MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

M.Sc.(Medical) MICROBIOLOGY

(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) Microbiology

(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 dealwith 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 methodologyand 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) : A post graduate student upon successfully qualifying in the M.Sc. (Microbiology)examination should be able to:

1. Demonstrate competence as a clinical microbiologist.
2. Interact effectively with the allied departments by rendering services in basic aswell as advanced laboratory investigations
3. Demonstrate application of microbiology in a variety of clinical settings to solvediagnostic and therapeutic problems along with preventive measures.
4. Play a pivotal role in hospital infection control, including formulation of antibioticpolicy and management of biomedical waste.
5. Acquire skills in conducting collaborative research in the field of Microbiology andallied sciences.
6. Conduct such clinical/experimental research as would have significant bearing

onhuman health and patient care

7. Demonstrate effective communication skills required for the practice of clinicalmicrobiology and while teaching undergraduate students
8. Establish good clinical microbiological services in a hospital and in the communityin the fields of bacteriology, virology, parasitology, immunology mycology, serology and mycobacteriology.
9. Plan, execute and evaluate teaching assignments in Medical Microbiology.

Plan, execute, analyze and present the research work in medical microbiology.

10. To acquire various skills for collaborative research.
11. To participate is various workshops/seminars/journal clubs/demonstration in theallied departments
12. Uphold the prestige of the discipline amongst the fraternity of doctors.

2. TITLE OF THE COURSE:

M.Sc. (Medical) Microbiology

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 Microbiology.
- 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) Microbiology 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) Microbiology 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:

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)

(g) 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.

(b) The pattern of practical examination shall be as follows –

Semester	Practical Marks					Practical Examiners
	End of Semester Examination(EOSE)			Total Marks	Min. Pass Marks	
	Practical	viva-voce	IA			
III 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) Continuous 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) Microbiology Marks Distribution of Semester – I Examination

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Anatomy	MSCM0323S101T	8	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Physiology	MSCM0323S102T	8	70	30	100	
Biochemistry	MSCM0323S103T	8	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Health care Services and its Application	MSCM0323S104T	6	70	30	100	
Basics of Computer	MSCM0323S105T	6	70	30	100	
Basics of Health Care IT	MSCM0323S106T	6	70	30	100	
TOTAL	**05 (05 Theory Paper 01 Practical)**	**36**	**350**	**150**	**500**	

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

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Pathology	MSCM0323S201T	8	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Microbiology	MSCM0323S202T	8	70	30	100	
Basic Instrumentation &Lab Practices	MSCM0323S203T	8	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Internet Technology	MSCM0323S204T	6	70	30	100	
Genetic Engineering	MSCM0323S205T	6	70	30	100	
Organisational Behaviour	MSCM0323S206T	6	70	30	100	
TOTAL	**05 (05 Theory Paper 01 Practical)**	**36**	**350**	**150**	**500**	

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

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
General Bacteriology	MSCM0323S301T	7	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Immunology	MSCM0323S302T	7	70	30	100	
Biostatistics & Research Methodology	MSCM0323S303T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Legal and Medical Issues in Hospitals	MSCM0323S304T	5	70	30	100	
Patient Care Management	MSCM0323S305T	5	70	30	100	
Sports Nutrition	MSCM0323S306T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0323S307P	5	140	60	200	
TOTAL	**06 (05 Theory Paper 01 Practical)**	**36**	**490**	**210**	**700**	

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

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Systematic Bacteriology I	MSCM0323S401T	7	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Systematic Bacteriology II	MSCM0323S402T	7	70	30	100	
Systematic Bacteriology III	MSCM0323S403T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Hospital Information System	MSCM0323S404T	5	70	30	100	
Constitution of India	MSCM0323S405T	5	70	30	100	
Environment and Ecology	MSCM0323S406T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0323S407P	5	140	60	200	
TOTAL	**06 (05 Theory Paper 01 Practical)**	**36**	**490**	**210**	**700**	

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

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Clinical Microbiology & Healthcare associated Infections	MSCM0323S501T	7	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Principles of Antimicrobials action & resistance And laboratory methods &strategies for antimicrobial testing	MSCM0323S502T	7	70	30	100	
Mycology	MSCM0323S503T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Artificial Intelligence and Machine Learning	MSCM0323S504T	5	70	30	100	
National Healthcare System	MSCM0323S505T	5	70	30	100	
Hospital Equipment Management	MSCM0323S506T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0323S507P	5	140	60	200	
TOTAL	**06 (05 Theory Paper 01 Practical)**	**36**	**490**	**210**	**700**	

