D. Y. Patil University, Kolhapur
DMLT Syllabus & Examination Pattern

Eligibility

An applicant for admission to DMLT examination shall:-

A) Have passed a B.Sc. Degree course of any recognised university within the state of Maharashtra with either Biochemistry, Chemistry, Microbiology or Zoology and Life Sciences as major (principal) subject or an equivalent degree of another recognised university.

B) Have attended a regular full time course of study for a period of not less than two academic terms (one academic year) in the subjects of Medical Biochemistry, Medical Microbiology and Human Pathology in a Medical Council of India recognised Medical College only;

C) Have undergone successfully technical skills proficiency training during the course of the period of attendance of two academic terms (one academic year) so proportionately divided that all the three subjects of study i.e. Medical Biochemistry, Medical Microbiology and Human Pathology are fully covered according to the syllabi (prospectus) of each subject appended here with as Appendix "B".

D) Have obtained the proficiency in technical skills referred to in paragraph (C) in laboratories of each subject of the Medical Council of India recognised Medical College only;

E) Have obtained the proficiency in technical skills referred to in paragraph (C) to carry out various 'laboratory tests' independently in Urban, Semi urban and rural health care setting;

F) not be conferred the Diploma in Medical Laboratory Technology unless he/she has passed in all the three prescribed subjects of the examination both in theory and practicals in accordance with the provisions of the DMLT regulations appended here with as Appendix "A";

The fees of the examination shall be as decided by the University from time to time;

~~Notwithstanding anything to the contrary in this Direction~~ No student shall be admitted to the examination under ~~this direction~~ if he/she has already passed the same examination or an equivalent examination of any other statutory University;

Dr. S S Sabane
Chairman BOS Para

Appendix A .

1. Pattern of Theory and Practical Examination

S.N.	Subject	Theory Exam.		Practical Exam.		
		Maximum Marks	Duration	Maximum Marks	Duration	
1	Medical Biochemistry	100	3 Hrs.	100	1/2/3 days	3 DAYS
2	Medical Microbiology	100	3 Hrs.	100	1/2/3 days	
3	Human Pathology	100	3 Hrs.	100	1/2/3 days	

- **Note : 100 maximum marks for practical examination in each subject shall include 20 marks for internal assessment which shall be based upon practical record book evaluation, technical skill proficiency training work/participation evaluation report, theory, practical and oral (viva voce) examination evaluation at term ending and preliminary examination.**

2 : Standard of Passing

To be eligible to pass the examination –

a) A candidate must have scored not less than 50% marks in each head of passing separately simultaneously.

b) For the Computer Training Candidates should have acquired computer literacy and computer proficiency certificate from Govt. of Maharashtra approved standard computer education institutes as is applicable for Govt. Servants.

3. Regulation DMLT 4 : Qualification of Examiners

All examiners on the University panel for under graduate and post graduate examinations for the three subjects of the course i.e. Medical Biochemistry, Medical Microbiology and Human Pathology will be eligible for an appointment as an examiner for the DMLT examination.

4. Panel of examiners for theory examination Panel for theory paper setters.

For each subject of the course i.e. Medical Biochemistry, Medical Microbiology and Human Pathology three examiners each will be appointed. Each examiner will set one set of question paper and senior examiner in each of the subject will act as moderator for that subject for finalising three sets of theory papers in each of the subject.

5. Panel of Examiners for Practical Examination :-

There will be six examiners - 3 Internal and 3 External one each from each of the subjects (Medical Biochemistry, Medical Microbiology and Human Pathology) common to all the candidates. Out of six examiners, senior most internal examiner will act as Chairman / Convenor and will make the work distribution for smooth conduction of practical and viva voce examination.

6. Criteria for eligibility for University examination

Attendance : 75 % in Lectures (Theory).
80 % in non-lecture teaching programmes
a) technical skill proficiency training
b) practicals

Appendix B

I. MEDICAL BIOCHEMISTRY :

1) Total no. of teaching hours recommended for theory and practical together. - 240 hrs.

