Operational Manual of MBBS Curriculum 2021

Subject:
Microbiology



Developed By
Research, Publication & Curriculum Development Wing
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Preface

Curriculum is not the sole determinant of the outcome, it is very important as it guides the faculty in preparing their instruction and tells the students what knowledge, skills and attitude they are to develop through the teaching learning process. The ultimate indicators of assessing curriculum in medical education is the quality of health services provided by its graduates with required competencies.

To implement that curriculum all concerned such as teachers, students, deans, administrators, policymakers to be more dynamic, should run smoothly with the time & appropriate pace. This operational manual to implement the curriculum will act as a catalyst, will give momentum in implementing the curriculum. This operational manual will help to implement the curriculum uniformly, effectively, efficiently & smoothly at all the govt. & non govt. medical colleges under all the universities all over the country.

I would like to mention that the curriculum planning process is continuous, dynamic and never-ending as it is not static. If it is to serve best, the needs of the individual student, teacher, educational institution and the community to whom we are ultimately accountable, must be assessed. Before that assessment we should seriously concentrate for the better implementation of the curriculum. Implementation in regards to teaching-learning, integrated teaching, teaching on generic topics on medical humanities, clinical teaching, ambulatory care/OPD based teaching and acquiring identified competencies of each subject. There is a proverb that "Assessment drives Learning". To ensure students' learning formative and summative assessments should be taken care of properly. This operational manual on developed MBBS curriculum 2021 will play a vital role in those regards.

I congratulate all who were involved in developing this operational manual implement MBBS curriculum 2021, particularly the Director (Research, Publication & Curriculum Development), DGME, focal persons, teachers, members of the concerned society, seniors, juniors, legendary teachers & heads of the departments of Microbiology Different Govt. and non Govt. medical colleges. Special appreciation to the Deans, Faculty Medicine of different medical Universities who were requesting to develop this operational manual and will take lead to implement this operational manual. They contributed a lot to complete this activity, a commendable job and deserve special appreciation.

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Acknowledgement

It is easier to change a graveyard than to change a curriculum. Yet then time & society demand for the change of the curriculum. In such a situation MBBS curriculum 2012 was reviewed and updated in 2021 to fulfill the need of the stakeholders. The updated MBBS curriculum 2021 was started to implement from the August 2022. For implementation of that reviewed & updated curriculum operational manual is also the demand of the present time.

For better implementation of integrated teaching, teaching as per identified competencies, teaching on generic topics on medical humanities, planning, designing, constructing assessment tools for formative and summative assessment, this operational manual will act as the road map.

Research, Publication & Curriculum Development (RPCD) of DGME in association with heads of the departments of Microbiology of Phase III of different Govt. & non govt. medical colleges & Deans Offices, DGME, ME, FWD, BM&DC took the initiative to develop the operational manual. Concerned stakeholders meetings were held through active participation of different professional groups, focal persons, faculty members, heads of the department of Microbiology of Phase III of different govt. & non govt medical colleges of Bangladesh.

I hope this operational manual will help to serve as guiding principle for the students and as well as for faculty members.

Last but not least, I would like to extend my deep gratefulness to the Director General, DGME, ADG(ME) & ADG(Admin), DGME, all Directors of DGME, faculty members of Microbiology of different Govt & non Govt medical colleges and others who shared their expertise, insights, contributed and worked hard to develop this precious document. Efforts given by the focal persons providing their valuable time, opinions & efforts during the development process of this operational manual for Phase III of MBBS curriculum are duly acknowledged.

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Background and Rationale

Curriculum is a study track along which students travel throughout the course of study. In this journey teachers play an important role in regards to teaching learning and assessment. To produce need based, community oriented, competent graduate medical doctors, MBBS curriculum was reviewed and updated in 2021. The updated MBBS curriculum 2021 was started to implement from the August 2022. For better implementation of MBBS curriculum 2021 effectively, uniformly & competently an operational manual of each subject was felt by each of the Faculty of Medicine of all universities. In this regard Director (Research, Publication & Curriculum Development (RPCD) of Directorate General of Medical Education (DGME) has taken the time felt initiative under the gradience of Director General, DGME. Thanks to DG, DGME, Director (RPCD), DGME, focal persons, members of the concerned society, senior, junior and legendary teachers and heads of the department of concerned subject of different government & non government medical colleges to finalise this operational manual. This operational manual will work as the skeleton of the curriculum in a comprehensive manner. This user-friendly document will serve the purposes of the faculty to ensure better teaching-learning and assessment to produce knowledge competent and compassionate physicians in Bangladesh.

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Overview and Assessment of Phase- III: Implementing MBBS Curriculum 2021

Common Information and Activities of Phase III

1.1. Basic information

i. The course is offered in 2 terms (1st and 2nd) and total duration of Phase III is 12 months including Third professional MBBS examination. The course is expected to start on first day of July/January.

ii. Third professional examination to be started on first working day of May and November.

iii. Time for integrated teaching, examination, and preparatory leave of formative and summative assessment is common for all subjects of the Phase III.

iv. Assessment:
   a) There will be in-course (item/ term) and end-course (professional) assessment for the students.
   b) Formative assessment will be done through results of term final examination and class attendance.

1.2. Distribution of teaching-learning hours/days in Phase III

Lecture	Tutorial	Practical	Total Teaching hours	Integrated teaching hour for Phase III	Term final Exam		3rd Professional	
					Preparatory leave	Exam time	Preparatory leave	Exam time
100 hrs	45 hrs	45 hrs	190 hrs	15 hours	10 days	15 days	15 days	15 days
Time for integrated teaching, examination, preparatory leave of formative & summative assessment is common for all subjects of the phase								

1.3. Common Classes (Generic Topics)-3 hours

Following classes shall be conducted as common within 3rd phase under supervision of Phase-III coordination committee in collaboration with medical education unit (MEU).
These classes will be held from January/July of each session.
The duration of each class will be 1 (one) hour and will be completed by separate three classes within the time period of two terms.
The sessions will be under the guidance of Principal & Vice-principal, coordinated by concerned departments and sessions will be delivered by concerned experts of the topics.
Attending this session will be mandatory and will be reflected in the formative & summative assessment of Phase-III.

Topic	Duration
Integrity of medical professionals	1 hr - Pathology
Accountability of medical professionals	1 hr - Microbiology
Aspects of a good doctor	1 hr - Community Medicine

1.4 Duration of each term (4 months)

If 2nd Prof is on November:

i. Term I: January to May
First Term Final Exam: 1st& 2nd week of May

ii. Term II: May to Sepember
Second Term Final Exam: 3rd & 4thweek of September

If 2nd Prof is on May:

i. Term I: July to November
First Term Final Exam: 1st& 2nd week of November

ii. Term II: November to March
Second Term Final Exam: 3rd & 4thweek of March

1.4 Cards of Phase III

There will be 2 (two) Cards

1. **Item card 1:** General Bacteriology, Systemic Bacteriology, Immunology
2. **Item card 2:** Parasitology, Virology, Mycology and Clinical Microbiology

1.5 In-course assessment

In Term final examination (both regular & supplementary) will be written, oral & practical and it will be organized by Phase III committee.