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

Course/Paper Name	Course/Paper Code	Credits	Theory/ Practical/Viva			
CORE COURSES			EOSE	CA	Total	Pass Marks
Parasitology	MSCM0323S601T	7	70	30	100	50 % aggregate including continuous assessment marks separately in theory and practical.
Virology	MSCM0323S602T	7	70	30	100	
Recent Advanced in Microbiology,	MSCM0323S603T	7	70	30	100	
ELECTIVE COURSES(ANY TWO)						
Biomedical Waste Management	MSCM0323S604T	5	70	30	100	
Teaching Methodology	MSCM0323S605T	5	70	30	100	
Basic Life Support (BLS)	MSCM0323S606T	5	70	30	100	
PRACTICAL/ABILITY ENHANCEMENT COURSE						
Practical& Viva	MSCM0323S607P	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.**

2. A student obtaining **Grade F** shall be considered **failed** and will be required to reappear in the examination.

3. 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

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 Course Component (CCC)	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) Microbiology : -

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) Microbiology. 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)Microbiology. Students have to **CHOOSE ANY TWO COURSE IN EACH SEMSTER** from the pool of course given to that semester.

3. **Practical/ Ability Enhancement Courses (AEC:** 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

$$\textbf{SGPA}(S_i)=\sum(C_i \times G_i)/\sum C_i$$

Where C_i is the number of credits of the ith course and G_i is the gradepoint scored by the student in the ith 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.

$$\textbf{CGPA=} \sum(C_i S_i)/\sum C_i$$

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

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

Illustration of Computation of SGPA and CGPA and Format for Transcripts

i. Computation of SGPA and CGPA
Illustration for **SGPA**

Course	**Credit**	**Grad elett er**	**Grad epoi nt**	**CreditPoint** (Credit x Grade
Course1	3	A	8	3X 8 = 24
Course2	4	B+	7	4X 7 = 28
Course3	3	B	6	3X6=18
Course4	3	O	10	3X10= 30
Course5	3	C	5	3X5 = 15
Course6	4	B	6	4X 6= 24
	20			139

Thus, **SGPA=139/20=6.95**

Illustration for **CGPA**

Semester1	**Semester2**	**Semester3**	**Semester4**
Credit:20 SGPA:6.9	Credit:22 SGPA:7.8	Credit :25 SGPA:5.6	Credit:26 SGPA:6.0

Semester5	**Semester6**		
Credit : 26SGPA :6.3	Credit :25 SGPA:8.0		

Thus,

CGPA= $\frac{20x6.9+22x7.8+ 25x5.6+ 26x6.0+ 26x 6.3+ 25x8.0}{144}$ **=6.73**

SEMESTER I

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Anatomy
Course Code	MSCM0323S101T
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) Microbiology
Program Code	MSCM03
Name of the Course	Physiology
Course Code	MSCM0323S102T
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 harmones
(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) Microbiology
Program Code	MSCM03
Name of the Course	Biochemistry
Course Code	MSCM0323S103T
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 nucleicacids.

(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) Microbiology
Program Code	MSCM03
Name of the Course	Health care Services and its Application
Course Code	MSCM0323S104T
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)andEpidemiologyofNoncommunicablediseases(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)

References:

ParkK:2005.*TextBookofPreventiveandSocialMedicine*.BanarsidasBhanotPublishers:Jabalpur. 1

BeagleholeR&BonitaR.1997.*PublicHealthattheCrossroads:AchievementsandProsp ects*.Cambridge University Press: United Kingdom

Gupta MC, Chen LC & Krishnan TN. 1996. *Health Poverty and Development in India* .Oxford University Press: Bombay

WhiteK.2006.*TheSageDictionaryofHealthandSociety*.SagePublications:NewDelhiK umarR.1998.*MedicineandtheRaj:BritishMedicalPolicyinIndia*(1835-1911).SagePublications:New Delhi

GoelSL.2001.*HealthCareSystemandManagement: Primary Health Care management*. Deep & Deep Publications: New Delhi. Vol 4
HarrisMG&Assoc.2003.*ManagingHealthService:Concepts&Practices*.Maclennan+ Petty:Sydney
BeagleholeR,BonitaR&KjellstromT.1993.*BasicEpidemiology*.WHO:Geneva
GwatkinDR,WagstaffA&YazbeckAS.2005.*ReachingthePoorwithHealth,Nutrition&P opulationServices:Whatworks,What doesn't&Why*.WB: Washington DC

BhendeA&KanitkarT.1992. *PrinciplesofPopulationStudie*s.HimalayaPublishingHouse:Bombay.5th Ed.