2) *Syllabus for Medical Biochemistry.*

a) Professional ethics, role of laboratory technician in laboratory diagnosis.

b) Basic principles of laboratory work, personal safety against various accidents and hazards in biochemistry laboratory. Knowledge of First Aid. Care in handling dangerous materials.

c) Organisation and management in the biochemistry laboratory, methods of receiving, labelling, collection of specimen. Special containers for collecting and transporting of specimen. Maintenance of laboratory records, reports, index and cataloguing. Use of computers in data analysis, data storage and record data reports.

d) Laboratory glassware - different types, use and care in handling, cleaning and disposal. Use and calibration of autopipettes and dispensers. Calibration of volumetric apparata.

e) Principles of working of various instruments and their uses, care and maintenance/ repair / condemnation.

- Balances - mono pan, two pan, top pan ; • Incubators; • Ovens;
- Water baths; • Sterlizers; • Deionizers/Distillation plants;
- Magnetic stirrers; • Vortex mixers;
  - Centrifuges - table top, high speed - room temp and cold, ultracentrifuge;
  - pH meters : grip / digital ;
  - Colorimeter, spectrophotometer, fluorimeter, flame photometer, ion selective electrodes ;
    - Semi / Auto analysers, dry chemistry analysers,
  - Spectroscope : - Identification of Hb derivatives ; • Urinometer

f) Other laboratory requirements :

- Chemicals and reagents - Solid and liquid ; • Diagnostic kits for detection of metabolites, chemicals enzymes - criteria for selection of kits and specifications ; • Purchasing and indenting procedures ; • Inventory control and maintenance of stocks ; • Periodic stock verifications and audit.

g) Basic principles of biochemistry and biophysics :

- Solvents and solutions - Normality, Molarity, Molality, preparations of standard solutions e.g. Normal solution, molar solution, percent solution ; • Titrations ;
- Use of buffers, buffer preparations ; • pH indicators and pH maintenance.

h) Analytic techniques and their applications - Principles and Practice

- Qualitative and Quantitative methods ; • Chromatography ; • Colorimetry;
- Electrophoresis - Paper, Agar gel, PADGE, Disc gel, slab gel ; • Immuno electrophoresis ; • Densitometry ; • ELISA and Immunoblot methods.

i) Principles, procedures and applications of detection of biomolecules in clinical specimen (Blood, Urine, C. S. F., other body fluids etc.)

- Blood
- Metabolites • Glucose, sugar, GTC, Glycated Hb ; • BUN - Urea , creatinine ; • Protein - Total, Albumin, Globulin, A/G ratio ; • Total and Direct bilirubin ; • Uric acid ; • Lipid profile - TG, cholesterol, LDL, HDL ; • Therapeutic drug monitoring - e.g. Barbiturates ;
- Minerals / Electrolytes • Na, K, Ca, P, Cl, Fe, iron binding capacity
- Enzymes • ALT, AST, Alk. phosphatase, Acid phosphatase, Amylase, Isoenzymes LDH, G_6PD, Lipase.

- Urine
- Detection of normal and abnormal constituents :- sugar, protein, ketone bodies, blood, bile salts and bile pigments etc.
- Dip stick examination
  - C. S. F.
  - Physical exam, Tests for sugar, protein, chloride, bicorbonate .
  - Other body fluids
  - Physical test, Tests for detection of metabolites, biomolecules, enzymes etc.

j) Organ function tests :
- Metabolic role of liver, kidney, pancreas, thyroid, heart, stomach etc.
- General principles of organ function tests
- Liver function tests ; • Kidney function tests ; • Pancreas function tests ;
- Gastric function tests ; • Thyroid function tests ; • Cardiac function tests

k) Acid base balance - Blood pH, Handerson - Hasselbach equation, Acidosis, Alkalosis (Metabolic & respiratory)

l) Methods of Quality control and Quality Assurance
- Definition of terms : Quality Control and Quality Assurance, • Internal and External Quality Control - control charts, • Preanalytical and Post analytical Quality Control, Analytical errors, • Specificity , Sensitivity - Importance of accuracy and precision.

m) Investigation Audit : Pricing and cost effectiveness of tests

n) Laboratory waste disposal and biosafety : General laboratory protection methods

o) Information systems : Use of computers networking.