1.6 Pre-requisite for appearing the examination

- Students must complete all items of the cards.
- At least 75% attendance of generic, integrated teaching and general classes
- Completion of assignment on integrated teaching.

1.7 Leave

Following leaves will be granted to the students:

1.7.1 **Pre-term:** Total 10 days, 5 days before each term (term I, II).

1.7.2 **Preparatory leave for third Professional exam:** Total fifteen (15) days preparatory leave will be granted to students before Third Professional Examination.

1.8 Third Professional Examination:

Marks distribution of Assessment of Microbiology:

Total marks – 300

- Written= 100 (MCQ 20+SAQ & SEQ 70+formative Assessment Marks 10)
- MCQ=20 (Multiple T-F 10 + SBA 10)
- SAQ + SEQ = 70

- Structured oral examination (SOE)=100
- Practical =100 (OSPE-50 +Traditional- 40+ Practical note book-05+ Integrated teaching-05).

[Students will prepare a short case report after each integrated teaching and will submit to all the departments of respective phase. Total 9 classes of integrated teaching occur; students will submit 9 such reports.]

Formative marks

Academic performances of the students must be properly documented. Calculation of Formative marks will be in the following way:

Total marks: Ten (10) = Five (05) from 2 term exams
Five (05) from attendances

Term Examination marks: 10 marks will be taken from the total marks obtained in two terms examination as follows (Average marks (10/2) will be the 5 marks for two term exams).

If a student obtained

- 80% and above marks he/she will get 5 out of 5 in each term
- 75% to less than 80% marks he/she will get 4.5 out of 5 in each term
- 70% to less than 75%marks he/she will get 4 out of 5 in each term
- 65% to less than 70% marks he/she will get 3.5 out of 5 in each term
- 60% to less than 65% marks he/she will get 3 out of 5 in each term

Attendance: 05 marks

- For attendance of general classes : 3 marks
- For attendance of integrated teaching : 1 mark
- For attendance of Generic topics : 1 mark

Calculation of marks for attendance of general classes and integrated teaching

a) For class attendance:

- ≥ 90% : 3 marks
- 80% to 89% : 2 marks
- 75% to 79% : 1 mark
- < 75% : Non eligible

b) For Integrated Teaching attendance:

- ≥ 90% : 1 mark
- 75% to 89% : 0.5 mark
- < 75% : Non eligible

Calculation of marks for attendance of generic topics

- Mandatory: 1 mark

Calculation of lowest marks of formative assessment for an eligible student of 3rd professional examination:

From 2 term examinations must obtained: 3 marks From all attendance must obtained: 3 marks

Total: 3+3= 6 marks

Minimum marks to become eligible to appear in Third professional examination is 6. ***Without scoring these 6 marks, students will not be eligible for Third professional examination.*

1.9 Pre-requisite for appearing in the Third professional examination:

i) Students must pass all the term examinations. If a student fails in a term

examination, he/she will have to pass the supplementary term examination.

ii) Certificate from the respective Head of Departments regarding students' attendance which must be at least 75% in all classes (lecture, practical, and tutorial, including generic topics and integrated teaching)

1.10 Summative Examination

1.10.1 10 marks of formative assessment of each subject will be added to the written marks of Third professional examination.

1.10.2 For MCQ (MT/F + SBA) of each paper, 20% marks are allocated. There will be separate answer script for MCQ part of examination. Total number of MCQ (MT/F+ SBA) will be 20 for each paper.

1.10.3 For SAQ and SEQ of each paper, 70% marks are allocated.

1.10.4 Oral part of examination will be structured.

1.10.5 OSPE will be used for assessing skills/ competencies

1.10.6 Pass marks in examinations is 60% of total marks. Student will have to pass in written, oral and practical examination separately.

1.10.7 The results will be published as per following GPA system with the provision of reflection of marks in the academic transcript.

Numerical Grade	**Letter Grade**	**Grade Point**
80% and above	A+	5.00
75% to less than 80%	A	4.50
70% to less than 75%	A-	4.00
65% to less than 70%	B+	3.50
60% to less than 65%	B	3.00
less than 60%	F	0.00

1.11 Examination:

Distribution of marks of Third Professional Examination

Subjects	**Written Exam marks**	**Struct86 u red Oral Exam marks**	**Practical Exam marks**	**Formative Exam marks**	**Total Marks**
Community Medicine & Public Health	90	100	100	10	300
Pathology	90	100	100	10	300
Microbiology	**90**	**100**	**100**	**10**	**300**
Total					900

1.12. Question setting:

Total number of paper setters must be 3.

Paper setters for both SAQ, SEQ and MCQ (MT/F 50%+ SBA 50%)

Third Professional MBBS Microbiology Written Examination:
Levels of cognitive domain to be addressed:

- Recall- 50%
- Understanding- 35%
- Application- 15%

Examples:

Single best answer:
A patient came to you with history of fever and cough for 3 month.You suspect a case of pulmoary tuberculosis. What is the more rapid and sensitive test for the diagnosis of pulmonay tuberculosis?
a. Sputum AFB
b.Sputum Culture
c.Tuberculin test
d.Gene expert
e.Interferon gama release assay(IGRA)

Key-d

MTF (Multiple true false) type MCQ

Parasites cause autoinfection are
a. *Taenia saginata*
b. *Strongyloides stercoralis*
c. *Enterobius vermicularis*
d. *Schistosoma haematobium*
e. *Ancylostoma duodenale*

Checklist: a. F, b. T, c.T, d.F, e. F
SAQ (Short Answer type Question)

Q. Classify Spirochetes with the diseases they produce. Mention the different stages of syphilis with characteristic lesion 2+2

SEQ: (Single essay type)
Q. Describe pathogenesis of Pulmonary Tuberculosis 7

PBQ (Problem based Question)
A 15-year-old boy develop fever for 7 days with rashes on his extremities and trunk. Complete blood count revealed thrombocytopenia with high hematocrit value.
1+.5+.5+.5
a. Name the probable viral cause for above condition.
b. List the serological test for diagnosis.
c. State the complications caused by this virus in this condition
d. Name causative vector for the disease.

1.13 Moderation

Total number of moderators will be two.
Moderation may be done in 02 consecutive days
*Checklist of SEQ & PBQ must be supplied with the answer script to the examiner

Microbiology

Departmental Objectives

Undergraduate medical students after completing the course on Microbiology will become well versed about the behavior and etiology of microbial diseases, their pathogenesis, immunological responses involved and some important clinical illnesses that would enable them to plan and interpret necessary laboratory investigations for the diagnosis, treatment and prevention. The department will provide teaching-learning experiences to achieve the following learning objectives:

Knowledge

At the end of the course, students will be able to:

- describe and understand the morphology, antigenic structure, aetiopathogenesis of the diseases caused by microbes such as bacteria, virus, parasites and fungi and the diseases caused by them commonly prevalent in Bangladesh
- explain the host-parasite relationship, normal flora of the body, pathogens and opportunistic pathogens
- understand the principles and applications of immunology involved in the pathogenesis, diagnosis and prevention of microbial and immunological diseases.
- understand hospital acquired infection and its prevention
- understand the emerging and re-emerging microbial diseases in Bangladesh and their diagnosis, control and prevention
- understand antibiotic resistant pattern and selection of appropriate antibiotics and its rational use.
- understand the antimicrobial resistance and containment of antimicrobial resistance.
- understand infection prevention and control in the hospital and outside.
- understand biosafety and biosecurity measures particularly in the laboratory.
- understand about the medical wastes disposal system.

