36	490	210	700	

M.Sc.(Medical) Biochemistry Marks Distribution of Semester – V Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			Pass Marks
			EOSE	CA	Total	
CORE COURSES			EOSE	CA	Total	50 % aggregate including continuous assessment marks separately in theory and practical.
Biochemical techniques	MSCM0223S501T	7	70	30	100	
Clinical Biochemistry I	MSCM0223S502T	7	70	30	100	
Immunology	MSCM0223S503T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Artificial Intelligence and Machine Learning	MSCM0223S504T	5	70	30	100	
Hospital Organization and Management	MSCM0223S505T	5	70	30	100	
Hospital Equipment Management	MSCM0223S506T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0223S507T	5	140	60	200	
TOTAL	06 (05 Theory Paper 01 Practical)	36	490	210	700	

M.Sc.(Medical) Biochemistry Marks Distribution of Semester – VI Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			Pass Marks
			EOSE	CA	Total	
CORE COURSES			EOSE	CA	Total	50 % aggregate including continuous assessment marks separately in theory and practical.
Molecular Biology	MSCM0223S601T	7	70	30	100	
Clinical Biochemistry II	MSCM0223S602T	7	70	30	100	
Recent Advances & Quality Assurance	MSCM0223S603T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Biomedical Waste Management	MSCM0223S604T	5	70	30	100	
Teaching Methodology	MSCM0223S605T	5	70	30	100	
Basic Life Support (BLS)	MSCM0223S606T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0223S607T	5	140	60	200	
TOTAL	06 (05 Theory Paper 01 Practical)	36	490	210	700	

15. REVALUATION / SCRUTINY:

Revaluation of answer book(s) and security of the marks shall be permissible as per the policy of the university.

16. TEACHING HOURS:

Teaching hours shall be not less than 400 hours in every semester.

17. AWARD OF DEGREE:

The degree shall be awarded by the University only after receipt of Course completion certificate and NO dues from the Head of Institution. (Principal of the college).

18. LETTER GRADES AND GRADE POINTS

LETTER GRADE	GRADE	PERCENTAGE OF MARKS
O (Outstanding)	10	100 %
A+(Excellent)	9	90-99.99 %
A(Very Good)	8	80-89.99 %
B+(Good)	7	70-79.99 %
B(Above Average)	6	60-69.99 %
C(Average)	5	50-59.99 %
F(Fail)	0	0 Less than 50 %
Ab (Absent)	0	0 Absent

19. Grades Qualifying for Pass:

Theory and Practical Examination

- 1. Minimum 5 Grade** in the university examination and **5 Grade** in internal assessment evaluated by the department are required to pass **who fails to obtain 5 Grade shall be declared failed.**
- A student obtaining **Grade F** shall be considered **failed** and will be required to reappear in the examination.
- Letter Grade **Ab (Absent)** will be showing the absent of the candidate in examination and will be required to reappear in the examination.

Continuous Assessment (CA)

Internal assessments will be conducted two times in a semester. Internal assessments will consist of departmental examinations, assignments, departmental posting, and evaluations. The objective is to allow students to have hands on experience. It would also help students to develop and formulate the data collection process and data analysis.

End of Semester Examination (EOSE)

- a. Each theory paper examination shall be of 3 hours duration.
- b. There will be five papers of theory in Each Semester

20. Credit Weightage Distribution (%)

Item	Credit Weight (%)
1.Internal Assessment	
Class participation/presentation, study records	10.00%
Assignment, quizzes	10.00%
Departmental Postings, case studies, project reports	10.00%
2.University Exam	
70.00%	
Total	100%

21. Authority to issue transcript

The Controller of Examination of the University shall be the authority for issuing transcript after receiving the described fee from the candidate.

22. Working Hours/Days

Duration	3 Years(6 Semesters)
Working Days	6 Days in A Week
Working Hours	36 Hours in A Week

23. Distribution of Courses Semester-Wise

Semester	Core Component (CCC)	Course	Elective Course Component(ECC)	Practical / Ability Enhance Component	Total No. Of Courses/Papers
Semester I	3		2	-	5
Semester II	3		2	-	5
Semester III	3		2	1	6
Semester IV	3		2	1	6
Semester V	3		2	1	6
Semester VI	3		2	1	6
Total	18		12	4	34

24. Distribution of Courses in Each Semester

Sr. No.	Type of Course	Numbers
1	Core Course	3
2	Elective Course	2
Total	05 (Five)	

25. Types of Courses in M.Sc (Medical) Biochemistry: -

1. Core Course-course designed under this category aim to cover the basics that a student is expected to imbibe in the discipline of M.Sc (Medical) Biochemistry A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

2. Elective Course-it is a course which can be chosen from a pool of courses it is specific or specialized or advanced or supportive to the discipline of M.Sc (Medical) Biochemistry. Students have to **CHOOSE ANY TWO COURSE IN EACH SEMSTER** from the pool of course given to that semester.

3. Ability Enhancement Courses (AEC)/Practical: The Ability Enhancement (AE) Courses or practical are the courses based upon the content that leads to Knowledge enhancement. They are skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

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 by a student, i.e.

$$\text{SGPA}(S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

Where C_i is the number of credits of the i th course and G_i is the grade point scored by the student in the i th course.

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

$$\text{CGPA} = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

Where S_i is the SGPA of the semester and C_i 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 and Format for Transcripts

- i. Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Gradeletter	Grade point	CreditPoint (Credit x Grade)
Course1	3	A	8	$3 \times 8 = 24$
Course2	4	B+	7	$4 \times 7 = 28$
Course3	3	B	6	$3 \times 6 = 18$
Course4	3	O	10	$3 \times 10 = 30$
Course5	3	C	5	$3 \times 5 = 15$
Course6	4	B	6	$4 \times 6 = 24$
	20			139

Thus, $\text{SGPA} = 139/20 = 6.95$

Illustration for CGPA

Semester1	Semester2	Semester3	Semester4	Semester5	Semester6
Credit:20 SGPA:6.9	Credit:22 SGPA:7.8	Credit :25 SGPA:5.6	Credit:26 SGPA:6.0	Credit : 26SGPA:6.3	Credit :25 SGPA:8.0

Thus,

Thus, $20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0$

$\text{CGPA} = \frac{\quad}{\quad} = 6.73$

SEMESTER I

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Anatomy
Course Code	MSCM0223S101T
Course Type	Core
Credits	8
Hours per Semester	120

ANATOMY:

- (1) Anatomical terminology, Anatomical planes, Anatomical positions, Clinical positions, Terms related to movements
- (2) Musculoskeletal system:
 - (a) Bones & their classification, Morphology, ossification, blood supply
 - (b) Muscles: Morphology, classification, blood supply, innervations, functions
- (3) Integumentary system: Thick Skin, Thin skin, layers of dermis & epidermis, Skin appendages, blood supply, innervations, functions
- (4) Cardiovascular system: Morphology of blood vessels, classification of blood vessels, blood capillaries, blood circulation, functions
- (5) Nervous system: Central Nervous system & Peripheral Nervous system, Gross basic Anatomy, Cranial nerves, Spinal nerves, Functions of nerves, Autonomic nervous system
- (6) Lymphatic system: Formation of lymph, Lymphatic ducts, Thoracic duct, Lymph circulation, functions
- (7) Digestive system: Parts of digestive system, gross anatomy and functions
- (8) Excretory system: Parts of excretory system, gross anatomy of kidney, ureter, urinary bladder, and their functions
- (9) Reproductive system: Male reproduction system- gross anatomy of penis, testis, epididymis, vas-deferens, seminal vesicles and prostate. Female reproductive system- gross anatomy of ovaries, uterine tube, uterus, vagina, menstruation cycle

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Physiology
Course Code	MSCM0223S102T
Course Type	Core
Credits	8
Hours per Semester	120

CELL PHYSIOLOGY:

- (1) Membrane transport, Bio-membrane potentials, Nernst equation,
- (2) Composition of ECF and ICF, Goldmann equation.

NERVE-MUSCLE:

- (1) Neuron (structure, functions and classification) and neuroglia,
- (2) Action potential, neuromuscular junction,
- (3) Skeletal muscle (structure, mechanism of contraction).
- (4) Smooth muscle (structure, mechanism of contraction).

BLOOD:

- (1) Function and composition,
- (2) Erythrocytes,
- (3) Hemoglobin,
- (4) Blood groups,
- (5) Leucocytes,
- (6) Thrombocytes,
- (7) Immunity (basics).

CARDIOVASCULAR SYSTEM:

- (1) Cardiac muscle,
- (2) Physiological Anatomy of heart and conduction system,
- (3) Normal ECG, cardiac cycle, heart sounds,
- (4) Cardiac output and blood pressure,

- (5) Coronary circulation,
- (6) Common symptoms of cardiovascular illness (basics only).

RESPIRATION:

- (1) Functional Anatomy of the respiratory system,
- (2) Mechanism of breathing, dead space, surfactant, dynamic and static lung volumes and capacities,
- (3) Transport of oxygen and carbon dioxide,
- (4) Regulation of respiration: neural and chemical
- (5) Cyanosis,
- (6) Hypoxia,
- (7) Oxygen therapy,
- (8) Artificial respiration.

GASTROINTESTINAL TRACT:

- (1) Functional Anatomy,
- (2) salivary glands (secretion and functions of saliva, deglutition),
- (3) Stomach (composition, regulation of secretion and functions of the gastric juice),
- (4) Liver and its functions.
- (5) Pancreas (secretion and function),
- (6) Intestinal secretion (composition and functions), movement of intestines,
- (7) Hormones of GIT (Basic only).

EXCRETORY SYSTEM:

- (1) Functions of kidney,
- (2) Juxta glomerular apparatus,
- (3) Formation of urine, counter current mechanism,
- (4) Role of kidney in maintenance of acid base balance,
- (5) Renal function tests

AUTONOMIC NERVOUS SYSTEM:

- (1) Organization of the ANS,
- (2) Neurotransmitters,
- (3) Effect of Sympathetic and Parasympathetic stimulation on different organ systems.

ENDOCRINE SYSTEM

- (1) Introduction
- (2) Enumerate the endocrine glands and their functions

REPRODUCTIVE SYSTEM

- (1) Introduction
- (2) Menstrual cycle , male/female sex hormones
- (3) Methods of contraceptions .