3) ***Syllabus for practicals/demonstrations***

a) Commonly used glass wares, instruments, chemicals and reagents

b) Determination tests
- Metabolites • Glucose, GTC • BUN • Urea • Creatinine • Proteins : Albumin, Globulin, A/G ratio, total proteins • Total and direct bilirubin • Uric acid • Lipid profile - TG, cholesterol, LDL, HDL
- Minerals : Na, K, Cl, Ca, P etc.
- Enzymes : ALT, AST, acid and alkaline phosphatase, amylase etc.

c) Urine Analysis - Normal / Abnormal constituents - Urine reports

d) CSF Analysis - Tests for sugar, proteins, chlorides etc.

e) Determination of Hb derivatives - Spectroscopy

f) Organ function tests - Liver, kidney, stomach etc.

g) Use of colorimeter - Beer Lambert's law

4) ***Pattern of theory question paper***

Section A

Q.No.1) Multiple choice questions (MCQ) (30) 30 Marks
- a) Best response type - 10
- b) True / False type - 10
- c) Matching type - 10

Section B

Q.No.2) Long descriptive (Essay type) : any one out of two 14 Marks

Q. No. 3) Short descriptive (Notes type) : any two out of three 20 Marks

Section C (2 X 10)

Q. No, 4)Short answer type : any SIX out of EIGHT 12 Marks (6 X2)

Q. No. 5) Short answer type : any SIX out of EIGHT 12 Marks (6X 2)

R. No. 6) Short answer type : any SIX out of EIGHT 12 Marks (6X 2)

5) *Pattern of Practical Examination Question Paper*

Q. No. 1) a) Any two estimations of organ function tests 15 Marks

Or

b) Glucose tolerance test

Or

c) Clearance tests

Q. No.2) a) Estimation of metabolites (any two) 15 Marks

Or

b) Estimation of minerals (any two)

Or

c) Estimation of enzyme (any two)

Q. No. 3) a) Normal / Abnormal constituents of urine (any two) 10 Marks

Or

b) CSF analysis (any two tests)

Or

c) Determination of Hb derivatives (spectroscopy)

Q. No. 4) Spot identification and suitable answer type - ten spots 20 Marks

Q. No. 5) Viva - voce examination 20 Marks

Q. No. 6) Internal assessment 20 Marks

- Practical record book evaluation (10)
- Technical skill proficiency evaluation (training period - (5))
- Theory / practical / viva-voce performance evaluation at term ending and preliminary examination (5)

6) ***Books recommended***

a) Clinical chemistry in diagnosis and treatment : Zilwa J. F., Pannoll Peter R, Mayne Philip D. Edward Arnold Publications

b) Practical Clinical Biochemistry : Varley Publications : William Heinemann

c) A Biologist's guide to principles and techniques of practical biochemistry; William and Wilson - Edward Arnold Publications.

d) Lynch's Medical Laboratory Technology : Raphael D. B. W. B. Saunder's Publications

e) Practical Biochemistry - Plummer

f) Text Book Medical Biochemistry by Ramakrishnan, Prasannan and Rajan

g) Biochemistry by A. C. Deb.

h) Medical Biochemistry by MN Chaterjee and Rana Shinde

i) Medical Biochemistry by Debajyoti Das.

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Dr BM Tiwale
(Biochemistry)

II. MEDICAL MICROBIOLOGY :

1) Total no. of teaching hours recommended for theory and practical together. - 240 hrs.

2) *Syllabus for Medical Microbiology :*

A) Theory :

a) Introduction, Scope of Microbiology. Morphology and Physiology of bacteria.

b) Classification of microbes - Bacteria, Fungi, Viruses, Parasites. Different types of classifications. Normal flora of Human body.