Placement Semester	Semester I
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Basics of Computer
Course Code	MSCM0323S105T
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) Microbiology
Program Code	MSCM03
Name of the Course	Basics of Health Care IT
Course Code	MSCM0323S106T
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) Microbiology
Program Code	MSCM03
Name of the Course	Pathology
Course Code	MSCM0323S201T
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, Thalassaemia, 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

P**ANCREAS**:Diabetes Mellitus, Pancreatic Function Test

Placement Semester	Semester II
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Microbiology
Course Code	MSCM0323S202T
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 duringgrowth.
(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) Microbiology
Program Code	MSCM03
Name of the Course	Basic Instrumentation & Lab Practices
Course Code	MSCM0323S203T
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	MSCM03
Name of the Course	Internet Technology
Course Code	MSCM0323S204T
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 cybersecurity, 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	MSCM03
Name of the Course	Genetic Engineering
Course Code	MSCM0323S205T
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-Electromobility shift assay, DNaseI footprinting, 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 PCRmultiplex, nested, reverse transcriptase, real time PCR, touchdown PCR, hot start PCR, colony PCR, in situ PCR, cloning of PCR products, Tvectors, 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	MSCM03
Name of the Course	Organisational Behaviour
Course Code	MSCM0323S206T
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, Skimmer's)

Semester III

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	General Bacteriology
Course Code	MSCM0323S301T
Course Type	Core
Credits	7
Hours per Semester	105

Bacteriology

(1) History of Microbiology
(2) Principles, mechanism of different types of microscopes and their uses
(3) Morphology of bacteria, Bacterial metabolism, Bacterial taxonomy and classification.
(4) Sterilization and disinfection
(5) Growth and nutrition of bacteria and methods of cultivation
(6) Isolation and identification of bacteria
(7) Bacterial genetics and variation
(8) Normal bacterial flora, zoonoses, epidemiology and transmission
(9) Bacteriological examination of water, food, air and milk
(10) Care, management, method of inoculation and uses of experimental laboratory animals
(11) Antimicrobial chemotherapy.

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Immunology
Course Code	MSCM0323S302T
Course Type	Core
Credits	7
Hours per Semester	105

Immunology

(1) Anatomy, development and functions of immune system
(2) Host and parasite relationship
(3) Biology of immune response
(4) Microbial pathogenicity and host immune response
(5) Infection and immunity
(6) Antigen and antibodies
(7) Toxins, antitoxins
(8) Complement
(9) Antigen antibody reactions
(10) Hypersensitivity
(11) Vaccine and Immunization
(12) Immunodeficiency diseases
(13) Autoimmunity, Immunological tolerance
(14) Immunology of transplantation and malignancy
(15) Immunohematology
(16) Laboratory immunological procedures

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Biostatistics & Research Methodology
Course Code	MSCM0323S303T
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	MSCM03
Name of the Course	Legal and Medical issues in hospital
Course Code	MSCM0323S304T
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.

Contents:

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:

AnoopKaushalK,Medicalnegligenceandlegalremedies,3rdedition, universallawPllblishcr.5.New Delhi, 2004.

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

FrancisD.,GovernmentandBusiness,HimalayapublishingHouse,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	MSCM03
Name of the Course	Patient Care Management
Course Code	MSCM0323S305T
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 disastermanagementandMasscasualties,Componentsofdisasterplan:pre-hospitalandhospital,Disaster alertness in Hospital, Disaster management planning and implementation, Severity of illness amongst disaster victims and risk assess, 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

GuptaS&KantS.1998.Hospital&HealthCareAdministration:AppraisalandReferralTreatise.Jaypee: New Delhi

HarrisMG&Assoc.2003.*ManagingHealthService:Concepts&Practices*.Maclennan+Petty:Sydney

KellyDL.2006.EncyclopediaofQualityManagementinHospitals&HealthCareAdministration.Vol 1-6. Pentagon Press: Chicago
KilpatrickAO&JohnsonJA.1999.HandbookofHealthAdministration&Policy.Marcel DekkesInc: New York
KumarA.2000.EncyclopediaofHospitalAdministration&Development:VolumeI.AnmolPublicationsLtd: New Delhi.
RansomSB.JoshiMS&NashDB.2006.TheHealthCareQualityBook:Vision,Strategy&Tools.Standard Publishers Distributors: Delhi
ReddyN KS.2000. MedicalJurisprudence&Toxicology. ALTPublications:Hyderabad
RaoMS.1992.Health&HospitalAdministrationinIndia.Deep&DeepPublications:New Delhi

Placement Semester	Semester III
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Sports Nutrition
Course Code	MSCM0323S306T
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 Atheletic 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	MSCM03
Name of the Course	Practical & Viva
Course Code	MSCM0323S307P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	75

(1) Microscopy-Handling and general maintenance
(2) Staining procedures-Preparation of stains and staining methodology
(3) Growth and survival of micro organisms and estimation of microbial colonies byvarious procedures
(4) Cultivation-Media preparation – details of ingredients, pH measurement, preparation ofreagents, buffers, glass wares etc and quality control