CENTRAL NERVOUS SYSTEM

- (1) General organization of CNS & PNS,
- (2) Sensory system (general sensations, receptors, sensory pathways, sensory areas of brain)
- (3) Motor system: (Spinal reflexes, reflex arc, corticospinal and extra pyramidal tracts)

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Biochemistry
Course Code	MSCM0223S103T
Course Type	Core
Credits	8
Hours per Semester	120

BASICS OF BIOCHEMISTRY:

- (1) Cell structure and function and transport through the biological membrane.
- (2) Chemistry of Biomolecules – carbohydrate, lipids, amino acids, proteins and nucleic acids.
- (3) Chemistry of Blood & Haemoglobin.
- (4) Enzymes – Nature and classification, concepts, Kinetic, mechanism of action.
- (5) Bioenergetics and Biological oxidation.
- (6) Metabolism of Carbohydrates, Proteins, Lipids.
- (8) Nutrition, Vitamins & Minerals.
- (10) Molecular Biology.
- (11) Organ function tests (Renal Function Tests, Liver function tests, Thyroid Function tests &pancreatic Function tests).
- (12) Immunology – General outline
- (14) Principles, working & applications of Basic Biochemical techniques : a) Colorimetry b) Spectrophotometry c) Chromatography d) Electrophoresis e) ELISA

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Health care Services and its Application
Course Code	MSCM0223S104T
Course Type	Elective
Credits	6
Hours per Semester	90

Health care Services and its Application

To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

UNIT I

Health and Disease

Concept, Definitions & Dimensions of health, Wellbeing, Determinants of health, Evolution of medicine, Public Health, Health indicators, Health service philosophies, Disease & causation, Natural history of disease, Disease control & prevention, Changing patterns of disease.

Medical sociology –Introduction Sociological perspective of health, illness and healing. Institutional perspective and Organizational perspective.

UNIT II

Public and Private Health Care Services in India

Evolution of public health systems in India (ancient, colonial & post-independence), Health Planning in India (Committees, Planning commission, Five year plans, National Health Policies), Public health systems in India (Center, State, District & Village level), Rural development, Corporate philosophy, Evolution and organization of private health systems in India and Current trends in private health care in India.

UNIT III

WHO- Objective, functions, UNICEF- objective and functions. Different Model of Healthcare- The Beveridge Model, The Bismarck Model, The National Health Insurance Model, The Out-of-Pocket Model. Brief Introduction of Health System of different countries: USA, UK, Canada, Australia, Sweden, and Germany.

UNIT IV

Population Health

Introduction to population studies, Issues of Indian society & culture, Nuptiality & Fertility, Reproductive health, Population and Development (policies, programs & evaluation), introduction to epidemiology (concept, terms, aims & uses), definition of epidemic, endemic, pandemic, sporadic. Prevalence and Incidence. Epidemiological methods- basic idea of Cohort study, Case Control study and RCT. Epidemiology of communicable diseases (TB, STDs, Diarrhoea & HIV/AIDS) and Epidemiology of Noncommunicable diseases (CHD, Cancer, Diabetes, Hypertension & Obesity).

UNIT V

Contemporary Issues in Health Services Management

National Health Policy; Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCH+A); National Vector Borne Disease Control Programme (NVBDCP)

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Placement Semester	Semester I
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Basics of Computer
Course Code	MSCM0223S105T
Course Type	Elective
Credits	6
Hours per Semester	90

COMPUTER- 1.0 Introduction 1.1 Objectives 1.2 what is Computer? 1.2.1 Basic Applications of Computer 1.3 Components of Computer System 1.3.1 Central Processing Unit 1.3.2 Keyboard, mouse and VDU 1.3.3 Other Input devices 1.3.4 Other Output devices 1.3.5 Computer Memory 1.4 Concept of Hardware and Software 1.4.1 Hardware 1.4.2 Software 1.4.2.1 Application Software 1.4.2.2 Systems software 1.5 Concept of computing, data and information 1.6 Applications of IECT 1.6.1 e-governance 1.6.2 Entertainment 1.7 Bringing computer to life 1.7.1 Connecting keyboard, mouse, monitor and printer to CPU 1.7.2 Checking power supply.

OPERATING COMPUTER USING GUI BASED OPERATING SYSTEM-2.0 Introduction 2.1 Objectives 2.2 Basics of Operating System 2.2.1 Operating system 2.2.2 Basics of popular operating system (LINUX, WINDOWS) 2.3 The User Interface 2.3.1 Task Bar 2.3.2 Icons 2.3.3 Menu 2.3.4 Running an Application 2.4 Operating System Simple Setting 2.4.1 Changing System Date And Time 2.4.2 Changing Display Properties 2.4.3 To Add Or Remove A Windows Component 2.4.4 Changing Mouse Properties 2.4.5 Adding and removing Printers 2.5 File and Directory Management 2.5.1 Creating and renaming of files and directories.

UNDERSTANDING WORD PROCESSING-3.0 Introduction 3.1 Objectives 3.2 Word Processing Basics 3.2.1 Opening Word Processing Package 3.2.2 Menu Bar 3.2.3 Using The Help 3.2.4 Using The Icons Below Menu Bar 3.3 Opening and closing Documents 3.3.1 Opening Documents 3.3.2 Save and Save as 3.3.3 Page Setup 3.3.4 Print Preview 3.3.5 Printing of Documents 3.4 Text Creation and manipulation 3.4.1 Document Creation 3.4.2 Editing Text 3.4.3 Text Selection 3.4.4 Cut, Copy and Paste 3.4.5 Spell check 3.4.6 Thesaurus 3.5 Formatting the Text 3.5.1 Font and Size selection 3.5.2 Alignment of Text 3.5.3 Paragraph Indenting 3.5.4 Bullets and Numbering 3.5.5 Changing case 3.6 Table Manipulation 3.6.1 Draw Table 3.6.2

Changing cell width and height 3.6.3 Alignment of Text in cell 3.6.4 Delete / Insertion of row and column 3.6.5 Border and shading.

USING SPREAD SHEET-4.0 Introduction 4.1 Objectives 4.2 Elements of Electronic Spread Sheet 4.2.1 Opening of Spread Sheet 4.2.2 Addressing of Cells 4.2.3 Printing of Spread Sheet 4.2.4 Saving Workbooks 4.3 Manipulation of Cells 4.3.1 Entering Text, Numbers and Dates 4.3.2 Creating Text, Number and Date Series 4.3.3 Editing Worksheet Data 4.3.4 Inserting and Deleting Rows, Column 4.3.5 Changing Cell Height and Width 4.4 Formulas and Function 4.4.1 Using Formulas 4.4.2 Function

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Basics of Health Care IT
Course Code	MSCM0223S106T
Course Type	Elective
Credits	6
Hours per Semester	90

Electronic Health records EHR

- Definitions – contents and examples of EHR practices
- Preliminary steps in implementation of HER
- Issues and challenges in implementation of EHR
- Planning for the introduction of EHR
- Factors to be considered when developing EHR & implementation plan
- Electronic Medical Record. Preliminary steps in implementation of EMR.
- Remote healthcare and telemedicine,
- PHR (Patient Health Record),
- Clinical Decision Support System,
- m-Health, e-Health and other healthcare tools and applications

Semester II

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Pathology
Course Code	MSCM0223S201T
Course Type	Core
Credits	8
Hours per Semester	120

INTRODUCTION TO PATHOLOGY:

- (1) Definition
- (2) Cause of cell injury
- (3) Reversible and irreversible injury
- (4) Pathologic calcification
- (5) Cellular adaptations in brief.

INFLAMMATION AND REPAIR:

- (1) Acute and Chronic inflammation
- (2) Chemical mediators of inflammation

HEALING:

- (1) By primary and secondary intention
- (2) Factors affecting wound healing

HEMODYNAMIC DISORDERS:

- (1) Edema
- (2) Shock

NEOPLASIA:

Definition, Nomenclature

- (1) Characteristic of benign and malignant neoplasm
- (2) Metastasis in brief
- (3) Carcinogenesis in brief.

HAEMOPOIETIC SYSTEM:

- (1) Anemia
- (2) IDA, Megaloblastic, Thalassemia, SCA, G6PD, deficiency, Haemophilia, Leukaemia
- (3) Lab investigation of haemorrhagic disorders.

LIVER:

- (1) Liver function test, Jaundice, Hepatitis-B

KIDNEY:

- (1) Stones, Nephrotic Syndrome, Renal Function Test
- (2) ARF, CRF
- (3) Glomerular nephritis in brief.

THYROID:

- (1) Goitre, Thyroiditis
- (2) Hypo and Hyperthyroidism

BONE:

- (1) Osteomyelitis, TB
- (2) Common Tumors

GALL BLADDER:

- (1) Gall stones, Cholecystitis

BLOOD GROUPS AND COAGULATION

PANCREAS: Diabetes Mellitus, Pancreatic Function Test

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Microbiology

Course Code	MSCM0223S202T
Course Type	Core
Credits	8
Hours per Semester	120

- (1) Cell Structure
 - (a) Microscopy, staining,
 - (b) Detailed structure in comparison to Eukaryotic cell, Morphological change during growth.
- (2) Microscopy
 - (a) Various optical methods available for viewing micro organism and their applications.
- (3) Overview of Microbial Worlds
 - (a) Basic principles and Purpose of Classification systems
- (4) Growth Survival of Micro-organism
 - (a) Growth
 - (b) Growth parameters
 - (c) Definition and measurement of bacterial growth
 - (d) Survival of micro-organisms in natural environment
 - (e) Role of antimicrobial agents.
- (5) Cultivation of micro-organisms
 - (a) Growth requirements
 - (b) Sources of metabolic energy
 - (c) Nutrition
 - (d) Environmental and other factors affecting growth
 - (e) Methods of cultivation
- (6) Microbial Metabolism
 - (a) Metabolism of biosynthesis and growth
 - (b) Biosynthesis pathways
 - (c) Energy Yielding metabolism
 - (d) Regulation of metabolic pathways
- (7) Bacterial Genetics
 - (a) Structure and replication of bacterial DNA plasmids
 - (b) Variation :
 - i. Mutation
 - ii. Transfer of genetic material
 - (c) Recombine DNA technology
- (8) Control of micro organism
 - (a) Sterilization & Disinfection
 - (b) Antimicrobial agents & bacterial resistance
- (9) General Principles in clinical microbiology
 - (a) Collection and handling of various samples

- (b) Laboratory safety
- (c) Quality control
- (d) Antimicrobial susceptibility and assay
- (e) Laboratory animals-handling and care

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical)Biochemistry
Program Code	MSCM02
Name of the Course	Basic Instrumentation & Lab Practices
Course Code	MSCM0223S203T
Course Type	Core
Credits	8
Hours per Semester	120

1. Introduction to Laboratory Apparatus- Glasswares, Chemical Balance, Centrifuge, Hot air Oven, Incubator, Laminar air flow pH meter.
2. Analytical & Physical Biochemistry – . Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards, buffer systems, Law of mass action, viscosity, surface tension, osmosis, Donnan equilibrium, Dialysis, free energy, high energy linkages, molecular weight determination.
3. Disposal of Laboratory/Hospital Waste- Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal
4. Good Lab Practices, Universal Precautions, Use of PPEs, Hand hygiene practices, Lab safety protocols

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Internet Technology
Course Code	MSCM0223S204T
Course Type	Elective
Credits	6
Hours per Semester	90