C) Common Lab. media for bacteria, Fungi, Mycobacteria and anaerobic bacteria.

d) Collection and Transport of specimen (including for anaerobic culture) containers; media - for different specimen eg. Blood, CSF, Urine, Pus, Stool, Sputum, Aspirated fluids, throat swab and Misc. swab. etc.

e) Processing of specimen for Bacteriological diagnosis Reception, Labelling of specimen, steps in processing and identification of common bacterial pathogens in specimen of Blood, CSF, throat swab, urine, stool, pus. etc.

f) Antigen, Antibody, Antigen - antibody reactions (basic principles) and common serological tests.

g) Pyogenic cocci - Staph, Strepto, Pneumo, Neisseriae. (Diseases produced diagnostic criteria and diagnostic methods used for each of them).

h) Gram Negative Bacilli - E. coli, Klebsiella, Proteus, Pseudomonas, Salmonella, Shigella, Vibrio etc.

i) Gram positive bacilli and Anaerobic organisms. Corynebacterium, Bacillus, Clostridia, Non-clostridial anaerobes. (Diseases produced and diagnostic methods).

j) Mycobacteria - M. tuberculosis, Atypical mycobacteria M. leprae. (Methods for diagnostic techniques).

k) Common Lab. animals - use and care of animals. Different routes and sites of inoculation. Germ free animals.

l) Introduction to Mycology - common pathogenic fungi. Diseases produced and specimen collected for Lab. diagnosis, methods for diagnosis.

m) Introduction to Virology - General properties of viruses (including Rickettsia). Common viral infections. (Common diseases produced and techniques in diagnosis).

n) Introduction to Parasitology , Common diseases produced by Protozoa and Helminths and Methods for their diagnosis.

o) Materials management - Record Keeping. Purchase, indent and maintenance of stock registers.

p) Preservation of cultures.

q) Biosafety Guide lines and prevention of laboratory acquired infections.

r) Laboratory Waste Management.

s) Quality control in Microbiology and Quality Assurance programme.

B) Practical Cum Demonstrations :

a) Glassware

- Types and uses for microbiological use.
- Cleaning and sterilization (procedures)
- Preparation of sterile swabs for culture.

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b) Sterilization and disinfection
- physical methods of sterilization, heat, filtration, radiations.
- chemical disinfections.
- indicators of sterilization.
- disinfection of specimen, laboratory and equipments.

c) Microscopy
- Different types, their principles and use. Different parts, their function and care of light microscope.

d) Staining
- Different types of staining, Monochrome staining. Negative staining, Differential staining, special staining for Spores, Flagella, Capsule, Metachromatic granules, Spirochaetes, etc. Preparation of stains and technique of staining - Gram's stain, Z-N. stain, Albert's stain.

e) Methods of cultivation of bacteria
- Methods of isolation and identification of common pathogens from clinical specimen - blood, urine, faeces (stool), pus, sputum, CSF, Throat Swab, Vaginal Swab and body fluids etc.

f) Antimicrobial susceptibility testing
- Methods, standardization, media preparation, preparation of antibiotic solutions, making of discs, interpretation, report
- Antitubercular drug sensitivity testing.

g) Stool exam
- Routine exam. for Ova, cysts and others.
- Concentration methods for Ova, Cysts.
- Preservation of stool.

C) Technical skill proficiency programme

a) Professional ethics, Role of Laboratory Technician in Laboratory Diagnosis.

b) Basic principles of laboratory work. Personal safety against various accidents and hazards. Knowledge of First - Aid. Care in handling dangerous materials.

c) Organisation and management in the Laboratory. Methods of receiving, labelling, collection of specimen. Special containers for collecting and transport of specimen. Maintenance of laboratory records-reports, indexing and cataloguing.

d) Principles of working of various laboratory instruments and their uses, care and maintenance.

e) Other laboratory requirements - Chemical and general items. Specifications of all laboratory requirements, and purchase procedures. Stock maintenance and inventory control.

f) Glassware
- Types and uses for microbiological use.
- Cleaning and sterilization (procedures)
- Preparation of sterile swabs for culture.

g) Media Laboratory - Preparation of distilled water. Cleaning and sterilisation of glass ware for media. Preparation and sterilization of common Lab. media, pH adjustment, preparation of special media. Making of pasteur pipettes and swabs, Disposal of used media.

