DMLT Microbiology (476)

Training Schedule

Schedule		Theory		Practical		Instructions to the trainer	Learning outcomes
Week	**Day**	**Topic**	**Hour**	**Topic**	**Hour**		
Week 1	Day 1	a) Difference between Eukaryotic and Prokaryotic b) Different staining techniques in bacteriology brieflyonly principal and uses • Gram stain • negative stain- India ink • impregnation stain with silver c) Microbiology of bacteria with eg.Gram +ve cocci, Gram -ve rods etc. d) Bacterial structure (difference between gram+ve & gram -ve) cell wall, capsule, spore, flagella e) Growth and multiplication of bacteria	2	a) **Microscope** parts of light microscope uniocular and binocular principle- focus and show. b) Introduction to phase contrast and dark field microscope c) Maintenance of microscopes. a) Learn to focus under 10x, 40x 100x b) See how gram stained, India ink and silver impregnation stained preparations looks by focusing slides	3	a) show different part of light microscope use of 10x, 40x, 100x by showing b) demonstrate various staining techniques c)how to focus and demonstrate presence of bacteria and other microorganisms	• Identifies light microscope and its parts and demonstrate its uses • Demonstrates focusing different stained slides in bacteriology
	Day 2	• Nutrition and growth of bacteria • Lab safety and standard precautions at workplace.	2	Uses, working, monitoring & maintenance of common lab equipment - example centrifuge, water bath, different type of refrigerators 4-8˚C, -20˚C, -40˚C, -70˚C, incubators, bio-safety cabinets.	3	f) Explain thoroughly regarding spillage management in labs by live demonstration and safety preparedness in case of any laboratory accident.	g) Identifies and apply different standing precautious for safety of oneself h) Identifies common symbols used in labs i) Recalls and apply preventions for spillage and accidents in lab

Week 2	Day 1	• Sterilization and disinfection in details including types, principles, application, • Disinfectant testing • Sterilization indicators	2	• Working of autoclave • Show disposable sterilized items • Preparation of common disinfectants and • Disinfectant testing by in use – test • Monitoring of sterilization	3	Demonstrate autoclave and parts, working how to prepare items for autoclave and hot air over preparation of common lab disinfecting in use test	• Defines sterilized and summarize difference sterilization disinfection methods. • Applies difference methods for difference items to be sterilized or disinfected • Handlings of autoclave and hot air oven.
	Day 2	Bio medical waste (BMW) management	2	• Show different colour containers, bag and its application and uses	3	• Visit to see BMW in hosp. unit • Visit to CSSD	• Identifies concept of BMW management • Adopts difference methods to segregate and dispose waste materials appropriately as per BMW rules of 2018
Week 3	Day 1	• Normal flora of human body • Pathogenesis of bacterial infections • Bacterial culture media- difference types • How to prepare and sterilize different culture media. • Different types of clinical specimens. • Specimen collection, transport and preservation of these specimens and their proper disposal as per BMW-2018	3	• Identify difference solid & liquid culture medias both with & without growth • Methods of isolation of bacteria • To be shown different containers for different clinical specimens& processing of different clinical specimens	2	• To show solids liquid medias both sterile and after growth Demonstrate hands on techniques of streaking, swabbing inoculations.	• Identifies difference types of culture media and recall its contents, preparation, sterilize and strong and uses. • Demonstrates and apply difference inoculation techniques on different types of clinical samples.
	Day 2	• Details of principle, components, uses of common staining techniques in ---- grams m ZN, mod- ZN, Alberts, etc.	2	• Preparation of stain and procedure of staining by these methods	3	Demonstrate different staining techniques with	• Identifies need for staining and identify substances used as stain.