Skill:

Students will be able to:

- plan necessary laboratory investigations selecting appropriate clinical samples at the right time, using the right method of their collection and interpret the results of these laboratory investigations to arrive at laboratory diagnosis of microbial and immunological diseases.
- carryout media preparation, bacterial culture and antimicrobial sensitivity tests.
- perform simple laboratory tests available in Upazila Health Complex.
- Interpret the results of tests and can treat the patients accordingly.
- carry out the techniques of asepsis, antisepsis and sterilization in day to day procedures.
- under take universal precautions in laboratory and clinical practices.

Attitude:

Students will be able to:

- demonstrate the attitude for further learning, research and continuing medical education for improvement of efficiency and skill in the subject.
- demonstrate good behavior/dealings with the patients, attendances, relatives and other personnel involved in the medical services.

List of Competencies to acquire:

After completion of graduation, an MBBS doctor is expected to achieve the following competency in the area of Microbiology. An MBBS graduate will be competent to:

1. perceive the etio-pathogenesis of diseases caused by microbes commonly prevalent in Bangladesh
2. proceed for diagnosing a case caused by microbes in terms of :

a. appropriate specimens necessary for diagnosis
b. timing of specimen collection and appropriate transport
c. appropriate diagnostic tests to advise

3. interpret the values of tests and the test results.
4. identify the basic problems of hospital acquired infection and its prevention
5. select appropriate antimicrobial agents for the treatment of common microbial diseases
6. use of antibiotics rationally
7. control infectious diseases in the hospital and outside.
8. manage patients having infectious diseases.
9. know biosafety, biosecurity and biohazards in medical practices.
10. know how to dispose off medical wastes.
11. know antimicrobial resistance and containment of antimicrobial resistance.
12. know and practice antimicrobial stewardship.
13. provide Counseling regarding vaccination against common diseases and chemoprophylaxis
14. appraise the need for research on common microbial diseases encountered in medical practice

Note: Microbial diseases include: bacteria, parasites, viruses and fungi.

15. Prepare disinfectants at their own for different purposes.
16. Practice personal protection by hand hygiene, wearing PPE and keeping hospital environment clean from infectious diseases (by practicing universal precautions).

Microbiology is now comprised of 6 subjects such as 1) Bacteriology, 2) Parasitology, 3) Virology,

4) Immunology, 5) Mycology 6) and molecular biology. All these are taught as an independent subject in the developed world. The medical students who are placed in the inpatients and outpatient departments have to know the clinical features, diagnosis of infectious diseases. They have to know the immunopathophysiology of the diseases and treatment (antibiotics, antiviral, anti-parasitic, anti- fungal and immunotherapies and biological therapy). In addition students have to observe the outcome of treatment and can change the treatment accordingly. This is the best way of integrated teaching which are being practiced. Moreover, antibiotic resistance containment program, infection prevention and control program and antibiotic stewardship program are introduced which are best understood while learning in wards with patents. Covid-19 has taught us the importance of emerging infectious diseases.

Distribution of teaching - learning hours

Lecture	Tutorial	Practical	Total Teaching hours	Integrated teaching hour for Phase II	Formative Exam		Summative exam	
					Preparatory leave	Exam time	Preparatory leave	Exam time
100 hrs	45 hrs	45 hrs	190 hrs	15 hours	10 days	15 days	15days	15 days
Time for integrated teaching, examination, preparatory leave of formative & summative assessment is common for all subjects of the phase								
Related behavioral, professional & ethical issues will be discussed in all teaching learning sessions								

Teaching-learning methods, teaching aids and evaluation

Teaching Methods				Teaching aids	In course evaluation
Large group	Small group	Self learning	Others (integrated teaching)		
Lecture	Tutorial Practical	Assignment, Self study	Both vertical and horizontal integration	Computer and Multimedia Bino-ocular and teaching microscope Microscope with projection (magnified) system Fixed Learning Module (FLM) Tape slide Video Coloured charts Hand out White board /chalk board	• Item Examination • Term final (written, oral+ practical)

Related Equipments:

Hot air oven, Bunsen burner, slide & cover slip, pipette, Micro pipette, Gram staining, Acid fast staining and other staining materials, different reagent, Bino-ocular and teaching microscope, Microscope with projection, (magnified) system, Centrifuge machine, Colorimeter, Spectrophotometer, Incubator, Balance, Water bath, Cell Counter, Autoclave, Computer, ElISA reader, Petri dish, automated blood culture machine, gene expert, PCR machine etc.

Learning Objectives and course content in Microbiology

General Bacteriology

Learning Objectives	Contents	Teaching hours
Students will be able to : • describe historical background and outline the scope and importance of Microbiology as a whole and particularly in medical science. • describe the prokaryotic and eukaryotic cells. • describe different structures of bacterial cell and their functions. • classify bacteria based on different aspects including staining and morphology • explain the theoretical basis of staining and clinical significance of certain staining including Gram stain, Z-N stain and Albert stain.	**CORE:** **Introduction of Microbiology:** • Brief historical background • Branches of Microbiology • Legends in the field of Microbiology • Koch's postulate, molecular Koch's postulate, the limitations and new adjucts. • Concept of medical biotechnology in relation to Microbiology • Importance and scope of microbiology in medical science. **Bacterial cell:** • Prokaryotic and Eukaryotic cells with examples • Different structures of bacterial cell and their functions. • Brief description of cell wall of Gram positive and Gram negative bacteria. • Spores structure and clinical importance. • L-forms, protoplast, spheroplast, Clinical importance of L-form. **Bacterial classification and staining:** • Nomenclature of Bacteria. • Classification by staining, morphology, Oxygen requirement, temperature requirement. • Staining- Theoretical basis and clinical significance of Gram and Z-N stain, Albert stain, Auramin-Rodamin stain • Practical on staining: Gram, Z-N staining and Albert stain.	L–1 L –2, T – 2, L –2, T – 2,

NB: L = Lecture. T= Tutorial. P= Practical.

