

**INTEGRAL INSTITUTE OF
MEDICAL SCIENCES & RESEARCH**

**INTEGRAL UNIVERSITY
LUCKNOW**

SYLLABUS

FOR

**M.Sc. (MEDICAL MICROBIOLOGY)
2012-13**

DEPARTMENT OF MICROBIOLOGY

STUDY AND EVALUATION SCHEME

M.SC. (MEDICAL MICROBIOLOGY) YEAR-I

S. No.	Course Code	Course Title	Periods			Evaluation Scheme						Total
						Internal Assessment		External Assessment				
			L	T/S/ D	P	Theory	Practical	Theory		Grand Viva Voce	Practical	
								Paper-I	Paper-II			
1	MHA-101	Essentials of Anatomy	05	02	00	20	00	50	50	20	00	140
2	MHP-102	Essentials of Physiology	04	01	00	20	00	50	50	20	00	140
3	MMBC-103	Essentials of Biochemistry	02	02	00	20	00	50	50	20	00	140
4	MRM-104	Research Methodology	01	00	00	20	00	30	00	00	00	50
5	MHA-151	Anatomy Practical	00	00	08	00	20	00	00	00	40	60
6	MHP-152	Physiology Practical	00	00	06	00	20	00	00	00	40	60
7	MMBC-153	Biochemistry Practical	00	00	02	00	20	00	00	00	40	60
8	MRM-154	Fundamental of Computers	00	00	01	00	20	00	00	00	30	50
		Total	12	05	17	80	80	180	150	60	150	700

Internal Assessment

Theory	Sessional		Vica Voce		General Proficiency (Attendance/ Assignment/ day to day performance)	Total
	1	2	1	2		20
	10	10	5	5		
	Average of Both (10)		Average of Both (05)			
Practicals	Sessional		Record/ MCQ/ case sheet/ Seminar (05)		Attendance (5)	20
	1	2				
	10	10				
	Average of Both (10)					

L= Lecture T=Tutorial S=Seminar D=Demonstration P=Practicals 1L=1hr 1T=1hr 1S=1hr 1D=1hr 1P=1hr

STUDY AND EVALUATION SCHEME

M.SC. (MEDICAL MICROBIOLOGY) YEAR-II

S. No.	Course Code	Course Title	Periods			Evaluation Scheme		Total
			L	T/S/D	P	Internal Assessment	External Assessment	
1	MMMB-201	General Microbiology and immunology	03	03	00	30	70	100
2	MMMB-202	Systemic Bacteriology	03	03	00	30	70	100
3	MTM-203	Teaching Methodology	01	01	00	30	70	100
4	MMMB-254	Medical Microbiology Practical-I	00	00	20	30	70	100
		Total	07	07	20	120	280	400

Internal Assessment

Theory	Sessional		Vica Voce		General Proficiency (Attendance/ Assignment/ day to day performance) (5)	Total
	1	2	1	2		30
	20	20	5	5		
	Average of Both (20)		Average of Both (05)			
Practicals	Sessional		Record/ MCQ/ case sheet/ Seminar (05)		Attendance (5)	30
	1	2				
	20	20				
	Average of Both (20)					

L= Lecture T=Tutorial S=Seminar D=Demonstration P=Practicals 1L=1hr 1T=1hr 1S=1hr 1D=1hr 1P=1hr

STUDY AND EVALUATION SCHEME

M.SC. (MEDICAL MICROBIOLOGY) YEAR-III

S. No.	Course Code	Course Title	Periods			Evaluation Scheme		Total
			L	T/S/D	P	Internal Assessment	External Assessment	
1	MMMB-301	Virology, Mycology Parasitology	03	01	00	30	70	100
2	MMMB-302	Clinical Microbiology	02	01	00	30	70	100
3	MMMB-303	Molecular Biology and Recent Advances in Microbiology	01	01	00	30	70	100
4	MMMB-354	Medical Microbiology Practical-II	00	00	24	30	70	100
5	MMMB-355	*Dissertation	00	00	00	50	50	100
		Total	06	03	20	170	330	500

Internal Assessment

Theory	Sessional		Vica Voce		General Proficiency (Attendance/ Assignment/ day to day performance) (5)	Total
	1	2	1	2		30
	20	20	5	5		
	Average of Both (20)		Average of Both (05)			
Practicals	Sessional		Record/ MCQ/ case sheet/ Seminar (10)		Attendance (5)	30
	1	2				
	20	20				
	Average of Both (20)					

- Will be based on dissertation work, presentation, viva voce & discussion

L= Lecture T=Tutorial S=Seminar D=Demonstration P=Practicals 1L=1hr 1T=1hr 1S=1hr 1D=1hr 1P=1hr

Year-I
Essentials of Anatomy
MHA-101

L T/S/D/ P
5 2 0

Paper-I

Course Contents:

General Anatomy:

1. Brief history of anatomy as related to medicine, subdivision of anatomy, anatomical terminology, Anatomical planes, anatomical position, terms related to movements, general principles of osteology, arthrology, mycology, neuroanatomy, and vascular system. [35]
2. Basics of cytology, structure of cell wall, cell organelles, junctional complexes, general Histology: introduction including importance of studying histology in patient care, epithelial tissue, surface specializations, connective tissue, cartilage, bone, muscle, nerve tissue. [40]
3. Introduction to skelton, joints, muscles, cardiovascular system, lymphatics, nervous system & fascia. [15]
4. General Embryology: Introduction to imbryology, oogenesis, ovum, spermatogenesis, sperm, ovulation, fate of discharges ovum, fertilization, anatomical basis of contraception, cleavage, morula, blastocyst, implantation of ovum, germ layers, intraembryonic coelom, notochord, neural tube, intraembryonic mesoderm, somites, folding of germs disc and formulation of embryo, connecting stalk, umbilical cord, trophoblast, chorion, placenta. [50]

Paper-II

Course Contents:

[Total 140 hrs.]