Semester IV

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Systematic Bacteriology I
Course Code	MSCM0323S401T
Course Type	Core
Credits	7
Hours per Semester	105

Systematic Bacteriology

Properties, epidemiology, transmission, methods of isolation, identification, pathogenesis, toxins and enzymes production, antigen structures, clinical importance and laboratory diagnosis of the infection with the following bacteria :

(1) Gram Positive Cocci: Staphylococcus, Streptococcus, Pneumococcus
(2) Gram Negative Cocci : Neisseria
(3) Gram Positive Bacilli : Corynebacterium, Bacillus, Clostridium
(4) Non-sporing Anaerobes

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Systematic Bacteriology II
Course Code	MSCM0323S402T
Course Type	Core
Credits	7
Hours per Semester	105

Properties, epidemiology, transmission, methods of isolation, identification, pathogenesis, toxins and enzymes production, antigen structures, clinical importance and laboratory diagnosis of the infection with the following bacteria :

Gram Negative Bacilli: Enterobacteriaceae, Vibrio, Pseudomonas, Acinetobacter,
Yersinia, Pasteurella, Fracisella, Haemophilus, Bordetella, Brucella

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Systematic Bacteriology III
Course Code	MSCM0323S403T
Course Type	Core
Credits	7
Hours per Semester	105

Properties, epidemiology, transmission, methods of isolation, identification, pathogenesis, toxins and enzymes production, antigen structures, clinical importance and laboratory diagnosis of the infection with the following bacteria :

Mycobacterium: Mycobacterium tuberculosis, atypical Mycobacterium, Mycobacteriumleprae

Spirochaetes

Mycoplasma

Actinomycetes,

Helicobacter, campylobacter and other miscellaneous bacteria

Rickettsia

Chlamydia

Immunology of bacterial infections.

Placement Semester	Semester IV
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Hospital Information System
Course Code	MSCM0323S404T
Course Type	Elective
Credits	5
Hours per Semester	90

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 and Development, TMH,1998

Mudford, Eric, Effective systems design and requirements analysis, Mc Graw Hill, 1995

A. V. Srinivasan, Managing a Modem Hospital, Chapters 10 and II, Response Books, New Delhi, 200CHospital Information Systems by S. AKelkar, 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	MSCM03
Name of the Course	Constitution of India
Course Code	MSCM0323S405T
Course Type	Elective
Credits	5
Hours per Semester	90

UNIT 1

Meaning of the team 'Constitution' making of the Indian Constitution 1946-1940.

UNIT 1I

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

UNIT 1II

Fundamental Rights and Duties their content and significance.

UNIT 1V

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 V1

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

UNIT VI1

The Election Commission and State Public Service commissions.

UNIT VII1

Method of amending the Constitution.

UNIT 1X

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	MSCM03
Name of the Course	Environment and Ecology
Course Code	MSCM0323S406T
Course Type	Elective
Credits	5
Hours per Semester	90

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 (eia).

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	MSCM03
Name of the Course	Practical& Viva
Course Code	MSCM0323S407P
Course Type	Practical / Ability Enhancement
Credits	6
Hours per Semester	90

(1) Sterilization and disinfection-Handling of main types of filters, preparation proceduresfor autoclaving hot air oven, testing of disinfectants

(2) Care and maintenance of common laboratory instruments

(3) Handling, maintenance and inoculation techniques of small laboratory animals

(4) Collection of specimens for Microbiological investigations such as Blood, Urine,
Throat swab, Rectal swab, Stool, Pus (swabs), OT and other specimens

(5) Complete Characterization of bacteria of medical importance including morphology, cultural, biochemical, serological, antimicrobial, susceptibility pattern and any other biological properties as well as molecular methods (if any)

Semester V

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Clinical Microbiology & Healthcare associated Infections
Course Code	MSCM0323S501T
Course Type	Core
Credits	7
Hours per Semester	105

Clinical Microbiology & Healthcare associated Infections

Clinical Microbiology

(1) Surveillance sampling
(2) O.T Sterility testing
(3) Bacteriological examination of water, milk, food and air
(4) Processing of clinical samples for pathogens
(5) Hospital infections and biomedical waste management
(6) Quality control in microbiology
(7) Laboratory control of antimicrobial therapy
(8) Collection of specimens for for bacteriological investigations
(9) Methods of culture, techniques and organisms encountered in: CSF, blood culture,sputum, pus, urine, stool, UTI, endocarditis, Bone and joint infections
(10) Bacteriological investigations in :
    (a) PUO
    (b) Tuberculosis