Introduction to Internet Technology, History and evolution of the Internet, Internet architecture and protocols, Internet service providers (ISPs) and their role, Internet Communication Protocols Transmission Control Protocol/Internet Protocol (TCP/IP),Hypertext Transfer Protocol (HTTP) and HTTPS, Domain Name System (DNS),Simple Mail Transfer Protocol (SMTP) and Post Office Protocol (POP),Internet Security, Introduction to cyber security, Secure Socket Layer (SSL) and Transport Layer Security (TLS)

E-commerce and Online Business, E-commerce fundamentals and models, Online payment systems, Digital marketing and search engine optimization (SEO),Privacy and legal considerations in online transactions, Cloud Computing and Internet Services

Internet of Things (IoT) and its applications , Social Media and Online Collaboration ,Social media platforms and their features, Online collaboration tools (e.g., project management, video conferencing),Social media marketing and analytics, Emerging Trends in Internet Technology

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Genetic Engineering
Course Code	MSCM0223S205T
Course Type	Elective
Credits	6
Hours per Semester	90

Basic concepts of DNA structure and properties, restriction enzymes, DNA ligase, Klenow enzyme, T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase, Cohesive and blunt end ligation, Linkers, Adapters, Homo polymeric tailing, Labeling of DNA, Nick translation, Random priming, Radioactive and non-radioactive probes, Hybridization techniques, Northern, Southern and Colony Hybridization, Chromatin immunoprecipitation, DNA-Protein Interaction-Electro mobility shift assay, DNase I foot printing, Methyl interference assay, Isolation of genomic DNA from prokaryotes and eukaryotes, Isolation of Plasmid DNA and Bacteriophage DNA. Isolation of total RNA and mRNA. Plasmids, Bacteriophages, pBR322 and pUC series of vectors, M13 and P2 phage based vectors, High capacity vectors: Cosmids, phagemid, BAC, Animal and Plant virus based cloning vectors, Shuttle vectors, Expression vectors, pMal, GST, pET-based vectors, Constructions of libraries, cDNA and genomic libraries, cDNA and genomic cloning, Expression cloning, Jumping and hopping libraries, South-western and Far-western cloning, Protein-protein interactive cloning and Yeast two hybrid system, Phage display. Primer designing, Fidelity of thermostable enzymes, Types of PCR multiplex, nested, reverse transcriptase, real time PCR, touchdown PCR, hot start PCR, colony PCR, in situ PCR, cloning of PCR products, T vectors, Principles in maximizing gene expression, Gene expression analyses, differential gene expression methods, Introduction of DNA into mammalian cells, transfection techniques.

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Organisational Behaviour
Course Code	MSCM0223S206T
Course Type	Elective
Credits	6
Hours per Semester	90

Management & Organizational Behavior

Importance of Management - Definition of Management -Characteristic features of Management - Roles of Management-Role of a Manager-Levels of Management and their functions-Process of Management-Managerial Skills-Management and Administration-Management – Science or an Art? - Management – a profession? Nature of Management principles, Need for Management principles- Early Management approaches - Scientific Management-Administrative Management-Human Relation Movement-Modern Management Approaches-Behavioral Approach-Quantitative Approach-System approach -Contingency approach

Thinking and Decision-making process

Human Information Processing -Approaches (Lens model, Cognitive approach, Process training approach)- Phases of decision making- Types of decision making- Decision cycle- Behavioral decision making- Decision rationality - Models of behavioral decision making-Use of heuristics-Thinking – process, images, language- Concepts- Problem solving- Creative thinking Perception Definition- Factors- Perceptual grouping and selectivity - Stimuli selection- Barriers - Honing perceptual skills Attitudes and values Definition, Characteristics, Functions and Formation of attitudes-Definition, types, formation of values- Values and behavior- Values and ethics- Values and attitudes Learning Definition – Components –Determinants- Theories (classical, operant, cognitive, social learning)- Principles of reinforcement- Punishment- Learning curves- Learning and behavior

General Management

Planning –Organization-Decision Making-Communication-Staffing-Directing-Motivation-Counseling -Mentoring –Leadership Organizational Behavior Personal Growth and Development
Definition, characteristics, determinants, causes, Theories (Type, Trait, Intrapsychic, Social learning, Skinner's)

Semester III

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Chemistry & Metabolism of Proteins & Lipids
Course Code	MSCM0223S301T
Course Type	Core
Credits	7
Hours per Semester	105

Unit–I:Chemistry of Amino Acids & Proteins

- Structure, Classification and General properties of amino acids.
- Peptide bond–stability and formation, Primary structure, Secondary structure and motifs, α helix, β sheet,3-10helix, Leucine zipper, Zinc finger, Tertiary & Quaternary structure.
- Biological importance of small peptides (glutathione, peptidehormones), Cyclicpeptides (Gramicidin).
- Classification of proteins-globular,fibrous,membrane,metallo-protein.
- Denaturation, coagulation, refolding, Role of chaperones in folding.

Unit–II: Metabolism of Amino acids & Proteins

- Metabolic fate of dietary proteins and amino acids
- General reactions of proteins
- Formation & circulation of ammonia, Glucose alanine cycle, Ammonia Toxicity
- Urea cycle & its inborn errors
- Metabolism of amino acids
- Genetic defects in metabolism of amino acids

Unit–III: Chemistry of Lipids

- Classification & biological significance of lipids & fatty acids
- Steroids, Sterols, relation to vitamin D and steroid hormones
- Chemistry of lipids: Oils, waxes, isoprene units, Phospholipids, Lipoproteins, Glycolipids, Sphingolipids, Cerebrosides, Gangliosides, Prostaglandins, Prostacyclins, Thromboxanes, Leukotrienes

Unit–IV: Metabolism of Lipids

- Fatty acid biosynthesis, Desaturation of fatty acids
- Beta-oxidation, breakdown of odd chain fatty acids, energy yields, Regulation of β -oxidation, ω -oxidation & α -oxidation
- Metabolism of phospholipids & Sphingolipids
- Regulation and Biosynthesis of cholesterol and other steroids
- Fate of acetyl CoA, formation of ketone bodies and ketosis
- Biosynthesis of prostaglandins, Prostacyclins, Thromboxanes, Leukotrienes
- Lipoprotein metabolism
- Inborn errors of lipid metabolism

Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Chemistry & Metabolism of Carbohydrates & Nucleotides
Course Code	MSCM0223S302T
Course Type	Core
Credits	7
Hours per Semester	105

Chemistry & Metabolism of Carbohydrates & Nucleotides

Unit–I: Chemistry of Carbohydrates

- Classification of carbohydrates (monosaccharides, disaccharides, oligosaccharides and polysaccharides)
- Physical and chemical properties of carbohydrates.
- Biological importance of mucopolysaccharides

Unit–II: Metabolism of Carbohydrates

- Reactions, energetics and regulation of: Glycolysis, Gluconeogenesis, TCA cycle, Pentose phosphate pathway, Glycogen metabolism, Glucuronic acid cycle
- Anapleurotic reactions
- Metabolism of Galactose and fructose

Unit–III: Chemistry and Metabolism of NucleicAcids

- Purines, pyrimidines, nucleosides, nucleotides
- Structure and types of DNA & RNA
- Biosynthesis & Degradation of purines and pyrimidines
- Inborn errors of nucleotide metabolism

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Biostatistics & Research Methodology
Course Code	MSCM0223S303T
Course Type	Core
Credits	7
Hours per Semester	105

i. Biostatistics:- Use of calculators and electronic spread sheets for understanding of: (1) Elements of data collection and presentation of data (2) Measures of central tendency and dispersion (3) Non parametric tests (4) Parametric tests (including ANOVA) (5) Correlation and regression (6) Sampling techniques, randomization, sample size estimation. (7) Scales of measurement, data display, and measures of central tendency (mean, median, mode). (8) Dispersion of data (variance, standard deviation). (9) Selection of tests (of significance) and their applicability. (10) Correlation and regression analysis. (11) Statistical software.

ii. Research Methodology: -

1. Literature search and bibliography.

2. Data management and presentation.
3. Formulation of research topic, study design, blinding procedures and protocol writing.

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Legal and Medical issues in hospital
Course Code	MSCM0223S304T
Course Type	Elective
Credits	5
Hours per Semester	75

To acquaint the students with various legal aspects concerning type and character of the health care organizations and its duties towards patients and its employees. To familiarize the students in matters of liability of hospital medical negligence and medical malpractice in diagnosis, administration of drugs, surgery etc.

ontents:

UNIT I

Law and establishment of hospitals-private / public hospitals, legal requirements under medical council Acts. West Bengal Clinical Establishment Act and rules 2017 (as amended till date).

UNIT II

Essentials of contract Act. Contractual obligations in hospital services - requisites of a valid contract - hospital as 'bailer' - sale and purchase of" goods- duties towards patients - code of ethics-violation legal consequences.

UNIT III

Legal aspects relating to organ transplantation, MTP Act, 1971, Basics of Drugs and Cosmetic Acts, anesthesia. ESI Act, PNDT Act, AERB, ICMR Guideline of Scientific Research Members, clinical trials.

UNIT IV

Legal liability of hospitals - criminal, civil and tortuous; liability for negligence, consumer protection law, absolute liability and vicarious liability, legal remedies available to patients: remedies under contract law, tort, criminal law and consumer protection' Act. Medical Jurisprudence.

UNIT V

Medical ethics – basic issues, importance, process of developing and implementing ethics and values in an institution – codes of conduct: Hippocrates oath and declaration of Geneva 2006 – NMC regulation – professional conduct, etiquette and ethics.

References:

Anoop Kaushal K, Medical negligence and legal remedies, 3 rd edition, universallawPllblishcr.5.New Delhi, 2004.

Avtar singh, company law, 13th edition, Taxmann publishers, Lucknow, 2001.ConsumerProtection Act1986

Francis D. Government and Business, Himalaya publishingHouse,1988

Gupta D and Gupta, S. Government and business, Vikas Publishing House, 1987 Varma, D.P.S,Monopolies.TradeRegulationsandConsumerProtection,T-ataMcGraw Hill,NewDelhi,1985.

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Patient Care Management
Course Code	MSCM0223S305T
Course Type	Elective
Credits	5
Hours per Semester	75

Objectives:

To understand the processes and details related to effective patient care and to further increase the satisfaction levels of patients

Contents:**UNIT I****Patient centric management**

Concept of patient care, Patient-centric management, Organization of hospital departments, Roles of departments/managers in enhancing care, Patient counseling & Practical examples of patient centric management in hospitals.

UNIT II

Patient safety and patient risk management, Basic Life Support, Patient Satisfaction, feedback and grievances.

UNIT III**Patient classification systems and the role of case mix**

Why do we need to classify patients, Types of patient classification systems, ICD 10 (CM, PM), Case mix classification systems, DRG, HBG, ARDRG, Case mix innovations and Patient empowering classification systems.

UNIT IV**Medical ethics & auditory procedures**

Ethical principles, Civic rights, Autopsy, Vicarious liability, Use of investigational drugs, Introduction/need & procedures for medical audit, Audit administration & Regulating committees. Confidentiality and professional secrecy, ethics of trust and ethics of rights – autonomy and informed consent, under trading of patient rights – universal accessibility – equity and social justice, human dignity.