General Bacteriology

Learning Objectives	Contents	Teaching hours
Students will be able to: • describe the general requirements related to microbial growth • classify bacteriological media and describe their uses • define sterilization, disinfection and antisepsis • describe certain methods of sterilization and disinfection, and outline their application • select appropriate method of sterilization in their clinical practice. • explain the mechanism of action of certain anti-microbial agents and their resistance pattern. • select appropriate antimicrobial agents	**Nutrition and Cultivation of bacteria:** • Nutritional requirement for the growth of bacteria. • Growth curve: phases with clinical significance • Common bacteriological media: classification and uses. **Sterilization and Disinfection:** • Definition, classification and applications of sterilization, disinfection and antisepsis • Methods of sterilizations: details of autoclaving, hot air oven and chemical methods. • Sterilization of medical equipment and culture media. • Disinfection of body fluid spillage and equipment. • Preparation of disinfectants and their use. **Antimicrobial agents:** • Definition of antibiotics, antimicrobial agents, chemotherapeutics, bacteriostatic, bacteriocidal, synergism, antagonism, selective toxicity etc. • Classification of anti microbial agents • Mechanism of action on bacteria with examples • Drug resistance: origin, mechanism, transmission and prevention • Indication of combination of antibiotics in bacterial infection • Hazards of indiscriminate use of antibiotics • Defining MDR, XDR and PDR bacteria. • Definition and importance of ESBL, MBL, MRSA, VRSA, VRE. • Definition and importance of Biofilm.	L – 1, L – 2, T – 2, L –**3**, T-1,

Systemic Bacteriology

Student will be able to: • enumerate the common bacterial agents in Bangladesh: describe epidemiology, their morphology, classification and important cultural characteristics • mention their virulence factors and describe pathogenesis and brief clinical features and the diseases they produce. • describe the laboratory diagnosis: selection, collection, transportation and preservation of clinical samples, laboratory tests and their interpretation. • describe in short the management of infectious diseases. • list the important characteristics and diseases produced by bacteria	• Staphylococci: S. *aureus,* S. *epidermidis,* S. *saprophyticus*, Enterococcus(VRE), MRSA, VRSA. • Streptococci *:* Group A Streptococcus, Streptococcus agalactiae and Streptococcus *pneumonia* • Neissreia: N. *gonorrhoea,* N. *meningitides* • Corynebacterium *diphtheria* • Enterobacteriaceae: Classification: Salmonella, Shigella, Esch. *Coli* and other Enterobacteriaceae, definition and clinical significance of ESBL, MBL and NDM-producing bacteria. • Vibrio *cholera* • Helicobacter *pylori* • Mycobacterium: M. *tuberculosis,* Atypical mycrobacteria and M. *leprae*. MDR, XDR TB. • Anaerobic bacteria: Clostridium: Cl. *tetani,* Cl. *botulinum*, Cl. *Perfringens* and other anaerobic bacteria • Bacillus: B. Anthracis, B. Cereus, B. Subtilis.. • Spirochaetes: Treponemma *pallidum* • Important characteristics and diseases produced by: Rickettssia Haemophilus influenzae, Haemophilus *ducrey*, Mycoplasma, Chlamydia, , Nocardia, Actinomycetes species **Additional:** • Streptococcus Group D • Klebsiella, Proteus , Pseudomonas: Ps. *aeruginosa* , Aeromonas, Plesiomonas, • Campylobacter *jejuni* • Bacteroides species • Clostridium *deficille* • Listeria • Barkholderia • G. vaginalis • Probiotics	L –2, T - 1 L –2, T -2 L –1T - 1 L-1 L –**2**, T - 2 L –1, T - 1 L –1 L –**2**, T - **2** L –3, T - 1 L-1, T - 1 L-**2**, T - 2 L-**2**, T - **2**

Immunology

Learning Objectives	Contents	Teaching hrs
Students will be able to: • explain the importance of history and role of immunology in modern medicine • describe the basic components of immune system including classification • explain the normal defense mechanism • mention the disorders of the immune system • explain the immunological principles involved in different diagnostic tests • explain immunopathogenesis of SLE, RA, AHA, ABO incompetibility	**CORE:** **1. Introduction:** • Brief historical background • Basic concepts of immunity: Definition, classification, types and components with examples. **2. Immune system:** • Organs, cells and soluble components **3. Antigens and Immunogens:** • Terms and definitions: antigen, immunogen, hapten, epitope, paratope. Criteria of immunogenicity. **4. Major histocompatibility complex (MHC/ HLA):** • Terms and definitions, types and distribution, clinical and biological significance. **5. Immunoglobulins and Antibodies:** • Terms and definitions, classification, structure, biological properties and functions. • Monoclonal antibodies. **6. Complements:** • Terms and definitions, activation, biological functions and clinical significance, deficiency disorders. **7. Mechanisms of immune response :** • Antibody and cell mediated immune response. • Primary and secondary immune response **8. Hypersensitivity:** • Terms and definitions, classifications, mechanisms, clinical significance with examples. • Atopy, desensitization. • Tests for Type-I reaction: Patch test, RAST, serum IgE assay. **9. Transplantation and Tumour immunity:** • Terms and definitions, types and outline of prevention of graft rejection. • Tumour antigens, role in diagnosis and clinical significance. • Immunosurveillance **10. Tolerance and Autoimmunity:** • Definition and classification of tolerance • Terms and definitions, basic concepts and mechanism of development of autoimmuniy. **11. Immunodeficiency disorders and immunotherapy:** • Classification with examples **12. Agents of immunotherapy and biologics.** **13. Immunodiagnostic tests** • Terms and definitions, types and applications in diagnostic medicine • Agglutination, precipitation, ELISA, Western blot test, PCR and RT-PCR.	L-1 L-2, T-1 L-1 L-1 L-1, T-1, L-1 L -1 L – 2, T-1 L –2, T-1 L –1 L L-1, L-1,

Parasitology

Learning Objectives	Contents	Teaching hours
Students will be able to: • mention the important characteristics and epidemiology of common parasitic diseases • describe pathogenesis • explain major complications and laboratory diagnosis of common parasites in Bangladesh. • Know the mode of treatment of common parasitic diseases of Bangladesh.	**CORE:** **Introduction:** Introduction to parasitology, common parasitic diseases of Bangladesh, Terms and definitions, classifications of parasites according to habitat, Host: definition, classification with examples. **Intestinal, luminal and free living protozoa:** **Entamoeba:** • Classification • Geographical distribution, morphology, disease, clinical features, pathogenesis, laboratory diagnosis and treatment. • Extraintestinal amoebiasis. ***Giardia intestinalis* and *Trichomonas vaginalis*:** • Morphology, transmission, disease, clinical features, pathogenesis, laboratory diagnosis and treatment. • Acanthemoeba, Negleria, Balamuthia and Sappinia **Blood and Tissue Protozoa:** **Leishmania species:** Classification, morphology, disease production. **Leishmania *donovani* and PKDL*:*** • Geographical distribution morphology, lifecycle, disease, clinical features, pathogenesis laboratory diagnosis and treatment. • Cutaneous leishmaniasis: Causative agents, pathogenesis, lab diagnosis and management. • Mucocutaneous leishmaniasis(MCL).	L –2, T-1 L –**1**, T-1, L –1, L –2, T-1,