(c) Leprosy
(d) Meningitis
(e) Eye infections

(11) Causative agents and investigations in case of :

(a) Food poisoning, gastroenteritis, diarrhoea
(b) Respiratory tract infections
(c) Sexually transmitted diseases
(d) Dental infections
(e) Blood transfusion and associated infections
(f) Immunoprophylaxis against diseases

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Principles of Antimicrobials action & resistance And Laboratory methods &strategies for antimicrobial testing
Course Code	MSCM0323S502T
Course Type	Core
Credits	7
Hours per Semester	105

Principles of Antimicrobials action & Resistance:

- Antimicrobial action
- Mechanism of Antibiotic Resistance

Laboratory methods &strategies for antimicrobial testing

- Goal &Limitation
- Testing method
- Laboratory strategies for antimicrobial Susceptibility testing
- Accuracy

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Mycology
Course Code	MSCM0323S503T
Course Type	Core
Credits	7
Hours per Semester	105

Mycology

(1) Morphology, cultivation, epidemiology, transmission, clinical importance and labdiagnosis of:
   (a) Yeasts
   (b) Yeast like Moulds
   (c) Dimorphic fungus
(2) Superficial, subcutaneous and deep fungal infections,
(3) Opportunistic fungal infection
(4) Laboratory contaminating fungus and mycotoxins
(5) Immunology of mycotic infections

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Artificial Intelligence and Machine Learning
Course Code	MSCM0323S504T
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	MSCM03
Name of the Course	Hospital Organization and Management
Course Code	MSCM0323S505T
Course Type	Elective
Credits	5
Hours per Semester	75

Definition of management; Productivity, Efficiency and Effectiveness; Managerial Skills, Evolution of management thought: Frederic W. Taylor's scientific management, Henry Fayol's principles of management, concept of 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 staffd) 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	MSCM03
Name of the Course	Hospital Equipment Management
Course Code	MSCM0323S506T
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,typesofmaintenancesystems,equipmentmaintenance,qualityandreliability,maintenanceplanning,maintenanceinformationsystem,maintenanceandmonitoringofbiomedicalequipment's,predictivemaintenance,equipmentavailability,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, Chapters12, Response Books, New Delhi, Barry, Jay Hazier, Principles of Operations Management, Prentice Hall, New Jersey, RogerG.,Operations Management-DecisionMakinginOperationsFunction,rawHiII.,NewDelhi.

l,ElwoodS.andSarin,RakeshK.,ModernProduction/OperationsManagement,John WileyillS,Singapore, 1987.
LeeJ.andLarryp.Ritzman,OperationsManagement-StrategyandAnalysis,'ton-WesleyPublications.
InternationalJournalofOperationsandQuantitativeManagement,(IJOQM)releasedbyNirmaInstituteof Management– Ahmadabad.

Placement Semester	Semester v
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Practical & Viva
Course Code	MSCM0323S507P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	75

Identification of fungus including direct microscopy, culture methods including slideculture, fungal staining.

Antimicrobial agents-Preparation, susceptibility testing, quality control, MIC, MBC

Semester VI

Placement Semester	Semester VI
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Parasitology
Course Code	MSCM0323S601T
Course Type	Core
Credits	7
Hours per Semester	105

Parasitology

(1) Taxonomy and classification
(2) Transmission, clinical features and prophylaxis of medically important
  (a) Protozoa
  (b) Cestodes
  (c) Trematodes
  (d) Nematodes
(3) Immunology of parasitic diseases
(4) Laboratory diagnosis of parasites

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Virology
Course Code	MSCM0323S602T
Course Type	Core
Credits	7
Hours per Semester	105

Virology

(1) General properties, cultivation, interferon and interference of virus.
(2) Clinical importance and laboratory diagnosis of infections with the following viruses:Pox, Herpes, Adeno, Picorna, Myxo, Arbo, Rhabdo, Hepatitis, Miscellaneous virus.
(3) Bacteriophages.
(4) Oncogenic viruses
(5) Slow viruses and Prion diseases
(6) Human Immunodeficiency Virus (HIV)
(7) Immunology of viral infections
(8) Diagnosis of viral infections (Cell culture, serology and molecular methods of diagnosis)

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Recent Advances in Microbiology
Course Code	MSCM0323S603T
Course Type	Core
Credits	7
Hours per Semester	105

Recent Advanced in field of Medical Microbiology:

- Nucleic acid- based analytic methods for Microbial identification and characterization.
- Overview of Immunochemical methods used for Organism detection .
- And other recent advances in field of Medical Microbiology