UNIT V**Disaster preparedness**

Policies & procedures for general safety, disaster plan and crisis management. Basics of disaster management and Mass casualties, Components of disaster plan: pre-hospital and hospital, Disaster alertness in Hospital, Disaster management planning and implementation, Severity of illness among disaster victims and risk assessment, Triage, different color coding related to disaster.

UNIT VI**Patient Medical Records**

Policies & procedures for maintaining medical records. e-records, legal aspects of medical records, its safety, preservation and storage.

References:

- Goel S L & Kumar R. 2004. Hospital Core Services: Hospital Administration of the 21st Century. Deep Deep Publications Pvt Ltd: New Delhi
- Gupta S & Kant S. 1998. Hospital & Health Care Administration: Appraisal and Referral Treatise. Jaypee: New Delhi
- Harris MG & Assoc. 2003. *Managing Health Service: Concepts & Practices*. MacLennan + Petty: Sydney
- Kelly DL. 2006. Encyclopedia of Quality Management in Hospitals & Health Care Administration. Vol 1-6. Pentagon Press: Chicago
- Kilpatrick AO & Johnson JA. 1999. Handbook of Health Administration & Policy. Marcel Dekker Inc: New York
- Kumar A. 2000. Encyclopedia of Hospital Administration & Development: Volume I. Anmol Publications Ltd: New Delhi.
- Ransom SB, Joshi MS & Nash DB. 2006. The Health Care Quality Book: Vision, Strategy & Tools. Standard Publishers Distributors: Delhi
- Reddy N KS. 2000. Medical Jurisprudence & Toxicology. ALT Publications: Hyderabad
- Rao MS. 1992. Health & Hospital Administration in India. Deep & Deep Publications: New Delhi

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Sports Nutrition
Course Code	MSCM0223S306T
Course Type	Elective
Credits	5
Hours per Semester	75

Course Content

Basics of nutrition

1. Introduction to sport and exercise
2. Bioenergetics of Physical activity
3. Nutrition Exercise and Athletic Performance

4. Muscle and Exercise Basics (Muscle and Neuromuscular Junction, Muscle action potential, Sarcomeres and contraction , muscle fiber type, muscle adaption to strength training and endurance exercise muscle fiber type and endurance adaption)
5. Hormonal Adaption to Acute and Chronic Exercise (Catecholamines, Insulin and Glucagon, Cortisol, Growth Hormone and ACTH)
6. Caffeine and Athletic Performance
7. Muscle Carbohydrate Utilization
8. Maintaining Blood Glucose levels (During Exercise, cori cycle and alanine cycle)
9. Carbohydrate, Fat and Protein metabolism Before, during and after exercise

Reference Book:

Nutrition in exercise and sports performance. Krause and Mahan's Food & The Nutrition Care Process

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Practical & Viva
Course Code	MSCM0223S307P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	90

Semester IV

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Bioenergetics & Intermediary Metabolism
Course Code	MSCM0223S401T
Course Type	Core
Credits	7
Hours per Semester	105

Bioenergetics & Intermediary Metabolism

Unit-I: Bioenergetics

- Laws of thermo dynamics, Gibbs free energy, relevance of entropy and Enthalpy in biological systems and reactions.
- Biological oxidation, high energy compounds, High energy bonds, redox and phosphate potential.
- Bioenergetics & biological oxidation – General concept of oxidation & reduction. Electron transport Chain (ETC) – functioning of ETC & inhibitors of ETC, Oxidative Phosphorylation, Uncouplers and theories of Biological oxidation & oxidative phosphorylation.

Unit-II: Intermediary metabolism

- TCA cycle
- Linking of urea & TCA cycle
- Metabolism during fasting & fed state
- Metabolism of starvation

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Enzymology
Course Code	MSCM0223S402T
Course Type	Core
Credits	7
Hours per Semester	105

Enzymology

Unit–I: Enzymes, Coenzymes and catalysis

- Nomenclature and classification of enzymes, co-factor, and co-enzymes
- Vitamin as cofactors
- Vitamin cofactors
- Factors affecting catalysis

Unit–II: Enzyme Kinetics

- Steady state, Michaelis-Mentonkinetics (derive equation and transformations)
- Transformation of Michaelis-Menton equation.
- Enzyme Inhibition (competitive, uncompetitive, non competitive, suicide),effect on kinetic constants
- Enzyme inhibitors as drugs:RT and Protease inhibitors as anti-HIV drugs
- Suicidal inhibition, covalent modification, induction & repression
- Reversible and irreversible activation of enzymes (pro-enzymes, phosphorylation)
- Enzymes activation, Catalytic mechanism, Allosteric regulation
- Multi-enzyme Complex

Unit–III:Enzymes in Physiology and Biotechnology

- Regulatory enzymes of metabolism
- Enzyme cascades (blood clotting,complement activation, cell division and apoptosis)
- Enzymes of diagnostic, prognostic & therapeutic importance.
- Isoenzymes & their diagnostic importance

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Nutritional Biochemistry
Course Code	MSCM0223S403T
Course Type	Core
Credits	7
Hours per Semester	105

Nutritional Biochemistry

Unit – I: Nutrition -I

- Balanced diet
- Calorific values of foods and their determination by bomb calorimeter.
- Specific dynamic action of foods
- Nutritional assessment by clinical testing; Anthropometric and Biochemical testing
- BMR and RDA for infants, children, adults and pregnant and lactating mothers; Food fortification; probiotics
- Enzymes of digestive system, Hormones in digestion
- Role of bile acids
- Absorption; Control of food intake (leptin, ghrelin, peptide YY)
- Cholesterol, sodium and blood pressure
- Diet calculation, food toxicity.

Unit – II: Nutrition – II

- Protein factor in nutrition, glycemic index
- Role of carbohydrates, protein and lipids in diet
- Malnutrition (PEM, Marasmus, Kwashiorkor), Obesity (BMI and other metrics)
- Eating disorders; Anorexia and bulimia; Obesity and starvation.
- Diet and longevity, ageing, pregnancy and lactation, old age
- Composition and nutritive value of common foodstuffs

Unit – III: Macrominerals and Microminerals

- **Macro minerals-** Calcium, Phosphorus, electrolytes, distribution in the human body
- Physiology, function, sources, RDA, Regulation, deficiency and toxicity of Macrominerals
- **Micro minerals-** Iron, Iodine, Fluoride, Mg, Cu, Zn, Se, Manganese, Chromium, Sources, distribution in the human body
- Physiology, function, RDA, Regulation, deficiency and toxicity of microminerals.

Unit–IV: Chemistry and Metabolism of Vitamins

- Classification of vitamins
- Sources, biochemical functions, RDA and deficiency manifestations of fat and water soluble vitamins.

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Hospital Information System
Course Code	MSCM0223S404T
Course Type	Elective
Credits	5
Hours per Semester	75

Objective:

This subject will provide models of HIS and help the student develop a subsystem for healthcare management.

UNIT I**Information System**

Overview, structure of MIS specific to hospital; information and data; information for control, decision, statutory needs, feedback; hierarchy of management activity; decision making process; document preparation, data capture, POS method.

UNIT II**Project Life Cycle**

Physical systems design, physical data base design; Programme development, procedure development; input-output design, online dialogue; design of files, data communication; Project life cycle, installation and operation, conversion, operation, documentation, training, maintenance, post audit system evaluation.

UNIT III**Approaches to HIS**

Patient based, functional organization based, user department based, clinician based HIS, Medical records, nursing information system; appointments scheduling, dissemination of tests and diagnostic information, general administration, productivity. Concept of DSS and ESS.

UNIT IV**Application of HIS in Hospitals**

Back office & Front Office- IPD & OPD- Patient Registration, Appointment Scheduling, Admission Discharge Transfer (ADT)- Wards Management Module, Computerized Physician Order Entry (CPOE), Nursing Workbench- Clinic Specialties- Roster Management- Laboratory Information System, Radiology Information System- CSSD, Pharmacy, Blood Bank, Operation Theatre, Dietary, Pharmacy- Medical Records- Patient Billing, Insurance, and Contract Management.

References:

Davis,G.B. and M.H.Oslon,Managent Information Systems-Conceptual Foundations, Structure andDevelopment,TMH,1998

Mudford,Eric,Effectivesystemsdesignandrequirementsanalysis,McGrawHill,1995

A. V. Srinivasan, Managing a Modern Hospital, Chapters 10 and II, Response Books, New Delhi, 200CHospital Information Systems by S.A Kelkar, PHI

Management Information System by Ashok Arora & Akshaya Bhatia,Excel Book.

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Constitution of India
Course Code	MSCM0223S405T
Course Type	Elective
Credits	5
Hours per Semester	75

UNIT 1

Meaning of the term 'Constitution' making of the Indian Constitution 1946-1949.

UNIT II

The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States. 32

UNIT III

Fundamental Rights and Duties their content and significance.

UNIT IV

Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

UNIT V

Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

UNIT VI

Doctrine of Separation of Powers - legislative, Executive and Judicial and their functioning in India.

UNIT VII

The Election Commission and State Public Service commissions.

UNIT VIII

Method of amending the Constitution.

UNIT IX

Enforcing rights through Writs.

UNIT X

Constitution and Sustainable Development in India.

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Environment and Ecology
Course Code	MSCM0223S406T
Course Type	Elective
Credits	5
Hours per Semester	75

UNIT I

General meaning of environment, relevance of the subject environment, ecology for hospital administrators.

UNIT II

Brief outline of the environment (protection) act 1986 & its importance for hospital administration, Legislation vs. Social obligation of hospitals, Role of ngo's like green peace in environmental protection.

UNIT III

Ecology - brief outline on elements of ecology; brief discussion on ecological balance and consequences of change, principles of environmental impact assessment. Environmental impact assessment report (.).

UNIT IV

Air pollution and control - factors responsible for causing air pollution in hospitals, sources & effects of air pollutants in the hospital context. Primary & secondary pollutants, greenhouse effect, depletion of ozone layer. Brief discussion on the air (prevention & control of pollution) Act 1989.

UNIT V

Water pollution and control - brief discussion on hydrosphere, natural water, pollutants: their origin and effects, river/lake/ground water pollution, the financial implication of water pollution control and steps required to be taken e.g. Sewerage treatment plant, water treatment plant. Standards and control in Relation to the effect of legislation by central and state boards for prevention and control of water pollution.

UNIT VI

Land pollution- Brief understanding of lithosphere, pollutants, municipal, industrial, commercial, agricultural, hospital, hazardous solid waste); their original effects, collection and disposal of solid waste, recovery & conversion methods in relation to a hospital enterprise with discussion about the financial implication.