Parasitology

Learning Objectives	Contents	Teaching hrs
	Plasmodium species: Epidemiology, morphology, lifecycle, disease, clinical features, pathogenesis, complications, laboratory diagnosis, treatment and prevention. **Acanthemoeba , Negleria, Balamuthia and Sappinia Toxoplasma *gondii*, Crytosporidium, Balantidium *coli* Cestodes and Trematodes:** • Classify according to habitat with examples • Common characteristics of Cestodes, Trematodes and Nematodes. • Morphology, lifecycle, diseases, clinical features, pathogenesis, laboratory diagnosis of Taenia *saginata* and Taenia *solium*, T. asiatica. **Echinococcus: Different species** • Morphology, lifecycle, disease, clinical features, pathogenesis and laboratory diagnosis and treatment. **Intestinal Nematodes:** • Geographical distribution, morphology, lifecycle, disease, clinical features, pathogenesis, laboratory diagnosis of Ascaris *lumbricoides*, Hook worm, *Trichuris trichiura*, *Enterobious vermicularis*, *Strongyloides stercoralis.* • Larva migrans and larva currens. • Hyperinfection syndrome **Tissue nematodes: Classification, morphology and mode of transmission, diseases produced. Wuchareria bancrofti, Brugia malayi, B. timori** • Morphology, lifecycle, disease (classical and occult filariasis, tropical pulmonary eosinophilia), clinical features, pathogenesis, complications, laboratory diagnosis and treatment of filariasis. Periodicity of microfilaria. Provocative test. • Parasites associated with cancer.	L –2, T-2, L –1, L –1, L-3, T- **1**, L –**2**, T-1,

Learning Objectives	Contents	Teaching hours
	Additional: 1. Important characteristics and disease produced by: • Hymenolepes *nana*, Diphylobothrium *latum*, *Dipylidium* • Schistosoma • Trypanosoma • Loa *loa*, Onchosercous *volvulous* • D. medinansis • Fasiolopsis *buski*, Faciola *hepatica*: habitat, disease, clinical features, laboratory diagnosis and treatment. • Anisakis • Cyclospora, Cystoisospora, Sarcocystis • Trichinella	L –2, T-1

Virology

Learning Objectives	Contents	Teaching hours
Students will be able to: • differentiate the basic structure of virus from bacteria. • mention epidemiology, diseases, important clinical features, pathogenesis and laboratory diagnosis of common viral diseases • identify the appropriate measures for prevention. • Know the treatment of viral diseases	**CORE**: 1. **General virology:** • Introduction to virology, common viral diseases in Bangladesh. • Basic structure of virus • Outline of viral replication • Classification • Lab diagnosis of viral diseases • Antiviral agents 2. **Herpes viruses:** • Classification, important characteristics, diseases, important clinical features, transmission, pathogenesis, complications, laboratory diagnosis, treatment and prevention. • Latency and reactivation of Herpes viruses. **3. Orthomyxo and paramyxo viruses** • Important characteristics, diseases, important clinical features, transmission, pathogenesis, complications, laboratory diagnosis and prevention, management. 4. **Hepatitis viruses:** • Classification, important characteristics, diseases, transmission, pathogenesis, complications, laboratory diagnosis, prevention and management.	L –2, T-1 L –**2**, T-1 L –**2**, T-1 L –1, T-1
	5. **Polio virus** • Important characteristics, diseases, transmission, pathogenesis, laboratory diagnosis and prevention • Merits and demerits of oral and injectable polio vaccine 6. **Rabies virus:** • Important characteristics, diseases, transmission, pathogenesis, laboratory diagnosis and prevention and treatment, merits and demerits of different types of vaccines 7. **Rota virus:** • Diseases, transmission, pathogenesis, laboratory diagnosis, prevention and	L –1 L –1 L –1,

	treatment 8. **HIV:** • Classification, important characteristics, diseases (AIDS), transmission, pathogenesis, laboratory diagnosis, prevention and treatment. 9. **Dengue** • Important characteristics, diseases (DHF, DSS), transmission, pathogenesis, laboratory diagnosis, prevention and treatment. 10. **Chikungunya:** Important characteristics, transmission, epidemiology, pathogenesis, laboratory diagnosis, prevention and treatment. 11. **Coronavirus:** Important characteristics, epidemiology, transmission, pathogenesis, organs involved, clinical features, laboratory diagnosis, prevention and treatment of COVID-19 and other Coronaviruses. **12. Other Emerging viral diseases** **Avian flue, SARS, MERS, Nipah, Swine flue, Zika, Ebola etc.** • Important characteristics of virus, important clinical features, transmission, pathogenesis, laboratory diagnosis and prevention 13. **Oncogenic virus**es • Definitions, list of oncogenic viruses with their associated tumours. 14. Latent and chronic viral infections.	L – 1 L – 1 L-1 L-1

Mycology

Learning Objectives	Contents	Teaching hours
Students will be able to: • describe morphology and classification of medically important fungal agents and the diseases caused by them • describe pathogenesis, important clinical features and laboratory diagnosis of superficial, cutaneous, subcutaneous and systemic mycosis	**CORE:** **1. Introduction:** • Introduction to Mycology, beneficial and detrimental effects, morphology, classification • Difference between fungus and bacteria • Antifungal agents and antifungal drug resistance 2. **Superficial and cutaneous mycoses:** • Aetiological agents and diseases • Transmission and pathogenesis, laboratory diagnosis of Pityriasis *versicolor*, Dermatophytosis, Candidiasis. **3. Subcutaneous** • Aetiological agents and diseases • Transmission, pathogenesis and Lab diagnosis. • Rhinosporiodiasis and Madura foot 4. **Systemic mycoses**: • Aetiological agents and diseases • Transmission, pathogenesis and lab diagnosis. • Histoplasmosis, Cryptococcal meningitis, Candidiasis, Pneumocystis jerovici, fungus ball, mycotoxin. **5. Opportunistic fungal diseases.**	L-1, L -2, T-1, L –**1** L – 2, T-1,

Clinical Microbiology

Learning Objectives	Contents	Teaching hours
Student will be able to: • know organisms causing diseases, plan and select appropriate investigation for diagnosis • interpret the findings of the investigations • design appropriate steps for antimicrobial therapy and prevention	**CORE:** 1. Collection of samples, transportation and storage 2. Microbial diseases of Gastrointestinal and Hepatobiliary diseases and Food poisoning 3. Microbial diseases of Genito-Urinary system 4. Microbial diseases of upper and lower Respiratory Tract 5. Microbial diseases of CNS. 6. Hospital Acquired Infections 7. Microbial diseases of Bone and Soft Tissue 8. Microbial diseases of Cardiovascular System 9. Microbial diseases of eye, ear, nose and throat 10. Pyrexia of unknown origin (Microbial cause with emphasis on blood culture). 11. Infectious disease control and prevention. 12. Collection, transport, preservation and lab tests of samples collected from COVID-19 patients. 13. Use of different types of masks, sanitizers, PPE in the prevention of viral infections.	L –1, T-1 L –2, T-1 L –1, T-1 L –1, L –1 L –1, L –1 L –1 L – 1, L- 1, L-1, L-1, T-1 L-1, T-1