						hands on trainings.	• List various stainingtechniques andtheir clinical applications.
Week 4	Day 1	• Quality control in microbiology preparation and quality of culture media	2	• Preparation of different Media like Blood Agar, Chocolate Agar, Muller Hinton Agar, LJ, BSA, XLD, Selenite F, peptone water. • Preparation of different biochemical testmedia and their methods of sterilization.	3	Visit to microbiology laboratory and show them the different culture media with their visual identification.	• Defines internal quality control, external quality assurance TQM, CQI,QA and integrate quality control in microbiology laboratories.
	Day 2	• Common lab reagents and their uses. • Bacterial identification tests of different types and uses	2	• Preparation of common laboratory reagents • Performing different bacterial identification tests	3	Describe the difference in stock solution and working solution	• Recalls, applies and interprets different biochemical tests, with their use in identification of microorganisms. And describe the processes involved in the identification to bacterial
Week 5	Day 1	• Immunity, antigens and antibodies complement system.	3	• Antimicrobial susceptibility testing methods and interpretation	2	• Demonstration of disc diffusion, (Kirby bour, Stokes, mod. Stokes, (E-test) and micro broth dilution technique	• Performs different AST and interpret them
	Day 2	• Structure & Function of Immune System	2	• Direct Agglutination, Slide Agglutination, tube AgglutinationWidal test & Indirect of Passive agglutination	3	• Show presentation with animated videos on concept of Direct & Indirect Agglutination	• Demonstrates the Direct Agglutination, Slide Agglutination, tube Agglutination Widal test & Indirect of Passive agglutination tests

Week 6	Day 1	Staphylococcus Streptococcus Pneumococcus Enterococcus	2	Culture of Staphylococcus, Streptococcus, Pneumococcus &Enterococcus on blood agar Gram staining from each culture Catalase test Coagulase test (slide +tube) Bile esculin test Bile solubility Types of hemolysis on blood agar Sensitivity testing for each	3	A) to demonstrate heat tolerance test a) to show types of haemolysis on blood agar b) Specific media used for sensitivity testing and discs used.	Demonstratesthe methods for processing of clinical samples
	Day 2	a) Neisseria meningitidis b) Neisseria gonorrhoea c) Corynebacterium	2	a) Growth of Neisseria on blood & chocolate agar. b) Gram stain, catalase, oxidase, RCUT & inoculate biochemicals from a single colony c) Culture of Corynebacterium on Loeffler serum slope, blood tellurite agar. d) Albert stain, Gram stain &inoculate biochemicals and serum sugar from culture	3	Demonstration of candle jar & how to use it, sensitivity of Neisseria on chocolate agar & discs to be used.	Demonstrates and identifies Neisseria meningitidis Neisseria gonorrhea & Corynebacterium growth

Week 7	Day 1	• Mycobacterium	1	• Direct & concentration smears by ZiehlNeelsen technique • Petroff's decontamination method • Culture on LJ media • Sensitivity tests by proportion method	4	To show Petroff's method To show culture on LJ media Preparation of LJ media Antibiotic sensitivity test(AST) by proportion methods To show growth of Mycobacterium tuberculosis on LJ media	• Demonstrates decontamination, staining & AST for Mycobacterium
	Day 2	a) Escherichia coli &Klebsiella b) Citrobacter, Edwardsiella, Enterobacter & Serratia	2	• Gram staining, motility (hanging drop) from MacConkey agar (MAC) • Streaking on MAC • Inoculate biochemicals from single colony • AST for gram negative bacteria	3	Explain specific features of MAC Agar	Demonstrates streaking, biochemical inoculation & AST techniques for gram negative bacilli
Week 8	Day 1	• Salmonella • Shigella	2	• Culture characteristics on MAC & XLD media. • Blood culture&subculture from inoculated bile broth on MAC • Faeces culture: Plating on MAC, XLD, & culture characteristics. • Widal test • Motility (Serotyping & inoculation of biochemicals • Antibiotic sensitivity & discs used	3	• Demonstration of MAC & XLD & media preparation • Demonstration of automated BACTEC for blood culture & VITEK system/ MICROSCAN	Demonstrates streaking, biochemical inoculation & AST techniques for gram negative bacilli
	Day 2	• Proteus& Providencia • Yersinia	2	• Gram stain Motility (hanging drop) & inoculation of	3	• Preparation of Blood agar, Mueller Hinton	Demonstrates streaking, biochemical inoculation &

		• Vibrio & related organisms		biochemicals from colonies on MacConkey media • Plating of Vibrio colony on BSA & TCBS media • Antibiotic sensitivity & discs used • Serotyping for vibrio		agar, TCBS, BSA, APW, Nutrient agar • To show swarming of Proteus on blood agar	AST techniques for gram negative bacilli
Week 9	Day 1	• Pseudomonas • Bordetella • Spirochaetes • Haemophilus	2	Gram stain, motility, biochemicals from culture on MacConkey & MHA Streaking on media Antibiotic sensitivity for Pseudomonas CSF plating for Haemophilus on Blood/chocolate agar in candle jar Streaking for urine samples VDRL & RPR	3	To show chocolate agar demonstration from blood agar Demonstrate satellitism test procedure for Haemophilus Silver staining technique for spirochaetes Pigment of Pseudomonas on Nutrient agar	Applies these processing methods for clinical samples like urine, pus & CSF
	Day 2	• Rickettsia • Chlamydia • Mycoplasma • Anaerobes	2	• Anaerobic methods • Anaerobic jar & anoxamat set up	3	Hands on demonstration of anaerobic jar set up Demonstration of RCM & TGB	Demonstrates anaerobic methods for processing