UNIT VII

Noise pollution - Sources, effects, standards & control

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Practical& Viva
Course Code	MSCM0223S407P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	75

Semester V

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Biochemical techniques
Course Code	MSCM0223S501T
Course Type	Core
Credits	7
Hours per Semester	105

Biochemical techniques

Unit–I: Spectroscopy

- Beer Lambert's Law, Molar extinction coefficient, Absorption maximum
- UV-Vis: Spectroscopy, Colorimetry–principle, instrumentation, application
- Fluorescence Spectroscopy–principle, Instrumentation, application
- Atomic Absorption Spectrometry–principle, instrumentation, application
- NMR–principle, instrumentation application
- Mass spectroscopy principle, instrumentation, application
- X-ray crystallography

Unit–II: Chromatography and Electrophoresis

- Types of chromatography, principle, instrumentation, application of types of chromatography- PC, TLC, GC, Ion–exchange, Gel filtration(Gel exclusion chromatography), Affinity chromatography, HPLC and RP-HPLC, FPLC, LC,
- Peptide mapping and N-terminal sequencing of proteins
- Electrophoresis–moving boundary and zonal electrophoresis

Unit–III: Centrifugation

- Centrifugation, RCF and types of rotors
- Ultra centrifugation–principle, instrumentation, application

Unit–IV: Tracer Techniques

- Stable and radioactive isotopes, Radioactivity theory, half life and emission spectra of Half life of biologically useful isotopes
- Isotopes used for labelling proteins and nucleic acids
- Principle, application and hazards of radioactive techniques
- Diagnostic and therapeutic uses of radioisotopes
- Immunoassays: ELISA, RIA, CLIA, Immunodiffusion

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Clinical Biochemistry I
Course Code	MSCM0223S502T
Course Type	Core
Credits	7
Hours per Semester	105

Clinical Biochemistry I

Unit – I

- Physiological Interrelationship between cardiovascular, respiratory and renal systems
- Normal values for different blood tests and clinical implications
- Regulation of salt, electrolyte and water, Acid base balance and imbalance
- Diagnosis of anemia, thalassemia, hemoglobin metabolism & hemoglobinopathies
- Hyper cholesterolemia, atherosclerosis.
- Cardiac markers, diabetic profile
- Chemistry, composition and functions of lymph, CSF, ascitic, pleural & synovial fluids.
- Urine formation, excretion & urine analysis.
- Composition, chemistry & functions of specialized tissues like muscle, bone, nerve, connective tissue & brain adipose tissue.

- Biochemistry of Diabetes mellitus, regulation of blood glucose levels, Atherosclerosis, Fatty liver & obesity.
- Radioisotopes & their clinical applications.
- Lipid per oxidation, free radicals & antioxidants, Nitric oxide formation, metabolism & role in Medicine.
- Biochemical changes in aging and pregnancy & lactation.
- Neurochemistry in Health & Disease.
- Inborn errors of metabolism.
- Xenobiotics
- Environmental biochemistry

Unit – II: Organ function tests

- Liver, Renal, thyroid, pancreatic & gastric function tests

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Immunology
Course Code	MSCM0223S503T
Course Type	Core
Credits	7
Hours per Semester	105

Immunology

Unit – I: Components of the Immune System

- History of immunology
- Natural & acquired immunity, Specific & non-specific immune response.
- Cells & organs of immune system
- Antigenic determinants, Epitopes, Haptens, Properties of strong antigens
- Adjuvants – types, mode of action, and applications.
- Classification, structure, and biological properties of immunoglobulins
- Isotypes, allotype, idiotypes.
- Theories of antibody formation, Generation of antibody diversity
- Genomic rearrangements of light and heavy – chain loci in B-cells
- Genomic rearrangements in T-cell receptor, structure of CD3, CD4, CD8

Unit – II: Events in Immune Response

- Antigen – antibody reaction, mechanisms and regulation of immune responses.
- Humoral & cell-mediated immune response
- Activation of T cells & B cells
- Kinetics and regulation of primary and secondary immune response
- MHC proteins structure & functions
- Antigen processing & presentation
- Transplantation immunology; Graft Versus Host Disease
- Complement fixation: pathways and biological consequences
- Discovery and action of Interferons
- Cytokines; Inflammation; Role in obesity, cancer
- Apoptosis
- Tumor immunology, biochemistry of cancer, tumor markers

Unit – III: Immune Disorders

- Types of Hypersensitivity; Coombs classification, Tests for diagnosis of hypersensitivity (Coombs), Tuberculin test
- Auto immune diseases; classification
- Immuno- deficiency disorders – primary and secondary deficiencies
- Gene therapy for ADA deficiency
- Immunology of AIDS
- Immunosuppressive drugs/agents & their mechanism of action

Unit – IV: Immunotechnology

- ELISA, RIA, CLIA
- Hybridoma technology – production of monoclonal antibodies; applications in research and immunotherapy; antibody engineering
- History and types of Vaccines; Conventional vaccines - killed, attenuated, and subunit Vaccines

- Modern vaccines; peptide, DNA, recombinant / vector, and anti-idiotypic vaccines
- Schedules of common vaccination, Benefits and adverse consequences of vaccination

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Artificial Intelligence and Machine Learning
Course Code	MSCM0223S504T
Course Type	Elective
Credits	5
Hours per Semester	75

Introduction to Artificial Intelligence (AI)

Overview of AI and its applications, Historical development and key milestones in AI, Different branches of AI (e.g., machine learning, natural language processing, computer vision)

Foundations of Machine Learning

Introduction to machine learning and its importance, Supervised, unsupervised, and reinforcement learning, Key concepts: features, labels, training data, and models, Neural Networks and Deep Learning,

Introduction to artificial neural networks (ANN)

Deep learning architectures: feed forward, convolution, and recurrent neural networks, Training neural networks using back propagation and optimization algorithms, Natural Language Processing (NLP) Fundamentals of NLP and its applications, Text preprocessing techniques (e.g., tokenization, stemming, stop-word removal), Language modeling, sentiment analysis, and named entity recognition Computer Vision Basics of computer vision and image processing, Feature extraction methods (e.g., edge detection, corner detection), Object recognition and image classification using deep learning

Ethics and Responsible AI

Ethical considerations in AI and machine learning, Fairness, transparency, and bias in machine learning models, Privacy, security, and legal implications of AI applications

Artificial Intelligence & Machine Learning in their use in Health Care

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Hospital Organization and Management
Course Code	MSCM0223S505T
Course Type	Elective
Credits	5
Hours per Semester	75

Definition of management; Productivity, Efficiency and Effectiveness; Managerial Skills, Evolution of management thought:FredericW.Taylor'sscientific management, HenryFayol'sprinciplesofmanagement, concept to bureaucracy, human relations approach, Behavioral approach, systems theory of organization, contingency theory of organization, management by objectives(MBO).

Management functions: Nature of management process and managerial functions – **Planning:**Types(mission,purpose,objectiveorgoals,strategies,policies,procedures,rules,programs,budgets), Steps in planning., Decision Making

Organizing- Meaning and purpose, Types: a) formal and informal, functional and matrix, line and staff) departmentation , Authority & Power, Centralization & Decentralization, Delegation of Authority

Staffing- Recruitment & Selection (Basic Concepts) Directing Manager vs Leader Motivation(Concept),Leadership(Concept)

Controlling: Basic control process, Control as a feedback system, Real time information and control, Control techniques, Concept of budgeting

Behavioral concepts and theories: Concept of OB, Challenges and opportunity for OB Motivational Theories, Maslow's Need hierarchy, Theory X and Theory Y, Two factor theory, McClelands theory of needs, Equity Theory, Expectancy theory

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Hospital Equipment Management
Course Code	MSCM0223S506T
Course Type	Elective
Credits	5
Hours per Semester	75

Objective:

Subject is intended to cover the Operations and Maintenance aspects with reference to minimum Utilization of resources in a hospital.

UNIT I

List of common medical equipment's-

1. Image- Digital X-ray, MRI, CT Scan, USG, PET Scan, 3D, Echo.
2. Laboratory- Semi+ Full auto-analyzer, ABG.
3. Ventilator, Multi-channel Monitor, Syringe pump.
4. Bronchoscope, Endoscope, Laparoscope
5. Robotics and I OT.

Justification of purchase proposal, hospital needs assessment (Capex)

Equipment selection guideline, estimation of cost and planning, purchase, installation, commissioning. Replacement and Buy back policy. International and Indigenous standards.

UNIT II

Maintenance Management

Objectives, types of maintenance systems, equipment maintenance, quality and reliability, maintenance planning, maintenance information system, maintenance and monitoring of biomedical equipment's, predictive maintenance, equipment availability, spares management, replacement policy, depreciation and loss of value, economic life, costing, cost of standby, maintenance in hospital.

UNIT III

Bio-Medical Technology, application in hospital environment, calibration tests, maintenance features, hazards.

UNIT IV

Medico-legal issues related to hospital equipment.

References:

Medical Technology, application in hospital environment, calibration tests, maintenance of hazards Srinivasan A. V. (ed), Managing a modern hospital, Chapters 12, Response Books, New Delhi, Barry, Jay Hazer, Principles of Operations Management, Prentice Hall, New Jersey, Roger G., Operations Management- Decision Making in Operations Function, raw Hi II., New Delhi. l, Elwood S. and Sarin, Rakesh K., Modern Production/Operations Management, John Wiley & Sons, Singapore, 1987. Lee J. and Larry P. Ritzman, Operations Management- Strategy and Analysis, 'ton- Wesley Publications. International Journal of Operations and Quantitative Management, (IJOQM) released by Nirma Institute of Management – Ahmadabad.

Placement Semester	Semester v
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Practical & Viva
Course Code	MSCM0223S507P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	75

Semester VI

Placement Semester	Semester VI
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Molecular Biology
Course Code	MSCM0223S601T
Course Type	Core
Credits	7
Hours per Semester	105

Molecular Biology

Genetics

Unit–I: DNA Replication

Structure of DNA & RNA, DNA Replication- Initiation, Elongation, Termination, Inhibitors of replication (In Prokaryotes and Eukaryotes)

Unit–II: DNA Repair

Types of damage & DNA repair, Diseases due to defects in DNA repair, Genetic code, mutations and mutants

Unit–III: Transcription & Translation

Transcription- Initiation, Elongation, Termination, Post transcriptional modifications.
Translation- Initiation, Elongation, Termination, post translational modifications, Inhibitors of protein synthesis.

Unit–IV: Protein Sorting, Targeting and degradation

Unit - V: Regulation of gene expression(In Prokaryotes and Eukaryotes), gene amplification

Unit – VI: Genetic Engineering

- Recombinant DNA technology & its applications, Genes and Chromosomes, Restriction endonucleases, Plasmids, cosmids, chromosome walking.
- Molecular markers- RFLP, AFLP etc.
- Molecular techniques- PCR, Botting techniques, FISH, Next generation sequencing etc.
- Gene mapping, Cloning, construction of Gene library, Gene cloning, strategies for screening DNA libraries.
- Human genome project

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Clinical Biochemistry II
Course Code	MSCM0223S602T
Course Type	Core
Credits	7
Hours per Semester	105

Clinical Biochemistry II

Unit–I: Endocrinology

- Organization and classification of hormones and endocrine systems
- Basic mechanism of action of peptide hormones and receptors, steroid hormones and receptors
- Chemistry, physiology, and disorders related to Hypothalamus-Pituitary axis, thyroid and parathyroid glands
- Glycoprotein hormones (LSH,FSH,TH,hCG,POMC)
- Growth hormone family (GH,hCS,Prolactin), Adrenal hormones, Gonadal hormones
- Regulatory pathways (positive, negative, feedback loops),Regulation of biosynthesis of steroid hormones by peptide hormones(LH,FSH,ACTH)
- Cancer & tumor markers

Unit II: Inborn errors of protein, carbohydrate, lipid & nucleic acid metabolism.