1. Gross Anatomy (Elementary)
Superior Extremity
Thorax [25]
2. Gross Anatomy (Elementary)
Inferior Extremity [20]
3. Gross Anatomy (Elementary)
Head & Neck
Brain [35]
4. Gross Anatomy (Elementary)
Abdomen
Pelvis [25]
5. Special embryology: development of respiratory system, abdominal wall, thoracic diaphragm, cardiovascular system, derivatives of aortic arches, venous system, upper and lower limbs. [35]

Reference Books:

1. Clinical Anatomy for Medical Students, by: Richard S. Snell
2. General Anatomy, by: Vishram Singh
3. General Anatomy, by: B.D.Chaurasia
4. Embryology for Medical Students, by: Inderbir Singh
5. Text Book of Histology, by: Inderbir Singh

Paper-I
Essentials of Physiology
MHA-102

L T/S/D/ P
4 1 0
[Total 100 hrs.]

Course Contents:

Unit-I

General and Cellular Physiology:

Cell as the living unit of body, the internal environment, control system, homeostasis, organization of the cell, physical structure of the cell, transport across the cell membrane, resting membrane potential, Nernst equation, equilibrium potential, Goldman equation, composition of ECF and ICF. [08]

Unit-II

Nerve and Muscle Physiology:

Neuron structure, function and classification neuroglia, resting membrane potential of nerve and muscle, action potential, nerve conduction, classification of nerve fiber, degeneration and regeneration of nerve, functional anatomy of skeletal muscle, neuromuscular junction, transmission and its blockers, excitation-contraction coupling, mechanism of muscle contraction, smooth muscle. [12]

Unit-III

Blood:

Function and composition of blood, structure and function of RBC, formation of hemoglobin, Destruction and fate of RBC, Anemia, polycythemia, Leucocytes (WBC) general characteristics, genesis and life span of WBC, classification and function of each type of WBC, leucocytosis, leucopenia, leukemia. Blood groups classification, immunoglobulins, antigenicity, agglutination, blood typing, transfusion, mismatched transfusion and its effect, Rh factor, Rh incompatibility, components of hemostasis, coagulation factors, mechanism of coagulation, coagulation test, anti coagulants, immunity innate and acquired immunity, allergic reactions, immune deficiency. [24]

Unit-IV

Respiratory Physiology:

Functional anatomy of respiratory system, pleura, mechanism of breathing, dead space, surfactants, dynamic and static lung, volume capacity, pulmonary and alveolar ventilation, principles of gas exchange, oxygen and carbon dioxide transport, surfactant, regulation of respiration, hypoxia, oxygen therapy and toxicity, artificial respiration, high altitude physiology, deep sea diving, abnormal breathing. [20]

Unit-V

Renal Physiology:

Functions of kidney, structure of nephron, juxta glomerular apparatus, urine formation, counter current mechanism, acidification of urine, renal handling of glucose sodium potassium bicarbonates and other substances. Regulation of acid base balance, micturition, diuretics, renal function test, renal failure. [18]

Unit-VI

Gastrointestinal System:

Functional anatomy general principles and organization of GI functions, salivary glands secretion, function of saliva, deglutition, oesophageal motility, vomiting, function of stomach, function composition and regulation of gastric juices, gastric mucosal barrier, pancreatic juice composition secretion and function, hepatobiliary system functions of liver its physiological anatomy, bile composition and function, GIT motility, digestion and absorption functions of small and large intestine defecation reflex, GIT hormones. [18]

Paper-II

Course Contents:

[Total 100 hrs.]

Unit-I

Cardiovascular Physiology:

Cardiac muscle, physiological anatomy of heart and conduction system, cardiac action potential, Nutrition and metabolism of heart, generation and conduction of cardiac impulse, ECG, Arrhythmias, cardiac cycle, heart sound cardiac output, principle of hemodynamics, neurohumoral regulation of cardiovascular function, microcirculation and lymphatic system, regional circulation; cardiac failure, circulatory shock[24]

Unit-II

Central Nervous System and Special Senses:

General organization of CNS and PNS, interneuronal communication, classification of somatic senses, sensory receptors, sensory transduction information processing, structure of spinal cord, sensory modalities, sensory pathways, somatosensory cortex, association areas, pain, motor system (muscle spindle, Golgi tendon organ, reflex arc, reflexes) motor cortex, corticospinal and extra pyramidal tracts, brain stem and cortical control of motor function, cerebellum, thalamus, hypothalamus, basal ganglia, maintenance of posture and equilibrium, limbic system, RAS higher function, sleep. Organization of ANS, sympathetic and parasympathetic nervous system, neuro transmitter, effect of sympathetic and parasympathetic stimuli. [26]

Unit-III

Eye:

(Functional anatomy, refractive errors, visual pathway lesions of visual pathway rod and cone and there functions, dark and light adaptation, accommodation reflex) Ear (functional anatomy middle ear and internal ear, mechanism of hearing, auditory pathway, deafness) Taste and olfaction. [12]

Unit-IV

Endocrine System:

Classification of hormones, mechanism of hormones action, pituitary gland hypothalamus, thyroidglands, parathyroid gland calcitonin, vitD and calcium metabolism, menstrual cycle, female sex hormones, pregnancy and location, function of placenta, parturition, location. [14]

Unit-V

Reproductive System:

General organization of male and female reproductive system, male spermatogenesis and action of testosterone, male sex hormones, hyper and hypogonadism, menstrual cycle, female sex hormones, pregnancy and lactation, function of placenta, parturition, lactation. [14]

Reference Books:

1. Guyton. A. Text Book of Medical Physiology, Elsevier Publication
2. Ganong, W.F.Reviews of Medical Physiology Lange Publication
3. Khurana I, Text Book of Physiology
4. Berne V Principal of Physiology Elsevier Mosby Publication
5. A. K. Jain Text Book of Physiology
6. A. K. Jain Practical Physiology
7. C. L. Ghai Practical Physiology
8. Neurophysiology Kandel
9. Human Physiology from cells to system auralee Sherwood
10. Human Physiology Best and Tylor

Paper-I
Essentials of Biochemistry
MMBC-103

L T/S/D/ P
2 2 0
[Total 80 Hrs.]

Course Contents:

1. Cell composition, subcellular organelles, nucleus, endoplasmic reticulum, Golgi apparatus, lysosomes, peroxisomes, mitochondria, fluid mosaic model, cytoskeleton, transport mechanisms, facilitated diffusion, ion channels, active transport, sodium pump. [12]
2. Chemistry, basic properties, type, structure, classification and functions of carbohydrates, lipids, amino acids, proteins, nucleotides, nucleic acids, hormones, chemistry of blood, hemoglobin and plasma proteins, chemistry of respiration. [14]
3. Classification of enzymes, co-enzymes, mode of action of enzymes, Michaelis constant, enzyme kinetics, factors influencing enzyme activity, enzyme inhibition: competitive inhibition, non-competitive inhibition, suicide inhibition, Specificity of enzymes, Clinical enzymology. [14]
4. Calorific value of food, Basal Metabolic Rate, specific dynamic action, nutritional requirements, dietary fibres. Protein Energy Malnutrition, obesity. Fat soluble vitamins (A, D, E, K) – chemistry functions, requirements and deficiency manifestations. Water soluble vitamins (B, C) – chemistry functions, requirements and deficiency manifestations. Functions, requirements and deficiency manifestations of major and trace elements. [14]
5. Redox potential, Biological oxidation, high energy compounds, organization of electron transport chain, flow of electrons, Oxidative phosphorylation, Chemi-osmotic theory, ATP synthase, inhibitors of ATP synthesis, Uncouplers of Oxidative phosphorylation. Free radicals, Reactive oxygen species, free radical scavenger systems, Lipid peroxidation, Chain breaking anti-oxidants, Preventive anti-oxidants. [14]
6. Mechanisms of Acid-base balance, Henderson-Hasselbalch equation, buffers, Acidosis and Alkalosis. Electrolyte concentration of body fluid compartments, regulation of sodium and water balance, hypotonic contraction and expansion, isotonic contraction and expansion. [12]

Paper-II

Course Contents:

[Total 80 hrs.]

1. Digestion and absorption of carbohydrates, proteins and lipids. Digestion of medium chain fatty acids, absorption of amino acids. [12]
2. Major and minor metabolic pathways of glucose: Glycolysis, Gluconeogenesis, Glycogen synthesis and breakdown. Hexose mono phosphate shunt pathways, Uronic acid pathway, galactose, mannose and fructose metabolism. Metabolism of fatty acids. Synthesis of triglycerides, Cholesterol, Lipoproteins and Amino acid metabolic, uric cycle. Citric acid cycle, significance of TCA cycle, amphibolic role, regulation, metabolic adaptations during starvation and metabolic profile in organs. Detoxification and biotransformation of Xenobiotics. [20]
3. Basics of purine and pyridine nucleotides metabolism. Basics of replication of DNA, transcription, post-transcriptional processing, genetic code, translation, post-translational processing. Recombinant DNA technology. Molecular biology techniques: blotting techniques, DNA finger printing, RFLP, DNA sequencing, PCR, hybridoma technology. [16]
4. Basics elements of Immunology, structure of immunoglobulins, classes of immunoglobulins, immunodeficiency states, molecular structure of antigens, HLA antigens, cytokines and lymphokines. [16]
4. Body fluids and its composition: milk, colostrums, Aqueous humor, cerebrospinal fluid, amniotic fluid, urine-normal and abnormal constituents. Tissue proteins in health and disease. Liver and gastric function tests: Makers of epatic dysfunction, tests for lever function tests for gastric function. Markers of obstructive liver disease, assessment of free and total acidity in gastric juice. [16]

Reference Books:

1. Lubert Stryer (Ed.), Biochemistry, W.H. Freeman & Company, New York.
2. Lehniger, Nelson & Cox (Ed.), Harpers Biochemistry, CBS Publishers & Distributors.
3. Murray R.K. & P.A. Mayes (Ed.) Harpers Biochemistry, D.K. Granner.
4. Thomas M. Devlin (Ed.), Text book of Biochemistry with Clinical Correlations, Wiley Liss Publishers.
5. Benjamin Lewin (Ed.), Genes VI, Oxford University Press.
6. Srivastava & Moudgal (Ed.), Text Book of Medical Biochemistry and Human Biology

Research Methodology
MRM-104

L T/S/D/ P
1 0 0
[Total 40 Hrs.]