Practical

Learning Objectives	Contents	Teaching hours
Students will be able to: • perform and interpret Gram's stain, Z-N stain and Albert stain. • Observe the common bacteriological media with growth of *Staphylococcus aureus, Streptococcus pyogenes, Escherechia coli,Salmonella, Shigella, Klebsiella, Proteus, Pseudomonas* and MTB. • Observe the drug sensitivity test of bacteria. Students will be demonstrated: • autoclave and Hot air oven. • Doffing and donning • Wearing PPE • Hand wash/sanitization • Preparation of disinfectants and their uses.	1. Gram's staining 2. Z-N staining, Albert stain, Auramin-Rodamin stain. 3. Demonstration of culture media namely Nutrient agar, Blood agar, Chocolate agar, MacConkey's agar, Lowenstein Jensen, Robertson's cooked meat media, Blood culture media, transport media (Carry-Blair/Stuart/Peptone water) with and without bacterial growth 4. Demonstration of colony morphology of common bacteria: *Staphylococci, Streptococcus* Lactose fermenters, Lactose nonfermenters, *Proteus, Klebsiella, E. coli, Pseudomonas,* Mycobacterium. 5. Demonstration of inoculation, incubation (aerobic, CO2 and Anerobic condition) and plate reading. 6. Demonstration of catalase, coagulase, and oxidase, TSI, MIU and Simmon's citrate tests 7. Demonstration of in vitro antibiotic sensitivity test by disk diffusion method, 8. Demonstration of sterilization by chemical agents autoclaving and hot air oven. 9. Demonstration of donning and doffing, wearing PPE, hand washing/sanitization. 10. Preparation of disinfectants.	4 4 5 3 2 4 4 2 1 1

Learning Objectives	Contents	Teaching hours
Students will be able to: • prepare stool smear and examine under microscope • observe cyst/trophozoites of intestinal and luminal protozoa namely Entamoeba histolytica, Giardia intestinalis, Trichomonas • obsserve ova of *A. lumbricoides*, *T. trichiuria*, Hook worms and others.. • observe pus cell, macrophage and RBC in stool sample • examine blood slide under microscope for demonstration of Plasmodium species and microfilaria • examine bone marrow smear for LD body • Observe and interpret the results of immunological tests • Observe skin scrapping for fungus. • observe pus cells, RBCs, casts and parasites in urine. • Know about slit skin smear for M. leprae.	**Demonstration** • Microscopic examination of stool for demonstration of cyst/trophozoites of protozoa, ova/larva of intestinal helminthes, pus cells, macrophage and RBC. • Microscopic examination of urine for demonstration of epithelial cells, pus cells, RBCs, casts and parasites. • Examination of blood smear for demonstration of malarial parasites • Examination of bone marrow smear for LD body • Microscopic examination of Gram stain smear of throat swab, wound swab, urethral discharge. • Examination of throat swab by Albert stain. • Microscopic examination of sputum and urine by Z-N stain for AFB. • Modified Z-N stain for Cryptosporidium in stool. • Immunological tests: Demonstration and interpretation of Widal test, RPR, ICT for HBsAg, Dengue, Chikungunya, HIV, HCV, COVID-19, Plasmodium, LD body and Filaria. • Microscopic examination of skin scrapping for demonstration of fungal elements (dermatophytes and candida). • PCR and RT-PCR.	4 2 1 1 1 1 1 1 1 1 1

Consolidated Teaching hours in Microbiology

Subject	Theoretical		Practical	Total
	Lecture	Tutorial		
1. General Bacteriology	13	7	15	35
2. Systemic Bacteriology	20	15	15	50
3. Immunology	16	4	1	21
4. Parasitology	17	8	6	31
5. Virology	14	4	1	19
6. Mycology	6	2	1	9
7. Clinical Microbiology+ Molecular Biology	14	5	6	25
Total	**100**	**45**	**45**	**190**

Teaching hour in 3rd year = 35 hours

Lecture: 1 in each week 13 hours
Tutorial: 1 in each week for each batch 07 hours
Practical: 1 in each week for each batch 15 hours

1st Term Allotted time (106 Hours)				2nd Term Allotted time (In 84 Hours)			
Subject	Lecture 49 hours	Tutorial 26 hours	Practical 31 hours	**Subject**	Lecture 51hours	Tutorial 19 hours	Practical 14 hours
General bacteriology	**13**	**7**	**15**	Parasitology	**17**	**8**	**6**
Systemic Bacteriology	**20**	**15**	**15**	Virology	**14**	**4**	**1**
Immunology	**16**	**4**	**1**	Mycology	**6**	**2**	**1**
				Clinical Microbiology	**14**	**5**	**6**

Grand Total = 1st Term 106 hours + 2nd Term 84 hours = 190 hours

Academic Calendar for Microbiology

3rd Phase (Inmonths)											
1	2	3	4	5	6	7	8	9	10	11	12
General Bacteriology Systemic Bacteriology Immunology			Preparation + 1st Internal Assessment	Parasitology Virology Mycology Clinical Microbiology			Preparation + 2nd Internal Assessment	Preparatory leave	3rd Professional Exam		

Evaluation of Microbiology

Summative Assessment (3rd Professional Examination)

Components	Marks	Total Marks
Formative assessment	10	10
WRITTEN EXAMINATION MCQ (50% SBA + 50% MTF) (~75% SAQ+ ~25% SEQ)	 20 70	90
PRACTICAL EXAMINATION OSPE Traditional methods Practical note book Assignment on Integrated Teaching	 50 40 05 05	100
ORAL EXAMINATION (Structured)		100
Grand Total		**300**

- OMR sheet will be provided for MCQ.
- Pass marks 60 % in each of theoretical, oral and practical.

3.Overview of Assessment in 3rd Professional Examination

Written	Oral	Practical
(Total marks – 100)	(Total marks – 100)	(Total marks- 100)

Grand total – 100, pass marks- 60% in each part i.e. in written, oral and practical

3.1 Assessment systems and marks distribution

Components	Marks	Total Marks	Contents
WRITTEN EXAMINATION Formative Assessment + MCQ +(SAQ +SEQ)	10+20+70 = 100	100	General Bacteriology Systemic Bacteriology Immunology Parasitology Virology Mycology Clinical Microbiology
PRACTICAL EXAMINATION OSPE Traditional practical methods and experiments Practical Note Book Assignment on Integrated Teaching	 50 40 05 05	100	
STRUCTURED ORAL EXAMINATION (SOE) 2 boards	Board – I = 50 Board – II = 50	100	
Grand Total	300		

3.2 Written examination:

SAQ+SEQ: 70

			Total Marks
Group A 1 SEQ- Mandatory 3 SAQ (3out of 4) 1 SAQ may be PBQ	General Bacteriology Virology	SEQ- 7 SAQ-(3.5X3) = 10.5	17.5
Group B 1 SEQ- Mandatory 3 SAQ (3out of 4) 1 SAQ may be PBQ	Parasitology	SEQ- 7 SAQ-(3.5X3) = 10.5	17.5
Group C 1 SEQ- Mandatory 3 SAQ (3out of 4) 1 SAQ may be PBQ	Systemic Bacteriology+Clinical Microbiology	SEQ- 7 SAQ-(3.5X3) = 10.5	17.5
Group D 1 SEQ- Mandatory 3 SAQ (3out of 4) 1 SAQ may be PBQ	Immunology+Mycology	SEQ- 7 SAQ-(3.5X3) = 10.5	17.5

i). Formative assessment

- Two term examination
- Attendance in classes (lecture, tutorial & practical)

Distribution of marks in formative assessment:

Marks of formative assessment are on the basis of three term examination and percentage of attendance.