Unit–III: Hemoglobin metabolism& its Disorders

- Synthesis and breakdown of Hemoglobin
- Anemia, Hemoglobinopathies, Thalassemia, Porphyrias

Unit- IV: Extracellular Matrix & Tissue Proteins in Health & Disease

Unit-V: Prenatal & New born screening for inherited metabolic disorders

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Recent Advances & Quality Assurance
Course Code	MSCM0223S603T
Course Type	Core
Credits	7
Hours per Semester	105

Recent Advances & Quality Assurance

Unit I: Latest advances in clinical Biochemistry

- Laboratory Automation: Principle & Standard Operating procedures including calibration
- Use of Auto analyzers and Chemiluminiscent analyzers, dry chemistry
- ABG and Electrolytes analyzers
- Latest trends in Automation, Biochips, Lab on a chip (LoC)

Unit II: Laboratory Quality Management System

- Introduction to Quality control
- Quality laboratory processes, Quality assurance, Quality assessment, Quality control,
- Quality planning and Quality improvement
- Internal quality control, basic steps, sources of error and their correction methods,
- Sources of variation in laboratory results, CAPA - corrective action & preventive action

- Quality control charts, Levy- Jennings and Cusum charts, West guard Rules
- External quality control
- Current trends in laboratory accreditation, ISO certificate, West guard Rules

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Biomedical Waste Management
Course Code	MSCM0223S604T
Course Type	Elective
Credits	5
Hours per Semester	75

Biomedical Waste Management –

BMW management and handling rule .

Segregation - Collection - Transportation – Disposal.

Modern technology for handling BMW

Radioactive waste handling

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Teaching Methodology
Course Code	MSCM0223S605T
Course Type	Elective
Credits	5
Hours per Semester	75

1. Group Dynamics
2. Principles of Adult Learning
3. Domains & theories of Learning
4. Appropriate use of Media
5. Defining objectives and preparation of Lesson Plan
6. Teaching learning methods- small and large group
7. Assessment- Formative & Summative
8. Feedback
9. Mentorship
10. Academic Networking

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Basic Life Support (BLS)
Course Code	MSCM0223S606T
Course Type	Elective
Credits	5
Hours per Semester	75

- * Introduction
- * Basic life support for adults
- * Basic life support for infants and children
- * Defibrillator
- * Respiratory arrest
- * Management of choking in adults, infants & children
- * Team dynamics
- * Summary of CPR guidelines

Placement Semester	Semester v
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM02
Name of the Course	Practical & Viva
Course Code	MSCM0223S607P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	75

Dissertation.

Pedagogy

Identifying several situations same and able to dissertation work, writing a proposal and making a presentation to the Dissertation faculty advisory committee. Reporting to the committee on the progress of research work periodically. Making use of a variety of research methods. Defending the inference before the Examining Committee.

Contents

Every student will do a detailed study on the topic selected for the dissertation, and is expected to prepare a two or three proposals which he intends to take up for the Dissertation. Faculty will examine this and decide on the topic of dissertation.

The Process involves:

1. Formulation of objectives and hypothesis
2. Review of literature
3. Designing the tool for data collection
4. Data collection
5. Coding, classifying and analysis of data
6. Inferences, conclusions and recommendations
7. Preparing a bibliography
8. Writing the dissertation and submission

First Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - I

Anatomy

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15 = 30

Q1. Describe Synovial joints under following headings: (2.5+10+2.5)

- (i) Components and Structure of joint (ii) Classification of synovial joint (iii) Factors providing stability to joint.

Q2. Describe central nervous system under the following headings: (10+2.5+2.5)

- (i) Parts and their functions (ii) Cells present in CNS (iii) Functions of cerebellum

Q3. Classify bones with examples and describe blood supply of long bone (10+5)

2. Short Essay (Attempt any two)

2x15=30

- A. Describe Compact and cancellous bones with examples
B. Components of respiratory system with functions.
C. Parts of female reproductive system with functions.

3. Write short notes on: (Any Four)

20 (5x4)

- (A) Types of cartilages
(B) Compare functions of sympathetic and Parasympathetic nervous system
(C) Contribution of A. Vesalius in study of anatomy
(D) Types of anastomosis between blood vessels
(E) Types of muscles with examples.

First Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - II

Physiology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

Long Answer Questions: (Attempt any two)

- . Describe Classification of Reflexes & Describe in detail Stretch Reflex
2. Define erythropoiesis. List the different stages of erythropoiesis. Describe factors necessary for erythropoiesis
3. Define cardiac output, how is it regulated? Give one method of measurement of cardiac output.

Short Answer Questions (Attempt any two):

10X2=20

1. Homeostasis
2. Functions of Cerebellum
3. Oxygen hemoglobin dissociation curve.

Short Notes (Any four)

5X4=20

1. Reninangiotensin system.
2. Blood Brain Barrier
3. Actions of parathormone.
4. Accommodation reflex
5. Spermatogenesis

First Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - III

Biochemistry

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. With the help of flow chart describe in detail about Glycolysis. Write its energetics
- B. Explain all the reactions of Urea Cycle. Add a note on Ammonia toxicity
- C. Enumerate Beta-oxidation with the help of flow chart. Also write the energetics of Palmatic acid.

1. Short Essay (Attempt any 2)

2x10=20

- A. Classification of Carbohydrate
- B. Write the biochemical function, RDA and deficiency disorders of Vitamin A
- C. Factors affecting enzyme activity

2. Short notes (Attempt any 4)

4x5=20

- A. Calcium Homeostatis
- B. Chromatography
- C. Functions of Mitochondria
- D. Structure of DNA
- E. Thyroid Function Test

First Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - IV

Health care Services and its Application

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two) 2X15=30

- Enumerate the steps involved in administration of care plan. Explain the risk factors of hospital acquired infections and how it can be controlled?
- Suppose a person has met with an accident. What kind of services of priority should be followed by the first aider in an emergency?
- What is the concept, definition and dimension of wellbeing? What are the determinants of good health?

2. Short Essay (Attempt any Two) 2X10 = 20

- A. Write short notes on – National Health Policies-Public Health Systems-Current trends in private healthcare
- B. Write a detailed note on World Health Organization.
- C. What are the relevant contemporary issues in health services which need to be addressed without delay? Explain your answer with specific example.

3. Short notes (Any four) 4X5 = 20

- A. Write short notes on – National Health Policies-Public Health Systems-Current trends in private healthcare.
- B. Write about national oral health program.
- C. Briefly explain healthcare models
- D. Illustrate the glimpses of NHP-2017
- E. What are the theories of diseases?

First Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - V

Basics of Computer

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

A. Discuss about Memory

B. Discuss about input / Output Devices.

C. What do you understand about Magnetic ink character recognition (MICR).

2. Short Essay (Attempt any Two)

2X10 = 20

A. Optical mark recognition (OMR).

B. Bar code reader.

C. Computer software

3. Short notes (Any four)

4X5 = 20

A. Monitor.

B. Word processing software.

C. Definition of Machine language.

D. Compiler & Interpreter

E. Interpreter.

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester I

MSCM0223S106T

First Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - VI

Basic of Health care IT

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Emerging technology issues in healthcare.
- B. Concepts and operation of the main components of word processor.
- C. Electronic spreadsheet

2. Short Essay (Attempt any Two)

2X10 = 20

- A. Conceptual and relational data modeling.
- B. Data integrity.
- C. Relational normalization theory

3. Short notes (Any four)

4X5 = 20

- A. Database systems
- B Health Statistics
- C. Billing softwares.
- D Models of health care delivery.
- E. Presentation software programs.

Second Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - I

Pathology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Describe anemia with its classification. Discuss in detail about Sickle cell Anemia.
- B. Describe and Define cell injury along with its Causes. Write in detail about Reversible and irreversible injury.
- C. Define neoplasia along with its nomenclature. Write in brief about carcinogenesis and metastasis.

2. Short Essay (Attempt any two)

2x10=20

- A. Factors affecting wound healing
- B. Difference between Acute and Chronic inflammation
- C. Difference between benign and malignant neoplasm

3. Short notes (Any four)

4x5=20

- A. Renal Function Test
- B. Liver Function Test
- C. Pancreatic Function Test
- D. Lab investigation of haemorrhagic disorders
- E. Discuss Diabetes Mellitus

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester II

MSCM0223S202T

Second Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - II

Microbiology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

A. Q1. Define Sterilization. How does it differ from disinfection? Classify the various agents used in sterilization. Add a note on the principle and functioning of autoclave. Components and Structure of joint (ii) Classification of synovial joint (iii) Factors providing stability to joint.

Q2. Name the various methods of gene transfer. Discuss any one of these in detail.

Q3. Describe in detail the structure and function of the cell wall and cell membrane of a gram-negative rod with the help of a diagram.

2. Short Essay (Attempt any two)

2x15=30

- A. Dark field microscope
- B. Bacterial growth curve
- C. Loeffler's serum slope

3. Write short notes on: (Any Four)

20 (5x4)

- (A) Lawa culture
- (B) Transduction
- (C) Nutrient agar
- (D) Biologic safety cabinets
- (E) Standard Precautions

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester II

MSCM0223S203T

Second Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - III

Basic Instrumentation & Lab Practices

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Describe in detail about the Biomedical Waste Management as per the guidelines.
- B. Define pH. Enumerate the important blood buffer. Explain Henderson-Hasselbalch equation.
- C. Explain in detail working principle of Laminar Air Flow chamber. Enumerate its types and applications of Laminar Air Flow.

1. Short Essay (Attempt any 2)

2x10=20

- A. Types of Glassware used in Laboratory
- B. Principle and applications of Centrifuge
- C. Material safety data sheet

2. Short notes (Attempt any 4)

4x5=20

- A. Steps of Hand Wash
- B. Use of PPEs
- C. Types of Vacutainers
- D. Molality & Molarity
- E. Indicators

Second Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper – IV

Internet Technology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

A. Discuss about Internet Technology application in health care sector.

B. Discuss healthcare Information Technology.

C. Discuss Issues in Internet Technology.

2. Short Essay (Attempt any Two)

2X10 = 20

A. What are Internet tools?

B. What are Internet networks?

C. Discuss access to Internet in hospital.

3. Short notes (Any four)

4X5 = 20

A. Informatics officer roles and responsibilities

B. IT and Computer

C. Communication

D. Models of health care delivery

E. Information Technology and Systems.

Second Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - V

Genetic Engineering

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

Discuss about Basic concepts of DNA structure

B. Define enzymes

C. What Radioactive and non-radioactive probes ?

Q. No. 2 Short Essay (Attempt any Two)

2X10 = 20

A. What is Isolation of total RNA and mRNA?

B. Write down about Bacteriophages

C. What is Plasmids?

Q. No. 3 Short notes (Any four)

4X5 = 20

A. cDNA

B. Introduction of DNA into mammalian cells

C. Real time PCR

D. Types of PCR multiplex and describe each.

E. Differential gene expression methods

Second Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - VI

Organizational Behaviour

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Discuss about organizational Behaviour
- B. Discuss about Organizational policies.
- C. Utilization management.