Course Contents:

1. Methods of collection of data, classifications and graphical representation of data. Binomial and normal probability distribution. Polygon, histogram, measure of central tendency. Signification of statistical methods, probability, degree of freedom, measure of variation – Standard deviation, Standard error.
2. Sampling, sample size and power. Statistical inference and hypothesis. Tests for statistical significance: t-test, Chi-square test, confidence level, Null hypothesis.
3. Linear regression and correlation. Analysis of variance (one way and two ways) Factorial designs (including fraction factorial design). Theory of probability, Permutation and Combination, Ratios, Percentage and Proportion. Two ways ANOVA and Multiple comparison procedures.
4. Non-parametric tests, Experimental design in clinical trials, Statistical quality control, validation, optimization techniques and screening design. Correlation and regression, least square method, significance of coefficient of correlation, nonlinear regression.
5. Report Preparation: Types and Layout of Research Report, Precautions in Preparing the Research Report. Bibliography and Annexure in the Report: Their Significance, Drawing Conclusions, Suggestions and Recommendations to the Concerned Persons. Use of SPSS in Data Analysis.

Reference Books:

1. Cooper & Schindler, Business Research Methods, Tata McGraw Hill
2. Saunders Research Methods for Business Student, Pearson Education
3. Malhotra Naresh K., Marketing Research, Pearson Education.
4. Fisher, R.A., Statistical Methods for Research Works, Oliver & Boyd, Edinburgh.
5. Chow, Statistical Design and Analysis of Stability Studies, Marcel Dekker, New York.
6. Finney, D.J., Statistical Methods in Biological Assays, Hafner, New York.
7. Montgomery, D.C., Introduction to Statistical Quality Control, Willy.
8. Lipschutz, Introduction to Probability and Statistics, McGraw-Hill.

**Anatomy Practical
MHA-151**

**L T/S/D/ P
0 0 8
[Total 320 Hrs.]**

Course Contents:

Demonstration on the following:

1. Superior extremity: General features & identification of clavicle, scapula, humerus, radius, ulna, identification of the skeleton of hand.
2. Thorax: General features for thoracic vertebrae – typical and atypical, ribs-typical and atypical, sternum.
3. Inferior Extremity: General features of hip bone, femur, patella, tibia, fibula, identification of the skeleton foot.
4. Abdomen and Pelvis: General features of eleventh and twelfth ribs, lumbar vertebrae – typical and atypical, sacrum, coccyx, pelvis – male and female.
5. Brain: General feature of basis cranii interna., skull cap.
6. Head and Neck: General features of skull, identification of individual skull bones, hyoid bone, ear ossicles, general features of cervical vertebrae typical and atypical.

Dissection

1. General introduction to cadaver, anatomical position.
2. Demonstration of the dissected part of superior extremity, thoracic structures: lung & heart, Inferior Extremity, Abdomen & Pelvis, Brain, Head & Neck.

Reference Books:

1. Text Book of Histology, by: Inderbir Singh
2. A Colour Atlas of Human Body, by: R.M.H. Mc Minn E.T. Hutchings
3. Cunningham's Manual of Practical Anatomy, Vol: 1, 2 & 3: G.J. Romances

**Physiology Practical
MHP-152**

**L T/S/D/ P
0 0 6
[Total 240 Hrs.]**

Course Contents:

(a) Hematology

- To study the different part of a compound microscope and its uses.
- To draw and study the different types of blood cells in a stained blood film.
- To do differential leucocyte count of your own blood.
- To do an arnth count of your own blood.
- To study haemcyto meter and calculation for total leucocyte count and total RBC count.
- To do total leucocyte count. of your own blood.
- To do total RBC count. of your own blood
- Estimation of haemoglobin content of your own blood by Sahli's method.
- To calculate haematological indices or absolute value of your own blood.
- To do reticulocyte count of your own blood.
- To do platelet count of your own blood.
- To find out the blood group of your own blood.
- To prepare haemin crystal of your own blood.
- To find out the bleeding time and clotting time of your own blood.
- To determine the erythrocyte sedimentation rate of the blood sample.

(b) Experimental Lab.

- General apparatus used in experimental physiology lab.
- To elicit a simple muscle twitch and to find out the time interval of various phases of a simple muscle curve.
- To demonstrate the effect of temperature on the frog muscle nerve preparation.
- To demonstrate the effect of strength of stimuli on muscle contraction of sciatic nerve gastronemius muscle preparation of the frog.
- To demonstrate the effect of summation to stimuli.
- To demonstrate the effect of two successive stimuli in a m.n.p. resulting in summation of effect.
- To study the genesis of tetanus.
Effect of change in length and load on muscle contraction.
- To demonstrate the phenomenon of fatigue gastronemius muscle preparation of the frog.
- To find out the conduction velocity of sciatic nerve in the frog.
- To record the normal cardiogram of frog and show the effect of temperature on it.
- To study the effect of drugs on frogs heart.
- To demonstrate the properties of frog hearts using students physiograph or kymograph.
- To study the effect of vagal stimulation and white crescentric line on frogs heart and to demonstrate the phenomenon of vagal escape.