Placement Semester	Semester V
Name of the Program	M.Sc. (Medical) Microbiology
Program Code	MSCM03
Name of the Course	Biomedical Waste Management
Course Code	MSCM0323S604T
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	MSCM03
Name of the Course	Teaching Methodology
Course Code	MSCM0323S605T
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	MSCM03
Name of the Course	Basic Life Support (BLS)
Course Code	MSCM0323S606T
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	MSCM03
Name of the Course	Practical & Viva
Course Code	MSCM0323S607P
Course Type	Practical / Ability Enhancement
Credits	5
Hours per Semester	75

Serology

(1) Blood collection and preservation for serological testing
(2) Precipitation tests (including immune diffusion tests)
(3) Agglutination tests
(4) ELISA
(5) Rapid Diagnostic Serological Tests

Virology

(1) Rapid Tests for Diagnostics of Viral Infections

Parasitology

1. Processing and identification of ova and cysts in stools samples including Wet mount &staining.
2. Peripheral blood examination for parasite identification.

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

MODEL PAPER

M. Sc. (Medical) Microbiology Semester I

MSCM0323S101T

First Semester
M. Sc. (Medical) Microbiology
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) **(5x4)= 20**

(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.

MODEL PAPER

M. Sc. (Medical) Microbiology Semester I

MSCM0323S102T

First Semester

M. Sc. (Medical) Microbiology

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. Acommodation reflex

5.Spermatogenesis

MODEL PAPER

M. Sc. (Medical) Microbiology Semester I

MSCM0323S103T

First Semester

M. Sc. (Medical) Microbiology

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

MODEL PAPER

M. Sc. (Medical) Microbiology Semester I

MSCM0323S104T **First Semester**

M. Sc. (Medical) Microbiology

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**

(a) Enumerate the steps involved in administration of care plan. Explain the risk factors of hospital acquired infections and how it can be controlled?

(b) Suppose a person has met with an accident. What kind of services of priority should be followed by the first aider in an emergency?

(c) 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?

MODEL PAPER

M. Sc. (Medical) Microbiology Semester I

MSCM0323S105T

First Semester

M. Sc. (Medical) Microbiology

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) Microbiology Semester I

MSCM0323S106T

First Semester

M. Sc. (Medical) Microbiology

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.

MODEL PAPER

M. Sc. (Medical) Microbiology Semester II

MSCM0323S201T

Second Semester

M. Sc. (Medical) Microbiology

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 Mallitus

MODEL PAPER

M. Sc. (Medical) Microbiology Semester II
MSCM0323S202T

Second Semester
M. Sc. (Medical) Microbiology
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**

Q1. Define Sterlization. How does it differ from disinfection? Classify the various agents used in sterilization. Add a note on the principle and functioning of autoclave.

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. Loffier's srum 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) Microbiology Semester II
MSCM0323S203T

Second Semester
M. Sc. (Medical) Microbiology
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.

2. **Short Essay (Attempt any 2)** **2x10=20**
   A. Types of Glasswares used in Laboratory
   B. Principle and applications of Centrifuge
   C. Material safety data sheet

3. **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

MODEL PAPER

M. Sc. (Medical) Microbiology Semester II

MSCM0323S204T

Second Semester

M. Sc. (Medical) Microbiology

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 crae 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.

MODEL PAPER

M. Sc. (Medical) Microbiology Semester II

MSCM0323S205T

Second Semester

M. Sc. (Medical) Microbiology

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

MODEL PAPER

M. Sc. (Medical) Microbiology Semester II

MSCM0323S206T

Second Semester

M. Sc. (Medical) Microbiology

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) Microbiology Semester III

MSCM0323S301T

Third Semester

M. Sc. (Medical) Microbiology

Examination (Month/ year)

Paper - I

General Bacteriology

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. Write briefly about anaerobic culture.

Q2. Define mutation. Describe various types of mutation.

Q3. Name various water-borne pathogens. Discuss the bacteriological examination of water.

2. Short Essay (Attempt any two) **2x15=30**

a.Koch's postulates

b.Electron microscope.

c. Sterlization of prions

3.Write short notes on: (Any Four) **(5x4)=20**

a. Lophotrichous
b. Redox potential
c. Streak culture
d. TSI
e. Normal flora of the skin

MODEL PAPER

M. Sc. (Medical) Microbiology Semester III
MSCM0323S302T

Third Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - II
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)** **2X15=30**

Q1. Discuss the mechanisms of innate immunity.
Q2. Define agglutination reaction? Discuss the principle and application of agglutination reactions.
Q3. Discuss briefly the classical pathway and alternative pathway of complement.

2. Short Essay (Attempt any two) **2x15=30**

a. Herd immunity
b. IgM.
c. ELISA

3. Write short notes on: (Any Four) **(5x4)= 20**

a. Null cells
b. Anaphylaxis
c. Graft –versus-host (GVH) reaction.
d. Immunosurveillance.
e. Complications of blood transfusion.