2. Short Essay (Attempt any Two)

2X10 = 20

- A. Professionalism.
- B. International Standards Organization.
- C. Hospital organizations

Short notes (Any four) 4X5 = 20

- A. Types of hospitals.
- B. Health Statistics
- C. Billing assessment of population health.
- D. Healthcare Industry.
- E. Information Technology in quality.

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester III

MSCM0223S301T

Third Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - I

Chemistry & Metabolism of Proteins & Lipids

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two) 2 x 15 = 30

- A) Write the reactions by which Glycine is synthesized and catabolised. Enumerate any 4 important compounds derived from Glycine and indicate their functions.
- B) Enumerate the major steps of synthesis of Cholesterol. Name the rate limiting step of cholesterol synthesis. Describe the role of cholesterol in atherosclerosis.
- C) What are ketone bodies. Give two conditions characterised by excessive production of ketone bodies. Explain the metabolic derangements and consequences of ketosis

2. Short Essay (Attempt any Two) 2 x 10 = 20

- A) How are Prostaglandins synthesized? Indicate their importance as local hormones.
- B) Describe the reactions of the Urea Cycle. Discuss the interrelation of urea cycle and citric acid cycle.
- C) Describe the steps of catabolism of phenylalanine and tyrosine. Indicate the inborn errors of metabolism associated with this pathway.

3. Short notes (Any four) 4 x 5 = 20

- A) Biological importance of peptides
- B) One carbon metabolism
- C) Ammonia toxicity
- D) Effect of Insulin on Lipolysis
- E) Role chaperones in folding

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester III

MSCM0223S302T

Third Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - II

Chemistry & Metabolism of Carbohydrates & Nucleotides

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two) 2 x 15 = 30

- A) Discuss the formation of acetyl-CoA from pyruvate. How is acetyl-coA further metabolized in the citric acid cycle.
- B) Give the sources of carbon and nitrogen atoms of purine and pyrimidine rings. How is the denove synthesis regulated? Indicate the clinical uses of inhibitors of purine nucleotide synthesis.
- C) “Gluconeogenesis is not a simple reversal of glycolysis” Justify the statement by explaining the pathway of gluconeogenesis.

2. Short Essay (Attempt any Two) 2 x 10 = 20

- A) Lesch-Nyhan syndrome: enzyme defect, clinical features, inheritance and treatment
- B) Discuss the changes in metabolism during diabetes mellitus.
- C) In anaerobic glycolysis, lactic acid is generated. What is the reason for reduction of pyruvate to lactate.

3. Short notes (Any four) 4 x 5 = 20

- A) Gout
- B) Significance of HMP Shunt
- C) Galactosemia
- D) Transport mechanism of glucose
- E) Differences between DNA & RNA

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester III

MSCM0223S303T

Third Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - III

Biostatistics & Research Methodology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

Q. 1. Long Answer (Attempt any two)

2X15=30

- A. Introduction to research methodology.
- B. Discuss about the biostatistics
- C. Describe Types of variables & scales of measurements.

Q. 2 Short Essay (Attempt any Two) 2X10 = 20

- A. Concept of probability distribution
- B. Basics of Testing of Hypothesis
- C. Describe Correlation & Regression

Q. 3 Short notes (Any four) 4X5 = 20

- A. Cluster randomization.
- B. Sampling & Non sampling errors
- C. Incidence & Prevalence
- D. Random & non- random sampling
- E. Methods of minimizing errors.

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester III

MSCM0223S304T

Third Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - IV

Legal and Medical Issues in Hospitals

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

Q. 1. Long Answer (Attempt any two)

2X15=30

- A. What are the laws with regard to the establishment of private / public hospitals? What are the legal requirements under Medical Establishment Act?
- B. What are the essentials of contract act? What are the contractual obligations in hospital services? Explain
- C. Explain the rule governing Prohibition of Violence against medical personnel and damage to property?

Q. 2 Short Essay (Attempt any Two)

2X10 = 20

- A. What are the legal liabilities of a hospital under the consumer protection law? What are the legal remedies available to the patient under consumer law?
- B. What are medical ethics? What are the basic issues and the importance of developing medical ethics?
- C. Provisions for registered practitioners under Medical Termination of Pregnancy Act

Q. 3 Short notes (Any four)

4X5 = 20

- A. Vicarious liability.
- B. Drugs and Cosmetics Act
- C. Hippocratic Oath
- D. Ethical guidelines for Bio-medical research
- E. Medical Negligence

MODEL PAPER

**M. Sc. (Medical) Biochemistry Semester III
MSCM0223S305T**

Third Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - V

Patient Care Management

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. What is meant by patient classification? Explain the various patients of patient classification systems?
- B. What are different types of natural disasters? Explain in detail.
- C. Disaster impacts differential groups at various levels. Justify.

Q. 2 Short Essay (Attempt any Two) 2X10 = 20

- A. Write short notes on –Medical Records-Legality of medical records-DRG- HBG
- B. Time taken for discharge procedure has a greater impact in providing patient centric services discuss?
- C. A hospital should take due care with regard to patient care safety and risk to them? Do you agree with this statement? Elaborate.

Q. 3 Short notes (Any four)

4X5 = 20

- A. What are the dimensions of patient safety culture?
- B. What are the calibers for patient satisfaction?
- C. Write about the concept of patient empowerment.
- D. What is the importance of consent form before nuclear medicine treatment?
- E. Patient care management and housekeeping- how will you connect the points?

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester III

MSCM0223S306T

Third Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - VI

Sports Nutrition

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Explain in detail difference between sports nutrition and nutrition for exercise
- B. Describe about bioenergetics for physical activity
- C. What is the different between medical nutrition therapy for endurance sports and strength sports?

Q. No. 2 Short Essay (Attempt any 2)

2 x 10 = 20

- A. Describe in detail about pre event and post event meals
- B. Describe the effect of caffeine on sports performance.
- C. Role of hormones in exercise.

Q. No. 3 Short Notes (Attempt any 4)

4 x 5 = 20

- A. How muscles use carbohydrates during exercise.
- B. What is the process of blood glucose maintenance during exercise?
- C. Describe carbohydrate, protein & fat metabolism before exercise.
- D. Describe muscle fibers.
- E. What is ACTH & how it works during exercise?

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester IV

MSCM0223S401T

Fourth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - I

Bioenergetics & Intermediary Metabolism

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) Write the components of the Electron Transport Chain, in the order of redox potentials, and show the steps where ATP is synthesised.
- B) Discuss the amphibolic role of TCA cycle in the integration of metabolism. Highlight the sources and utilization of acetyl-coA and explain the physiological regulation of TCA cycle.
- C) Explain the law's of thermodynamics and write a note on Gibb's free energy.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) Discuss Chemiosmotic hypothesis to explain ATP biosynthesis by oxidative phosphorylation
- B) Explain how thermodynamically unfavourable reactions occur in our body.
- C) Explain metabolism during fasting and Fed state

3. Short notes (Any four)

4 x 5 = 20

- A) Inhibitors of ETC
- B) Energy rich compounds
- C) Biochemical effect of glucagon
- D) Uncouplers of oxidative phosphorylation
- E) Gluco-regulatory system

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester IV

MSCM0223S402T

Fourth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - II

Enzymology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) Enumerate the major classes of enzymes, explain the factors affecting the velocity of an enzyme reaction.
- B) Name the types of enzyme inhibition. explain various types of inhibition with it's examples.
- C) "Vitamins as cofactors" justify the statement.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) Enzymes used in the diagnosis of hepatic disease.
- B) Explain the properties and mechanism action of enzymes.
- C) Lab diagnosis of myocardial infarction

3. Short notes (Any four)

4 x 5 = 20

- A) Active site
- B) Allosteric regulation of enzymes
- C) Isoenzymes and their diagnostic importance
- D) Multiple enzyme complex
- E) Enzyme cascade in Blood clotting mechanism

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester IV

MSCM0223S403T

Fourth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - III

Nutritional Biochemistry

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) Describe the types, causes, clinical features and management of protein energy malnutrition.
- B) Enumerate the dietary sources, biochemical function, RDA and deficiency manifestations of Vitamin-D.
- C) Describe the biochemical functions, absorption, transport and storage of Iron. Write a short note on its deficiency manifestations.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) What are the proximate principles of food and explain the importance of dietary fibers.
- B) Diet chart in Pregnancy and lactation
- C) Biochemical functions and deficiency manifestations of Ascorbic acid.

3. Short notes (Any four)

4 x 5 = 20

- A) Wald's visual cycle
- B) Balance diet
- C) Eating disorders
- D) Wilson's disorder
- E) Calcium homeostasis

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester IV

MSCM0223S404T

Fourth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - IV

Hospital Information System

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

Q.1 1. Long Answer (Attempt any two)

2X15=30

- A. What do you understand by Management Information System? Explain the concept, roles and objectives of MIS with relevance to a hospital.
- B. Comment upon physical designs system? Explain the programme and procedure development with regard to input output design?
- C. Explain the relevance of hospital information system in hospitals? Substantiate your answer by taking four departments and explaining in detail?

2 Short Essay (Attempt any Two)

2X10 = 20

- A. What is project life cycle? Explain the procedure of its installation and operation.
- B. Explain the role of MIS in surveillance of healthcare systems. Elaborate your answer with the help of an example of a hospital.
- C. What factors have prompted in the development, implementation and evaluation of MIS systems? Has it been able to serve the requisite purpose till date? Comment

Q. 3 Short notes (Any four)

4X5 = 20

- A. Illustrate the hacks and drawbacks in HIS.
- B. Explain digitized ADT system.
- C. Write about DSS- Decision support system.
- D. COPI- Computerized Physician Order entry- Explain.
- E. Describe the computerized appointment scheduling system in hospital

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester IV

MSCM0223S405T

Fourth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - V

Constitution of India

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

1. "Powers of the Parliament to amend the Constitution is wide but not unlimited". Explain this statement.
2. Describe the powers and functions of the Supreme Court of India?
3. Describe the composition and functions of the Union Public Service Commission.

Q. 2 Short Essay (Attempt any Two)

2X10 = 20

- a. Discuss in brief the various writs that can be issued by a High Court in India. Explain the privileges and immunities of Parliament and its members.
- b. What are the emergency provisions relating to the failure of the constitutional? Machinery in the states ?
- c. Discuss in brief the various writs that can be issued by a High Court in India. Explain the privileges and immunities of Parliament and its members.