(c) Human Physiology

- Examination of cardiovascular system.
- Examination of arterial pulse and study the effect of moderate exercise on it.
- Recording the arterial pulse.

- Recording of Electrocardiogram.
- Recording of human blood pressure.
- To study the effect of change of posture on blood pressure.
- To study the effect of moderate exercise on blood pressure.
- Stethography part – I
- Stethography part - II
- To determine various lung volumes and lung capacities by spirometry.
- Determine the basic metabolic rate. Examination of Nervous system.
- Clinical examination of cranial nerves.
- Examination of sensory system.
- Study of superficial and deep reflexes.
- Examination of motor system.
- To map peripheral field of vision with perimeter.
- To find out acuity of vision.
- To test colour vision.
- To demonstrate light reflexes and accommodation reflex.
- To assess the hearing of individual

Reference Books:

1. Guyton. A. Text Book of Medical physiology, Elsevier Publication
2. Ganong, W.F. Reviews of Medical physiology Lange Publication
3. Khurana I, Text Book of physiology
4. Berne V Principle of physiology Elsevier Mosby Publication
5. A. K. Jain Text Book of physiology
6. A. K. Jain Practical Physiology
7. C.L. Ghai Practical Physiology
8. Neurophysiology Kandel
9. Human physiology from cells to system Lauralee Sherwood
10. Human physiology Best and Tylor

**Biochemistry Practical
MMBC-153**

L T/S/D/ P
0 0 2
[Total 80 Hrs.]

Course Contents:

1. Introduction: Handling of chemicals, preparation of reagents pipetting etc
2. Tests of carbohydrates
3. Tests for Lipids
4. Tests for proteins
5. Precipitation reactions of protein
6. Individual proteins – Albumin, Gloulin, Casein & Gelatin
7. Unknown protein identification
8. Milk analysis
9. Starch digestion by salivary amylase and products
10. Normal constituents of urine
11. Abnormal constituents of urine and reporting of abnormal urine
12. Estimation of free and total acidity in the gastric juice, gastric function test.
13. Glucose estimation in urine
14. Ascorbic acid (Vitamin C) estimation
15. Verification of Beer's Lambert Law. Principles of colorimetry and spectrophotometry in Quantitative analysis of biomolecules
16. Estimation of serum acids.
17. Estimation of total plasma protein and albumin levels and calculation of A/G Ratio
18. Estimation of Amino Acids
19. Estimation of Serum Urea level
20. Estimation of Serum Uric Acid level
21. Estimation of Serum Creatinine level
22. Estimation of Macro elements-Na. K, Copper
23. Estimation of Micro elements – Iron, Zinc, Copper
24. Vitamin - C saturation test
25. Estimation of RNA in terms of Ribose sugar
26. Estimation of DNA in terms of deoxy-ribose sugar

Reference Books:

1. Brutis & Ashwood W.B. (Ed.). Tietz Textbook of Clinical Chemistry, Saunders Company
2. Keith Wilson & John Walker (Ed.) Principles & Techniques of Practical Biochemistry, Cambridge University, Press.
3. Varley's Practical Clinical Biochemistry Vol. I & II.

Fundamentals of Computer
MRM-154

L T/S/D/ P
0 0 1
[Total 40 Hrs.]

Course Contents:

1. Basic computer organization functionally computer codes computer classification Boolean algebra, primary storage, secondary storage devices, input-output device, computer software, computer languages, operating system, business data processing concepts, data communication and networks and advances.
2. Planning the computer program, algorithm, flowcharts and decision tables.
3. Writing simple programs in 'C', Numeric constants and variables. Arithmetic Expressions, Input & Output in 'C' Programs, conditional statements, implementing loops in programs, arrays, logical expressions and control statements such as switch, break and continue functions, processing character strings, files in 'C'.
4. MS Office (Word, Excel, Power Point), Basic Database concept and classification, operations performed on database, using MS Access. Internet Features.
5. Computer applications in Biochemistry and clinical studies.

Reference Books:

1. Sinha, R.K. Computer Fundamentals, BPB Publications
2. Raja Raman, V, Computer Programming in 'C', PHI Publication
3. Hunt N & Shelley J., Computers and Common Sense, PHI Publication

Year-II
General Microbiology and Immunology
MMMB - 201

L T/S/D/ P
3 3 0
[Total 240 Hrs.]

Unit - I

History of Microbiology

Principles, mechanisms of different types of microscopes and their uses sterilization and disinfection.
Morphology of bacteria, Bacterial metabolism, Bacterial taxonomy and classification.

Unit – II

Growth and nutrition of bacteria and method of cultivation

Isolation and identification of bacteria,

Bacterial genetics and variation,

Normal bacteria flora, zoonoses, epidemiology and transmission

Bacteriological examination of water, food, air and milk, Antimicrobial chemotherapy.

Care, management, method of inoculation and uses of experimental laboratory animals.