MODEL PAPER

M. Sc. (Medical) Microbiology Semester III
MSCM0323S303T

Third Semester
M. Sc. (Medical) Microbiology
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) Microbiology Semester III
MSCM0323S304T

Third Semester

M. Sc. (Medical) Microbiology

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) Microbiology Semester III
MSCM0323S305T

Third Semester

M. Sc. (Medical) Microbiology

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) Microbiology Semester III
MSCM0323S306T

Third Semester
M. Sc. (Medical) Microbiology
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. 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) Microbiology Semester IV
MSCM0323S401T

Fourth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - I
Systematic Bacteriology 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)** **2X15=30**

Q1. Describe the laboratory diagnosis of infections caused by Staph. aureus.
Q2 Describe the laboratory diagnosis of gonorrhea .
Q3. Name the different species of genus Corynebacterium. Discuss in detail the laboratory diagnosis of diphtheria

2. Short Essay (Attempt any two) **2x15=30**

a. MRSA
b.CAMP test
c. Anthracoid bacilli

3. Write short notes on: (Any Four) **(5x4)= 20**

a. Non- gonococcal urethritis (NGU)
b. Nagler reaction
c. Prophylaxis against tetanus
d. Anaerobic cocci
e. ViridIans streptococci

MODEL PAPER

M. Sc. (Medical) Microbiology Semester IV
MSCM0323S402T

Fourth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - II
Systematic Bacteriology 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)** **2X15=30**

Q1. Describe the various mechanisms by which Esch. Coli produces diarrhea.
Q2 Discuss the laboratory diagnosis of dysentery caused by shigella.
Q3. Describe in detail the laboratory diagnosis of enteric fever.

2. Short Essay (Attempt any two) **2x15=30**

a. Halophilic vibrios
b.Pyocin typing
c. Prophylaxis against plague

3.Write short notes on: (Any Four) **(5x4)= 20**

a. Satellitism
b. X and V factors
c. Vaccination against pertussis
d. Serodiagnosis of brucellosis
e. Castaneda's medium

MODEL PAPER

M. Sc. (Medical) Microbiology Semester IV
MSCM0323S403T

Fourth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - III
Systematic Bacteriology III
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. Classify Mycobacteria. Discuss the laboratory diagnosis of pulmonary tuberculosis.
Q2 Name different spirochaetes and diseases caused by them. Describe the laboratory diagnosis of syphilis.
Q.3 Discuss the laboratory diagnosis of rickettisial diseases.

2. Short Essay (Attempt any two) **2x15=30**

a.Photochromogens
b. Labortory diagnosis of leprosy
c. Leptospirosis

3. Write short notes on) **4X5 = 20**

a. L-forms
b. NGU
c. Mycetoma
d. Scrub Typhus
e. TRIC agents

MODEL PAPER

M. Sc. (Medical) Microbiology Semester IV
MSCM0323S404T

Fourth Semester

M. Sc. (Medical) Microbiology
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 youranswer 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) Microbiology Semester IV
MSCM0323S405T

Fourth Semester
M. Sc. (Medical) Microbiology
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) Microbiology Semester IV
MSCM0323S406T

Fourth Semester
M. Sc. (Medical) Microbiology
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) Microbiology Semester V
MSCM0323S501T

Fifth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - I
Clinical Microbiology & Healthcare associated Infections
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. Name various organisms causing urinary tract infection. Discuss the laboratory diagnosis of this condition.
Q2 Enumerate the different causes of diarrhea. How will you diagnose it in the laboratory?
Q3 Define bacteraemia, septicaemia, pyaemia and endotoxaemia. Name various organisms causing septicaemia.

2. Short Essay (Attempt any two) **2x15=30**

a. Infection control policy
b. Significant
c. Food-borne botulism

3. Write short notes on: (Any Four) **(5x4)= 20**

a. Traveler's diarrhea
b. Aseptic meningitis
c. LGV
d. Modes of transmission of healthcare associated infection
e. Prevention of healthcare associated infection

MODEL PAPER

M. Sc. (Medical) Microbiology Semester V
MSCM0323S502T

Fifth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - II
Principles of Antimicrobials action & resistance and laboratory methods & Strategies for antimicrobial testing
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 in details about mechanisms of antibiotic resistance
Q2 Discuss in detail about mechanisms of action of Antibiotics
Q3. Describe in detail commercial Antimicrobial susceptibility testing systems .