- From two terms - 05
- From class attendance – 05
- Head of the department will keep the records of formative assessment of the students.
- It is the responsibility of the Convener of the examination to send the calculated marks of formative assessment to the controller of examination signed by all the four (2 internals+ 2 externals) examiners

ii) Multiple choice questions (MCQ) MTF + SBA:

- Time allocation for MCQ is 30 minutes
- Number of questions is 20. Among the 20 questions, 10 questions will be Multiple True/False (MT/F Type**)** and 10 questions will be Single Best Answer (SBA type).
- Each question will carry one stem and five alternatives.

- Each stem will carry one mark.

For multiple true/false (MT/F

- Type of question is multiple choice true/false type
- Each alternative will carry 0.2 marks
- Ideally True: False in each stem should be 3:2 or 2:3. **For SBA**
- Each question will carry one stem and five alternatives.
- Most appropriate answer will be considered as correct answer.
- Single correct answer will carry one (1) mark.
- More than one alternative will produce no mark
- No negative marking for SBA.

Marking of MCQ

- Fraction marks should be excluded, 0.5 marks or more than 0.5 marks will be considered as 1 mark and less than 0.5 marks will be considered as previous mark.
- Keys of MCQ must be supplied (if MCQ is not checked centrally by OMR machine).
- OMR sheet will be supplied for answering MCQ.
- MCQ will be checked centrally by digital process.

iii)Short answer questions (SAQ) + Structured essay questions (SEQ):

- There will be four Groups
- There will be five questions in each group.
- For Each Group:
  - Q. No.1-3: each carrying 4 marks are SAQ type of which 2 to be answered
  - Q. No. 4: (with or without an alternate) carrying 07 marks is SEQ type (mandatory)
  - Q. No. 5: problem based question (PBQ) of SAQ type carrying 2.5 marks (mandatory)

Allocation of time for SAQ +SEQ is two (2) hours and thirty (30) minutes.

- The question may have stems but it is not mandatory to have stems in all questions.
- The students will use separate answer script for each group.

Type of Questions

- Recall type – 50%
- Understanding type – 35%
- Problem based / Analytical type – 15%

Distribution of written scripts among the examiners:

- There will be four examiners- two internals and two externals.
- Each examiner has to examine one packets of written scripts, one group of SAQ+SEQ.

3:3. Structured Oral Examination (SOE)

- Number of oral examination board will be two (board I and board II).
- Number of examiners in each board will be two: one internal and one external.
- SOE must be structured.
- For each board marks are fifty (50).
- Number of questions for each board is ten (10).
- Allocation of marks for each question is five (5).
- For SOE, the ideal pattern of questions are as follows: Recall –50%
  Understanding–35%
  Problem based /Analytical –15%
- Board I will take Group A+B, Board II will take Group C+D
- Systems must be exchanged between two boards on every alternate day for better evaluation.
- In each day, maximum fourteen numbers of students should be scheduled for oral and practical examination.
- In the same day, each student will face both oral (board I & board II) examination and practical examination.

3:4. Practical examination:

Marks distribution:

OSPE (each question/ station= 5 marks x 10)	50
Traditional practical	40
Practical note book	05
Assignment on Integrated Teaching	05
Total	100

Objective structured practical examination (OSPE):

- Number of stations in OSPE is 10
- Number of procedure station is four (1 + 3 Microscope)
- Number of question station is six (Media 2+ Sterilization 1+ Immunology/Stool/Urine 3)
- Allocation of time for each station is two (2) minutes.
- Allocation of marks for each station is (5).
- In the question station, some question should be based on the information obtained at the previous station
- OSPE with its check list should be prepared by the internal examiner.
- Observer of procedure station observes & gives mark according to check list.
- If the procedure needs more than two minutes then there may be a gap station in the next.
- The four examiners according to the check list will evaluate answer script of question station.
- Better to avoid fractionation of marks.

➢ **Traditional Practical examination:**

- Experiments of traditional practical examination will be held according to the curriculum.
- Practical examinations will be conducted by all four (two internal and two external) examiners.
- One/two experiment should be given to each student.

➢ **Practical Notebook:**

- Total number for practical note book is two
- Marks will be given by the internal examiner on the basis of content of the topics, regularity and cleanliness.

4. Post Examination Procedure

Preparation and submission of marks sheet

(Marks sheet of formative, oral and practical examination should be sent to the Controller of examination by the Convener of the examination).

- ❖ Written
- ➢ **Formative**
  - Formative marks should be sent to the Controller of examination in a separate marks sheet.
  - Marks sheet should be signed by all four(two external and two internal) examiners
- ➢ **SAQ+SEQ**
  - SAQ+SEQ marks should be submitted by all four examiners to Controller of examination within the oral and practical examination schedule.
- ➢ **MCQ**
  - Multiple choice questions will be checked centrally by OMR machine.
  - OMR sheets should be packed and sealed properly by hall superintendent of written examination and will be submitted to the Head of the center.
  - The Head of the center will send the packet of OMR sheet to the Controller of examination.
- ➢ **Practical**
  - Total practical marks (OSPE+ Traditional+ Note book) will be submitted to Controller of examination in a separate marks sheet signed by four (two internal + two external) examiners.
- ➢ **Oral**
  - Marks of board – I & board – II = Total marks.
  - These total oral marks will be submitted by the convener signed by four examiners immediately after the end of examination to the head of the center.

- ➢ **Rules for fill up the mark sheet supplied by University:**
  - Subject, paper and group must be written clearly at the top.
  - Oral, practical & formative must be mentioned at the top.
  - Roll number and obtained marks must be written clearly four times for self, Deputy Controller, Tabulator one & Tabulator two.
  - Roll number of absent student/s must be filled up in each section SAQ+SEQ, MCQ (if applicable), oral & practical.
  - Three small enveloped must be prepared for each section with clearly mention the subject, paper, group, oral, practical & formative, and closed & sealed appropriately with mark sheet/s.
  - Two large envelop must be prepare with above mentioned. One large envelope will be closed & sealed with one small envelope and other large envelop will be closed & sealed with two small envelops.