Unit – III

Anatomy, development and functions of immune system

Host and parasite relationship

Biology of immune response

Microbial pathogenicity and host immune response

Infection and immunity

Unit – IV

Antigen and antibodies

Toxins, antitoxins

Complement

Antigen antibody reactions

Hypersensitivity

Vaccine and immunization

Unit – V

Immunodeficiency diseases

Autoimmunity, Immunological tolerance

Immunology of transplantation and malignancy

Immunohematology,

Laboratory immunological procedures

Reference Books:

1. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longman, India; 2009.
2. Collee J G Mackie and McCartney Practical Medical Microbiology 14th Ed. 1999.
3. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.
4. Collier, Leslie Topley and Wilson's Microbiology and microbial infections Vol 1,2,3,4,5,6,7:9th Ed.
5. Koneman EW, Allen SD, Schreckenbach PC, Winn WC (Eds): Atlas and Text Book of Diagnostic Microbiology, 4th Ed. J B Lippincott, Philadelphia, 1992.
6. Murray PR, Baron EJ, Pfaller MA, Tenover PC and Tenover RH (Eds): Manual of Clinical Microbiology 6th Ed. American Society for Microbiology, Washington, DC 2005.

7. Parija SC, Text Book of Practical Microbiology, 1st Ed., 2007 Ahuja Publishing House, New Delhi, India
8. Woods GL, Washington JA: The Clinician and the Microbiology Laboratory, Mandell
9. GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Disease 4th Ed. Churchill Livingstone, New York, 2002.

Systemic Bacteriology

MMMMB - 202

L T/S/D/ P
3 3 0
[Total 240 Hrs.]

Course Contents:

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:

Unit - I

Gram Positive Cocci: Staphylococcus, Streptococcus, Pneumococcus, Gram Negative Cocci: Neisseria

Unit - II

Gram Positive Bacilli: Corynebacterium, Bacillus, Clostridium, Non-sporing Anaerobes

Unit - III

Gram Negative Bacilli: Enterobacteriaceae, Vibrio, Pseudomonas, Actinobacter, Yersinia, Pasteurella, Francisella, Haemophilus, Bordetella, Brucella

Unit - IV

Mycobacterium: Mycobacterium tuberculosis, A typical Mycobacterium, Mycobacterium leprae

Unit - V

Spirochaetes, Mycoplasma, Actinomycetes, Helicobacter, Campylobacter and other miscellaneous bacteria, Rickettsia, Chlamydia. Immunology of bacterial infections.

Reference Books:

1. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longman, India; 2009.
2. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003.
3. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.
4. Collier, Leslie Topley and Wilson's Microbiology and microbial infections Vol 1,2,3,4,5,6,7:9th Ed.
5. Koneman EW, Allen SD, Schreckenbach PC, Winn WC (Eds): Atlas and Text Book of Diagnostic Microbiology, 4th Ed. J B Lippincott, Philadelphia, 1992.
6. Murray PR, Baron EJ, Tenover PC and Tenover RH (Eds): Manual of Clinical Microbiology 6th Ed. American Society for Microbiology, Washington, DC 2005.
7. Parija SC, Text Book of Medical Microbiology and Immunology, 1st Ed., Elsevier, 2009.
8. Woods GL, Washington JA: The Clinician and the Microbiology Laboratory, Mandell
9. GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Disease 4th Ed. Churchill Livingstone, New York, 2002.

Teaching Methodology

MTM - 203

L T/S/D/ P
1 1 0
[Total 80 Hrs.]

Course Contents:

1. Challenges for teachers in Medical Education
2. Teaching strategies
 - Lecture method
 - Small group teaching
 - Inquiry and problem solving methods
 - Case study Team project
 - Presentation
 - Seminar
 - Field visit
 - Simulation
 - Computer based instructions
 - Bed side learning
 - One to one teaching
 - Self directed teaching
3. Preparation of lesson
4. Selection of teaching methods
5. Identification and review of literature
6. Identification of teaching resources
7. Developing teaching aids for instructional activities that link research and theory to practice
8. Content development: Key element of curriculum design and evaluation
9. Implementation and monitoring of curriculum transaction and student's evaluation
10. Student feedback: designing and implementation
11. Research paper writing

Medical Microbiology Practical - I

MMMB - 254

L T/S/D/ P
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Course Contents:

- Microscopy - Handling and general maintenance. Care and operation of microscopes viz., Dark ground, Phase Contrast, Fluorescent microscope and Electron microscope.
- Sterilization and disinfection – Handling of main types of filters, preparation procedures for autoclaving, hot air oven.
- Operation and maintenance of autoclave, hot air oven, distillation plant, filters like Seitz and membrane and sterility tests.
- Washing and sterilization of glassware.
- Preparation of reagents – oxidase, kovac etc.
- Disposal of contaminated materials.
- Testing of disinfectants – Phenol coefficient test and its use.
- Staining procedure – Preparation of stains viz, Grams, Alberts, Capsules, Spores, Ziehl Neelsens etc. and performing of staining.
- Media preparation and Quality control.
- Aseptic practice in Lab and Safety precautions.
- Care and maintenance of common laboratory instruments.
- Collection and transportation of specimens for Microbiological investigations such as Blood, Urine, Throat swab, Rectal swab, Stool, Pus, OT specimens.
- Processing of samples, inoculation and interpretation.
- Preservation of bacteria.
- Preparation and pouring of media – Nutrient agar, Blood agar, Mac Conkey agar, Sugars, Kligler iron agar, Robertson's cooked meat.
- Collection and preservation of serum.
- Preparation of antigens.
- Preparation of adjuvants and rising of antisera in animals.
- Tube agglutination tests: Widal test, Weil Felix test.
- Slide agglutination: RA, CRP, ASO.
- Precipitation tests: VDRL, RPR.
- Performance of common serological tests.
 - Precipitation tests (including immunodiffusion tests)
 - Agglutination tests
 - Immuno electrophoresis
 - Immunodiffusion and CIEP
 - Radial immune-diffusion
 - ELISA
 - CD4, CD8 counts
- Immunofluorescence