Q.3 Short notes (Any four)

4X5 = 20

- a. What are fundamental rights of a citizen of India?
- b. Explain the steps involved in amending the Constitution, in India?
- c. Briefly touch upon the functioning of Public Service Commissions of states?
- d. Discuss in brief the collective responsibility of the Council of Ministers.
- e. Write a brief note on Election Commission with regard to its functioning and powers?

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester IV

MSCM0223S406T

Fourth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - VI

Environment and Ecology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. What is climate change? Discuss the causes and consequences of climate change.
- B. Brief outline the environment (protection) act of 1986. Explain the importance of environment protection act with relevance to hospital administration.
- C. What is the relevance of environment and ecology? Explain the same with relevance to hospital administrators.

2. Short Essay (Attempt any Two)

2X10 = 20

- A. What is air pollution? Explain the factors and sources responsible for causing air pollution in hospitals.
- B. Explain water pollution and measures to control water pollution. What is the relevance of sewerage treatment plant?
- C. What is Noise pollution? What are the sources, effects and control standards for noise pollution?

2. Short notes (Any four)

4X5 = 20

- A. Write about pollution controlling certification in hospitals.
- B. What is Ecological balance. What are the consequences of change in ecological balance?
- C. State the colors of dustbins used in hospital waste process and explain.
- D. How noise pollution can be controlled?
- E. What is greenhouse effect?

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester V

MSCM0223S501T

Fifth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - I

Biochemical Techniques

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two) 2 x 15 = 30

- A) Write a note biological effect of cellular oxidants. Describe the cellular process where oxidants species are generated.
- B) Explain the Principle, types, instrumentation and applications of Chromatography.
- C) What are isotopes and write the diagnostic and therapeutic role of radio isotopes.

2. Short Essay (Attempt any Two) 2 x 10 = 20

- A) Types and Applications of ELISA
- B) RIA
- C) Principle, types and applications of Centrifugation

3. Short notes (Any four) 4 x 5 = 20

- A) Antioxidants
- B) Mass spectroscopy
- C) Immunodiffusion
- D) Beer's & Lambert's law
- E) Oxidative stress

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester V

MSCM0223S502T

Fifth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - II

Clinical Biochemistry I

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) Give an account of the serum enzymes derived from the Liver & their importance in Liver Function Test and describe the biochemical parameters for the differential diagnosis of jaundice.
- B) Outline the pathway of heme synthesis. Mention its regulation. Correlate the features of porphyria's with regulation of heme synthesis.
- C) Explain the chemistry, composition and functions of CSF and its diagnostic use in various disorders.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) Thyroid Function Test
- B) Explain the phases of xenobiotic, metabolism with details of glucuronidation.
- C) Define diabetes mellitus. Write its type, symptoms, diagnosis and complications of diabetes mellitus.

3. Short notes (Any four)

4 x 5 = 20

- A) Lead poisoning
- B) Biochemical changes in Ageing
- C) Atherosclerosis
- D) Clearance Test
- E) Structure and synthesis of Collagen

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester V

MSCM0223S503T

Fifth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - III

Immunology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) What are carcinogens and explain etiological factors and pathophysiology of cancer. Write a note on oncogenes.
- B) List the various techniques used in recombinant DNA technology. describe any two in detail.
- C) What do you mean by immune response? what are different effector mechanism found in our body? Add a note on bence jones proteins?

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) Explain the types of complement activation pathway with their regulation.
- B) Explain the types, structure and functions of MHC complex.
- C) Enumerate different Immunoglobulins. Describe the structure of Immunoglobulins and compare the salient Features of different classes of Immunoglobulins.

3. Short notes (Any four)

4 x 5 = 20

- A) Applications of hybridoma technology.
- B) Types of hypersensitivity reactions
- C) Antibody Diversity
- D) Tumor markers
- E) AIDS

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester V

MSCM0223S504T

Fifth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - IV

Artificial Intelligence and Machine Learning

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Introduction to Artificial Neural Networks
- B. Describe Models of a Neuron.
- C. Discuss Computer vision .

2. Short Essay (Attempt any Two)

2X10 = 20

- A. Describe Machine Learning.
- B Recurrent Networks
- C What is Boltzman, Supervised and unsupervised learning?

3. Short notes (Any four)

4X5 = 20

- A. Network architectures
- B. Boltzmann machine
- C. What is Temporal processing?
- D. Recurrent neural networks.
- E. Deep Learning

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester V

MSCM0223S505T

Fifth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - V

Hospital Organization and Management

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Discuss about **Management**.
- B. Evolution of management thought.
- C. Nature of Management process.

2. Short Essay (Attempt any Two)

2X10 = 20

- A. What is accounting information?
- B. What is Third Party Administrator?
- C. Discuss access and quality of care issues.

3. Short notes (Any four)

4X5 = 20

- A Decision Making
- B Steps in planning.
- C Delegation of Authority Staffing.
- D. Models of health care delivery.
- E Information Technology and Systems.

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester V

MSCM0223S506T

Fifth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - VI

Hospital Equipment Management

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A.** What are the guidelines for selection of medical equipment for the hospital?
- B.** Describe the methods of medical equipment maintenance in the hospital.
- C.** What are the factors to be considered before installing and commissioning of biomedical equipment?

2. Short Essay (Attempt any Two)

2X10 = 20

A. Medico-legal issues related to hospital equipment
What is buy-back and replacement policy in Equipment management. Enumerate advantages and disadvantages

3. Short notes (Any four)

4X5 = 20

- A.** Importance of International and Indigenous standards of Equipment
- B.** Maintenance and monitoring of biomedical equipment in hospital
- C.** Steps in planning to buy a medical equipment
- D.** Break-Even Analysis
- E.** Procedures for condemnation and disposal of medical equipment
- F.** Letter of Credit
- G.** Hospital need assessment
- H.** Prevention of hazards

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester VI

MSCM0223S601T

Sixth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - I

Molecular Biology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) Describe the phase of activation, initiation, elongation and termination of biosynthesis of protein.
- B) Discuss in detail the Lac operon and the molecular switch of prokaryotic genes.
- C) Explain the DNA repair mechanism with a note on the associated diseases.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) What is mutation? What are mutagens? Describe point mutation and frame shift mutation.
- B) How is the DNA molecule cloned? Write two applications of DNA cloning.
- C) Enumerate the process of PCR technique with its clinical applications.

3. Short notes (Any four)

4 x 5 = 20

- A) Chromosome walking
- B) Genetic Code
- C) Next Generation Sequencing
- D) Post transcriptional modifications
- E) Human Genome Project

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester VI

MSCM0223S602T

Sixth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - II

Clinical Biochemistry II

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) Define anemia. Write the etiological & morphological classification of anemia and laboratory diagnosis.
- B) Enumerate hemoglobinopathies and describe any two in detail.
- C) Define and classify hormones and explain the mechanism of action of steroid hormone.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) Discuss any 2 inborn errors of Metabolism of aromatic amino acids
- B) What is cyclic AMP? What is its metabolic importance.
- C) Glycogen storage diseases.

3. Short notes (Any four)

4 x 5 = 20

- A) Biological effect of glucocorticoids
- B) Functions of adrenal gland
- C) Glycoprotein hormones
- D) Oncogenes
- E) Fabry's disease

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester VI

MSCM0223S603T

Sixth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - III

Recent Advances & Quality Assurance

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary copy along with one main answer book is allowed.

1. Long Answer (Attempt any two)

2 x 15 = 30

- A) What is IQC? What are the basic steps followed in IQC.
- B) Describe the quality assurance along with the description of quality policy, precision and accuracy.
- C) What is Automation? Describe its Principle and explain standard operating procedures including calibration.

2. Short Essay (Attempt any Two)

2 x 10 = 20

- A) Describe in detail west guard rules with the help of LJ charts.
- B) Describe types of errors in laboratory. Describe different types of methods to remove these errors.
- C) Principle & advantages of Dry chemistry.

3. Short notes (Any four)

4 x 5 = 20

- A) Corrective action and Preventive action
- B) Biochips
- C) Chemiluminescent analyzers
- D) EQAS
- E) ISO certificate

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester VI

MSCM0223S604T

Sixth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - IV

Biomedical Waste Management

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Name the different types of biomedical waste generated in your hospital. Suggest measures for their disposal as per National and State Level rules
- B. Colour coding for disposal of biomedical waste is necessary - Justify. Explain in brief the methods of biomedical waste management in a Medical college and Hospital.
- C. What are the various methods of treatment and disposal technologies for health care waste?

2. Short Essay (Attempt any Two)

2X10 = 20

- A. Principles of Biomedical Waste management.
- B. How biomedical waste is categorized? How is category No. 3 disposed?
- C. EXPLAIN WHY Biomedical waste should be segregated at source.

3. Short notes (Any four)

4X5 = 20

- A. Disposal of sharp wastes in hospital setting.
- B. Injection safety
- C. Hospital waste disposal.
- D. Write the different containers and their colours for disposing the hospital wastes
- E. Disposal of sharp wastes in hospital setting

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester VI

MSCM0223S605T

Sixth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper – V

Teaching Methodology

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- 1 Enumerate various teaching learning methods for large group settings. Discuss their advantages and disadvantages.
- 2 Enlist the various models of feedback mechanism. Describe any one in detail along with its advantages.
- 3 What are the components of a Lesson plan. Prepare a lesson plan for topic of psychomotor domain.

Q. No. 2 Short Essay (Attempt any 2)

2 x 10 = 20

- a) Stages of group dynamics
- b) Teaching strategies for affective domain
- c) Significance of defining learning objectives

Q. No. 3 Short Notes (Attempt any 4)

4 x 5 = 20

- a) Formative assessment
- b) Qualities of a good mentor
- c) Progression of learning
- d) Assessment tools for practical skills
- e) e-learning

MODEL PAPER

M. Sc. (Medical) Biochemistry Semester VI

MSCM0223S606T

Sixth Semester

M. Sc. (Medical) Biochemistry

Examination (Month/ year)

Paper - VI

Basic Life Support (BLS)

Time: Three Hours

Maximum Marks: 70

Attempt all Questions

All the parts of one question should be answered at one place.

Only one Supplementary Copy along with one main answer book is allowed

1. Long Answer (Attempt any two)

2X15=30

- A. Describe basic life support for adults with diagrams.
- B. Describe basic life support for infants and children.
- C. What is defibrillator? Explain in detail.

Q. No. 2 Short Essay (Attempt any 2)

2 x 10 = 20

- A. Make a flow chart for compression only life support algorithm.
- B. What is cardiac arrest?
- C. What is respiratory arrest?

Q. No. 3 Short Notes (Attempt any 4)

4 x 5 = 20

- A. IHCA
- B. OHCA
- C. Explain about pediatric chain of survival
- D. Management of choking
- E. Explain role of team leader.