2. Short Essay (Attempt any two) **2x15=30**

a. Epsilometer (Test)
b. Minimum inhibitory concentration (MIC)
c. Classification of Antimicrobial drugs

3. Write short notes on **(5x4) =20**

a. Stokes disc diffusion method
b. Broth dilution method for Antibiotic sensitivity testing
c. Minimum bactericidal concentration (MBC)
d. Predictability of Antimicrobial susceptibility
e. Antimicrobial Resistance surveillance

MODEL PAPER

M. Sc. (Medical) Microbiology Semester V
MSCM0323S503T

Fifth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - III
Mycology
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. Discuss pathogenesis, clinical manifestations & laboratory diagnosis of infections caused by Candida .

Q2 Name various genera of dermatophytes. Discuss the laboratory iagnosis of infections caused by dermatophytes.

Q3 Discuss in detail etiology, pathogenesis & labortory diagnosis of mycetoma.

2. Short Essay (Attempt any two) **2x15=30**

a.Histoplasmosis
b.Cryptococcosis
c. Dengue virus

3. Write short notes on: (Any Four) **(5x4)= 20**

a. Aspergillosis
b. Zygomycosis
c. Dimorphic fungi
d. Sporotrichosis
e. Mycetoma

MODEL PAPER

M. Sc. (Medical) Microbiology Semester V
MSCM0323S504T

Fifth Semester
M. Sc. (Medical) Microbiology
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) Microbiology Semester V
MSCM0323S505T

Fifth Semester
M. Sc. (Medical) Microbiology
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) Microbiology Semester V
MSCM0323S506T

Fifth Semester
M. Sc. (Medical) Microbiology
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

B. What is buy-back and replacement policy in Equipment management.

C. Enumerate advantages and disadvantages of Equipment management

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 disposable of medical equipment
F. Letter of Credit
G. Hospital need assessment
H. Prevention of hazards

MODEL PAPER

M. Sc. (Medical) Microbiology Semester VI
MSCM0323S601T

Sixth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - I
Parasitology
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. Discuss geographical distribution,morphology, cultivation, life cycle, pathogenicity and laboratory diagnosis of Entamoeba histolytica..

Q2 Describe morphology, life cycle, pathogenicity and laboratory diagnosis of :

a. Diphyllobothrium latum
b. Taenia solium
c. Hymenolepis nana
d. Echinococcus granulosus

Q3. Discuss various methods of concentration of stool

2. Short Essay (Attempt any two) **2x15=30**

a. Occult filariasis
b. NIH swab
c. Prophylaxis of malaria

3. Write short notes on: (Any Four) **(5x4)= 20**

a. Pernicious malaria
b. Visceral larva migrans
c. Examination of CSF for Parasites
d. General characters of nematodes
e. Post kala-azar dermal leishmaniasis

MODEL PAPER

M. Sc. (Medical) Microbiology Semester VI
MSCM0323S602T

Sixth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - II
Virology
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. Discuss the various methods for isolation of viruses in the laboratory
Q2 Describe the morphology of HIV and laboratory diagnosis of HIV infection.
Q3 Name different oncogenic viruses and discuss the mechanisms of viral oncogenesis

2. Short Essay (Attempt any two) **2x15=30**

a. Interferons
b. Phage typing
c. Dengue virus

3. Write short notes on: (Any Four) **(5x4)= 20**

a. Prions
b. Actue haemorrhagic conjunctivitis
c. Rabies related viruses.
d. Non-A, Non-B hepatitis
e. Cell Culture vaccines

MODEL PAPER

M. Sc. (Medical) Microbiology Semester VI
MSCM0323S603T

Sixth Semester
M. Sc. (Medical) Microbiology
Examination (Month/ year)
Paper - III
Recent Advanced in 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**

Q1. Discuss in detail Polymerase chain reaction (PCR)

Q2 Discuss in detail Puslsed field gel electrophoresis (PFGE)

Q.3 Describe in detail about MALDI - TOF

2. Short Essay (Attempt any two) **2x15=30**

a. Monoclonal Antibodies

b. Immuno-fluorescent assay

c. Malaria Vaccine

3.Write short notes on **(5x4)= 20**

a. Recent advance in diagnosis of TB

b. Nucleic acid sequencing

c. Uses of restriction endonucleases in molecular diagnostics

d. Flourescence in situ-hybridization (FISH)

e. Multiplex (PCR)

MODEL PAPER

M. Sc. (Medical) Microbiology Semester VI
MSCM0323S604T

Sixth Semester
M. Sc. (Medical) Microbiology
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) Microbiology Semester VI
MSCM0323S605T

Sixth Semester
M. Sc. (Medical) Microbiology
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.

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) Microbiology Semester VI
MSCM0323S606T

Sixth Semester
M. Sc. (Medical) Microbiology
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.

2 Short Essay (Attempt any 2) **2 x 10 = 20**

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

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.