Reference Books:

1. Collee J G Mackie and McCartney Practical Medical Microbiology 14th Ed. 1999.

2. Koneman EW, Allen SD, Schreckenber PC, Winn WC (Ads): Atlas and Text Book of Diagnostic Microbiology, 4th Ed. J B Lippincott, Philadelphia, 1992.
3. Mackie & Mc Cartney Practical Medical Microbiology JG College et al London, Churchil Livingstone.
4. Murray PR, Baron EJ, Pfaller MA, Tenover PC and Tenover PC (Eds): Manual of Clinical Microbiology 6th Ed. American Society for Microbiology, Washington, DC 2005.
5. Manual of Clinical Laboratory Immunology Noel R Rose et al Washington D.C., American Society for Microbiology.
6. Fundamental Immunology William E Paul Newyork, Raven Press.
7. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longsman, India; 2009.
8. Roitt Ivan M, Immunology 10th edition Blackwell Science 1994.
9. Stites Immunology 10th Edn., Mc Greew Hill 2001.

Year-III
Virology, Mycology & Parasitology
MMMB - 301

L T/S/D/ P
3 1 0
[Total 160 Hrs.]

Unit - I

General properties, cultivation, interferon and interference of virus, Clinical importance and laboratory diagnosis of infections with the following viruses: Pox, Herpes, Adeno, Picorna, Myxo, Arbo, Rhabdo, Hepatitis, Miscellaneous viruses.

Unit - II

Bacteriophages, Oncogenic viruses, Slow viruses and Prion diseases
Human Immunodeficiency Virus (HIV)

Unit - III

Immunology of viral infections
Diagnosis of viral infections (Cell culture, serology and molecular methods of diagnosis)

Unit - IV

Morphology, cultivation, epidemiology, transmission, clinical importance and lab diagnosis of following fungus

- Yeasts
- Yeast like
- Moulds
- Dimorphic fungus

Superficial, subcutaneous and deep fungal infections, Opportunistic fungal infection, laboratory contaminating fungus and mycotoxins

Immunology of mycotic infections

Unit - V

Taxonomy and classification of medically important parasites
Transmission, clinical features and prophylaxis of medically important

- Protozoa
- Cestodes
- Trematodes
- Nematodes

Immunology of parasitic diseases

Laboratory diagnosis of parasitic infections

Reference Books:

1. Clinical Virology Douglas D. Richman Newyork, Churchill Livingstone
2. Field Virology Vol. I and Vol. 2 Bernard N Fields at al Philadelphia, Lippincott-Ramen
3. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longsman, India; 2009.
4. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003.
5. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.
6. Collier, Leslie Topley and Wilson's Microbiology and microbial infections Vol 1,2,3,4,5,6,7: 9th Ed.
7. Collee J G Mackie and McCartney Practical Medical Microbiology 14th Ed. 1999.
8. Jagdish Chander, Textbook of Medical Mycology, 3rd Edition, Mehta Publishers, 2002.
9. N. C. Dey, HLE Grueber, T.K.Dey Medical Mycology, New Central Book Agency, 2006.
10. Anaissie Elias J.Clinical Mycology, Churchill Livingstone 2003.

11. GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Disease 4th Ed. Churchill Livingstone, New York, 2002.
12. Parija SC, Text Book of Practical Parasitology, 3rd Ed. 2008. All India Publishers and Distributors, New Delhi, India
13. K.D.Chatterjee, Parasitology Protozoology & Helminthology, CBS Publishers & Distributors Pvt. Ltd.
14. Talib, Textbook of Medical Parasitology, 2006 Jaypee Brothers Medical Publishers (P) Ltd. (2006)

Clinical Microbiology

MMMB - 302

L T/S/D/ P
2 1 0
[Total 120 Hrs.]

Unit - I

Hospital infections
Quality control in microbiology
Laboratory control of antimicrobial therapy
Collection of specimens for bacteriological investigations

Unit - II

Methods of culture, techniques and organisms encountered in: CSF, blood culture, sputum, pus, urine, stool, UTI, endocarditis, Bone and joint infections

Unit - III

Bacteriological investigation in:

- PUO
- Tuberculosis
- Leprosy
- Meningitis
- Eye infections

Unit - IV

Causative agents and investigations in cases of:

- Food poisoning, gastroenteritis, diarrhea
- Respiratory tract infections
- Sexually transmitted diseases
- Dental infections

Unit – V

Blood transfusion and associated infections
Immunoprophylaxis against diseases
Rapid diagnostic methods in microbiology

Reference Books:

1. Murray PR, Baron EJ, Pfaller MA, Tenover PC and Tenover FC (Eds): Manual of Clinical Microbiology 6th Ed. American Society for Microbiology, Washington, DC 2005.
2. Woods GL, Washington JA: The Clinician and the Microbiology Laboratory, Mandell
3. GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Disease 4th Ed. Churchill Livingstone, New York, 2002.
4. E. Joan Stokes, M.W.D. Wren, G.L. Ridgway, Clinical Microbiology 7th Ed. Hodder Arnold Publishers 7th Edition.
5. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longman, India; 2009.
6. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003.
7. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.
8. Collier, Leslie Topley and Wilson's Microbiology and microbial infections Vol 1,2,3,4,5,6,7:9th Ed.