	Week 10	Day 1	• Introduction to parasitology • Stool examination • Entamoeba histolytica • Free living amoeba • Giardia	2	• Saline wet mount • Iodine wet mount • Concentration method: Formol ether sedimentation method • Preservation of stool by formalin • Preparation of 10% formalin • Giemsa staining for Giardia trophozoites	3	• To show cyst of Entamoeba histolytica & Giardia	• Adopts these techniques for parasitological examination of stool
		Day 2	• Nematodes classification • Ascariasis • Enterobius vermicularis • Hookworm • Trichuris trichura	2	• Saline wet mount • Iodine wet mount • Concentration method: Formol ether sedimentation method • Preservation of stool by formalin • Preparation of 10% formalin	3	To show cyst of Ascaris, hookworm, Giardia, Trichuris, H.nana& Taenia.	Adopts the techniques for parasitological examination of stool
	Week 11	Day 1	• Tissue nematodes • Trematodes • Cestodes • Echinococcus granulosus	2	• Salinewet mount • Iodine wet mount • Concentration method: Formol ether sedimentation method • Preservation of stool by formalin • Preparation of 10% formalin	3	To show cyst of Ascaris, hookworm, giardia, trichuris, H.nana& Taenia.	Adopts the techniques for parasitological examination of stool

		Day 2	• Plasmodium • Leishmania • Filaria	2	• Rapid diagnostic test • Thick & thin smear • Leishman & Giemsa staining • Dehaemoglobinization of thick smear	3	• Show slides of malaria parasite, LD bodies and microfilaria to students to help better understand • Show Anopheles mosquito	Applies these methods for preparing blood smears and staining them
	Week 12	Day 1	• Morphology and general properties of fungi • Laboratory diagnosis of fungi	2	• Sample collection for skin, hair & nails • <u>Direct wet mount</u>: India ink KOH LPCB Culture on SDA Slide culture Gram staining of yeasts	3	• Show growth of yeast & mycelial colony on SDA • Preparation of SDA • To mention BOD incubator (25degree centigrade)	Adopts and applies these methods for sample collection of skin, hair & nail for fungi & be able to prepare wet mounts, put culture for fungi

	Day 2	• Morphology & general properties of viruses • Lab. diagnosis of viral infections	3	• Separation of serum from blood • ELISA technique for detection for viral antigen or antibody	2	• To show also how to use an ELISA multichannel pipette, other autopipette & ELISA reader	• Applies ELISA detection of serum antigen or antibody
Week 13	Day 1	• Immunity • Antigen • Immunoglobulin • complement	2	• Widal test • VDRL test • ASO/CRP tests	3	To show the students how to put these tests & make them do on their own	Demonstrates • Widal test • VDRL test • ASO/CRP tests
	Day 2	• Immunology • structure & function of immune system • agglutination tests • complement fixation tests	2	• Hemagglutination & hemagglutination inhibition tests • ABO blood grouping & cross matching • LA from CSF.	3	To show the students how to put these tests & make them do on their own	Familiarise with the Immunology and Agglutination tests
Week 14	Day 1	• Immunofluorescence • EIA & RIA	1	Demonstration of Immunofluorescence technique Demonstration of EIA & RIA	4	Discuss application of Immunofluorescence	Demonstrates Immunofluorescence techniques- EIA & RIA and identifies its application

	Day 2	• Autoimmunity • Organ transplantation	1	Group discussion on rejection & Acceptance of transplantation	4	Calibration of instruments	Familiarize with the concepts of Organ transplantation
Week 15	Day 1	Doubts clearance class	2	Microscopes handling & slide preparation and analysis	3		Prepares slides for diagnostic purpose and its interpretation
	Day 2	Doubt clearance class	2	Revision class on ELISA technique for detection for viral antigen or antibody	3	Hands on training on Pipette handling and its calibration	Demonstrates and analyses ELISA detection of serum antigen or antibody
Total Hrs.			60		90		
Total Hrs.			150				