5.Students In-Course Evaluation Cards

ITEM CARDS

There will be 2 (two) Cards

1.Item card 1: General Bacteriology, Systemic Bacteriology, Immunology

2.Item card 2: Parasitology, Virology ,Molecular Biology , Mycology and Clinical Microbiology

DEPARTMENT OF MICROBIOLOGY
….....MEDICAL COLLEGE
ITEM CARD

Batch : Tut. Batch Roll (Write in the boxes) | | | |

Student's Profile

A passport sized recent photograph of the student to be attached

Name: ……
Contact Phone no……
Address:……
Guardian: ……
Contact Phone no……..
Address:……

GENERAL BACTERIOLOGY (First assessment Exam)

	Topic	Marks	Signature
1	Prokaryote and eukaryote, components of bacteria, cell wall of Gram positive and Gram negative bacteria, capsule, flagella, spore, classification of bacteria		
2	Growth and death of bacteria, growth requirements, classification of bacteria according to oxygen requirement, growth curve, generation time		
3	Pathogenesis of bacterial disease, exotoxin and endotoxin, Koch's postulates, their limitations, new adjuncts, molecular Koch's Postulates. Host defense against bacterial disease		
4	Sterilization, disinfection, antisepsis, different methods, their principles and uses		
5	Practical bacteriology: Use of microscope. Gram staining, Ziehl-Neelsen staining. Culture media – types, commonly used media with their use		
6	Antimicrobial drugs, their mechanism of action, resistance, selective toxicity, antibiotic combination, chemoprophylaxis, susceptibility test Bacterial genetics – plasmid, transposons, mutation, transfer of gene,		
	Multidrug resistant (MDR). Extensively drug resistant (DXR) and Pandrug rersistant (PDR) bacteria.		
7	Normal flora		
8	Biosafety and biosecurity, Biomedical waste disposal		

IMMUNOLOGY (First assessment Exam)

	Topic	Marks	Signature
1	Immunity, its type, components of innate immunity, comparison between active and passive immunity, immunocompetent cells		
2	Immunogen, antigen, properties of an ideal antigen, hapten		
3	Immunoglobulin, antibody, its structure, types, function		
4	Complements, major histocompatibility complex		
5	Cytokines, mechanism of immune response, primary and secondary immune response		
6	Tolerance, hypersensitivity, autoimmune diseases		
7	Tumour immunity, transplantation, immunodeficiency		
8	Immunological reactions- basic principles and examples		

MOLECULAR BIOLOGY (Second assessment)

	Topic	Marks	Signature
1	Principle of PCR, RT-PCT, Realtime PCR,		
2	Definition of DNA Cloning, DNA recombination, Genetic engineering, biotechnology, gene therapy		

MYCOLOGY (Second assessment)

	Topic	Marks	Signature
1	Basic structure of fungi, classification of fungi, antifungul drugs		
2	Superficial & cutaneous fungi- *Malassezia furfur*, dermatophytes, *Candida*.		
3	Subcutaneous, deep &oppprtunistic fungi- *Madurella, Rhinosporidium, Cryptococcus,Aspergillus.*		

VIROLOGY (Second assessment)

	Topic	Marks	Signature
1	Basic virology, basic structure of a virus, defective virus, prion, replication, pathogenesis of viral disease, host defense against viral infection, antiviral drugs, general scheme of lab diagnosis of viral diseases, common viral infections in Bangladesh		
2	Herpesvirus, orthomyxovirus, paramyxovirus, rubella virus		
3	Hepatitis viruses, oncogenic viruses		
4	Human immunodeficiency virus		
5	Polio virus, rabies virus, dengue virus, rotavirus, chikungunyia virus, Zika virus		
6	COVID-19		

PARASITOLOGY (Second assessment Exam)

	Topic	Marks	Signature
1	Basic concepts of host, parasites and their types, classification of medically important protozoa		
2	Entamoeba, free living amoeba, Giardia, Balantidium		
3	Leishmania, Trichomonas, Trypanosoma		
4	Plasmodium, Toxoplasma, Babesia		
5	Basic structure and classification of helminthes Cestode: Taenia, Echinococcus, Diphyllobothrium Trematodes: Schistosoma, Fasiolopsis		
6	Nematodes: Ascaris, Enterobius, Strongyloides, Trichuris		
7	Nematodes : Hookworm, Filariasis, Oncocerca Volvulus		

SYSTEMIC BACTERIOLOGY (First assessment)

	Topic	Marks	Signature
1	Staphylococcus		
2	Streptococcus		
3	Neisseria, causes of pyogenic meningitis		
4	Corynebacterium, Bacillus		
5	Mycobacterium		
6	Entrriobacteriaceae – General properties & classification, Escherichia coli, Shigella		
7	Salmonella		
8	Vibrio, Campylobacter		
9	Pseudomonas, Proteus, Klebsiella		
10	Haemophilus, Helicobacter, Bordetella, Bacillus		
11	Anaerobic bacteria, anaerobic culture		
12	Spirocheates, sexually transmitted disease		
13	Rickettsia, Chlamydia, Mycoplasma		

CLINICAL MICROBIOLOGY (Second Assessment Exam)

	Topics	Marks	Signature
1	Examination of stool, morphology of common parasites found in stool, diarrhea- causes and diagnosis		
2	Examination of urine, urinary tract infection- causes and diagnosis		
3	Examination of CSF, meningitis- causes and diagnosis		
4	Blood culture, pyrexia of unknown origin		

5	Examination of sputum, throat swab, pus, wound swab, pleural fluid, ascetic fluid, genital specimen. Causes of pneumonia, sore throat, wound infection, pleural effusion, ascites, vaginal discharge, urethral discharge,		
6	Basics of Hospital Acquired Infection		
7	Infection prevention and control, hand washing, donning and doffing, Preparation of disinfectants, Disposal of Medical wastes		

5.1- Cards for Term final examination on Microbiology for individual student

Department of Microbiology

Students name---------- **Roll no.----------**
Session ---------- **Year---------- Batch----------**
Date of starting ---------- **Date of ending ----------**

Components	Written		Oral		OSPE/ Practical	Total	Remarks (Signature & Date)
1st Term	100		50		50		
2nd Term	100		50		50		

5:2. Class Attendance Record

Department of Microbiology

Components	Total Class held	Total Class attended	Percentage (attended/ Held)	Remarks (Signature & Date)
Lecture 100 hours				
Tutorial (45 hours)				
Practical (45 hours)				
Generic classes (3 hours)				
Integrated teaching (20 hours)				

5.3. Formative Assessment Record

Total marks obtained in 1st term+ 2nd term	Marks from two terms	Marks from class attendance	Total marks of Formative Assessment
Total marks (200+200)= 400	5	5	10

Signature of Head of Department

5:4. Continuous Assessment Cards

Continuous Assessment Card-1

Department of Microbiology ---------- **Medical college----------**
Students name---------- **Roll no.----------**
Session ---------- **Year ---------- Batch ----------**
Date of starting ---------- **Date of ending ----------**

Card No- 1. …. General Bacteriology, Systemic Bacteriology, Immunology

No.	Topics	Marks (10 in each item)	Initial with date
1.			
2.			
3.			
4.			
5.			
6.			

Signature of the Batch teacher Signature of the Head of Department

Continuous Assessment Card-2

Department of Microbiology ---------- Medical college----------
Students name---------- Roll no.----------
Session ---------- Year ---------- Batch ----------
Date of starting ---------- Date of ending ----------

Card No- 2. Parasitology, Virology ,Molecular Biology , Mycology and Clinical Microbiology

No	Topics	Marks (10 in each item)	Initial with date
1			
2			
3			
4			
5			

Signature of the Batch teacher Signature of the Head of Department

6.Provisional Tabulation Sheet for Oral & Practical examination

Department of Microbiology

- Medical College

Third professional MBBS Examination of 20----

Date:--/--/----

Roll No	Oral		Total Marks (100)	Practical				Total Marks (100)	
	Board I(50)	Board II(50)		OSPE (50)	Traditional Practical (40)	Note Book (05)	Assignment (05)		Remarks

Signature of the examiners