Molecular Biology and Recent Advances in Microbiology

MMMMB - 303

L T/S/D/ P
1 1 0
[Total 80 Hrs.]

Unit - I

Basic knowledge of the following:

- Bacteriophage typing
- Recombinant DNA technology
- Southern, Northern and Western blotting

Unit - II

DNA amplification techniques, diagnostic PCR, different methods of PCR product detection

Unit - III

Genotyping of microbes and viruses

Unit - IV

Emerging infectious diseases

Bioterrorism

Unit - V

Quality control in Microbiology laboratory

Recent Advances in Microbiology, Journal club

Reference Books:

1. David H. Persing Molecular Microbiology: Diagnostic Principles and Practice, Second Edition, ASM Press; 2nd Edition.
2. Brenda A. Wilson, Abigail A. Salvers Author, Dixie D. Whitt MalcolmE. Winkler. Bacteria Pathogenesis: A Molecular Approach Amer Society for Microbiology; Revised Edition.
3. Lela Buckingham, Maribeth L. Flaws, Molecular Diagnostics: Fundaments, Methods and Clinical Applications F.A. Davis Company; 1st Edition.

Journal:

1. Journal of Medical Microbiology, Lippincott-Raven Publishers, Pathological Society of Great Britain & Ireland 1998.
2. Clinical infectious Diseases. Pub: The University of Chicago Press, Chicago Illinois 60637, 1998.
3. Clinical Microbiology reviews, pub: the American Society for Microbiology.
4. Microbiology and Molecular Biology Reviews (MMBR). Pub: American Society for Microbiology, 1999.
5. Journal of Clinical Microbiology (JCM); Pub: American Society for Microbiology, 1999.
6. The Journal of Infectious Diseases Pub: The University of Chicago Press, 1998.
7. Journal of Communicable Diseases, Pub: The Indian Society for Malaria and other communicable disease, 1999.
8. Infectious Disease Clinics of North America, Pub: W.B. Saunde Company, A Division of Harcourt Brace & Company, 1999.
9. Indian Journal of Medical Microbiology, Pub.: Indian Associates of Medical Microbiologists, 1999.
10. The Indian Journal of Medical Research Pub.: Indian Council of Medical Research, New Delhi, 1999.
11. Annual Review of Microbiology, Pub.: Annual Reviews Inc. Palo Alto California, USA 1997.

Medical Microbiology Practical - II

MMMB - 354

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0 0 24

Course Contents:

Virology

- Serodiagnosis of viral infections.
- Polymerase chain reaction (PCR) for viral nucleic acid detection (observation).
- Haemagglutination (HA) and Haemagglutination inhibition tests (HAI).
- ELISA
- Egg inoculation techniques.

Mycology

- KOH and LPCB preparations
- Staining techniques
- Culture of fungi
- Slide culture
- Basic identification techniques

Parasitology

- Examination of stool for parasites, including concentration techniques.
- Examination of blood for parasites and microfilaria.
- Examination of bone marrow for LD bodies.
- Examination of sputum/ aspirate/ tissue for parasites – trophozoites, larvae etc.

Clinical Microbiology

- Surveillance sampling
- O.T. Sterility
- Bacteriological examination of water, milk, food and air.
- Processing and clinical samples for pathogens.

Reference Books:

1. Clinical Virology Douglas D. Richman Newyork, Churchill Livingstone
2. Field Virology Vol. I and Vol. 2 Bernard N Fields at al Philadelphia, Lippincott-Ramen
3. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longsman, India; 2009.
4. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003.
5. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.
6. Collier, Leslie Topley and Wilson's Microbiology and microbial infections Vol 1,2,3,4,5,6,7: 9th Ed.
7. Collee J G Mackie and McCartney Practical Medical Microbiology 14th Ed. 1999.
8. Jagdish Chander, Textbook of Medical Mycology, 3rd Edition, Mehta Publishers, 2002.
9. N. C. Dey, HLE Grueber, T.K.Dey Medical Mycology, New Central Book Agency, 2006.
10. Amaissie Elias J.Clinical Mycology, Churchill Livingstone 2003.
11. GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Disease 4th Ed. Churchill Livingstone, New York, 2002.
12. Parija SC, Text Book of Practical Parasitology, 3rd Ed. 2008. All India Publishers and Distributors, New Delhi, India
13. K.D.Chatterjee, Parasitology Protozoology & Helminthology, CBS Publishers & Distributors Pvt. Ltd.
14. Talib, Textbook of Medical Parasitology, 2006 Jaypee Brothers Medical Publishers (P) Ltd. (2006)

Dissertation

MMMB-355

Course Contents:

Course MMMB-355 consists of dissertation. Students are allocated individually to internal, external faculty or research scientist. The format for dissertation is similar to the thesis style incorporating introduction, materials & methods, results, discussion and bibliography. A candidate will select a topic on current researches in the field of Medical Microbiology at the beginning of Year III. A candidate has to get approved the short synopsis and title to the dissertation/ research project within the first six months. The research project work has to be completed within the last six months of Year III. The dissertation will be submitted in a type written and bound form and a copy of each dissertation is submitted to the department for permanent record towards the end of the Year III.