h) Routine Bacteriology - Reception, Labelling, Recording of clinical specimen, Morphologic study; inoculation of media, Incubation, Reading of culture growth, Biochemicals. Special tests, Serology , Antibiotic sensitivity testing, Techniques in anaerobic bacteriology.

i) Antimicrobial susceptibility testing - Methods, standardization, media, preparation, preparation of antibiotic solutions, making of discs, interpretation, report, Antitubercular drug sensitivity testing.

j) Serology - Common serological tests, Widal, VDRL etc.
Immunology Lab, ELISA, ASO, Gel diffusion techniques etc.

k) Mycology and Mycobacteriology Lab.
Skin scraping, preparation of wet mount and culture fungi, Sputum for AFB, concentration of sputum, culture for AFB.

l) Stool exam - Routine exam. for ova, cysts and others, Concentration methods for ova, cysts; Preservation of stool.

3) *Pattern of theory question paper*

Section A

Q.No.1) Multiple choice questions (MCQ) (30) 30 Marks

a) Best response type - 10
b) True / False type - 10
c) Matching type - 10

Section B

Q.No.2) Long descriptive (Essay type) : any one out of two 14 Marks

Q. No. 3) Short descriptive (Notes type) : any two out of three 20 Marks

(2 X 10)

Section C

Q. No, 4) Short answer type : any SIX out of EIGHT 12 Marks

(6 X2)

Q. No. 5) Short answer type : any SIX out of EIGHT 12 Marks

(6X 2)

Q. No. 6) Short answer type : any SIX out of EIGHT 12 Marks

(6X 2)

4) *Pattern of Practical Examination Question Paper*

Q. No. 1) 20 Marks

a) Gram/ suitable staining of clinical specimen 5
b) Culture of clinical specimen on suitable media 5
c) Group, Genus identification (biochemical tests) 5
d) Antimicrobiological drug sensitivity test 5

Q. No. 2) 10 Marks

a) Media pouring
or
b) pH adjustment
or
c) Serology test

Q. No. 3) 10 Marks

a) Parasite examination of faeces 5
b) Stain a given smear 5
i) Albert staining
or
ii) Acid for staining

Q. No. 4) Spot identification and suitable answer type 20 Marks
Ten spots of two marks each

Q. No. 5) Viva voce examination 20 Marks

Q. No. 6) Internal assessment 20 Marks
- Practical record book evaluation (10)
- Technical skill proficiency evaluation (training period - (5))
- Theory / practical / viva-voce performance evaluation at term ending and proliminary examination (5)

5) ***Books recommended***

a) A Handbook of medical laboratory, Christian Medical College & Hospital, Vellore, Tamilnadu.

b) A new short textbook of Microbial and parasite infection.
B. I. Duerden, T. M. S. Reid, J. M. Jewsbury, D. C. Turh

c) Laboratory Manual by Baker Silverton

d) WHC Manual of Lab Technology

e) Medical Lab Technology for Tropical Countries
Vol. I & II by Monica Cheesborough.

f) Mackie and Mc Cartney
Practical Medical Microbiology Edited by : J. G. Collee / A. G. Fraser, B. P. Marmion / A Simmons (Fourteenth Edition)

g) Balley and Scott's Diagnostic Microbiology : Ellen Jo Boron Lance R. Peterson Sydney M. Finegold

h) Medical Microbiology, A Guide to the Lab diagnosis and Control of infection
12th Edition Volume I. Microbial infections
Robert Cruickshank, J. P. Deuguid, B. P. Marmion, R. H. A. Swain

i) Essential of Medical Microbiology
Rajesh Bhatia, Rattan Lal Ichhpujami.

j) A Text book of Microbiology by R. Anantnanarayan, C. k. Jayaram Panikkar

k) A Text book of Microbiology by P. Chakraborty

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Microbiology

III HUMAN PATHOLOGY

1) Total no. of teaching hours recommended for theory and practical together. - **240 hrs.**

2) *Syllabus for Human Pathology* .

A) Haematology :

Theory :

1) Introduction

Composition of blood and formation of blood cells and their function.

2) Haemoglobin

Technical, Normal values, abnormal values, physiological variations.

3) Red Blood Cells

Techniques, Normal values, abnormal values, physiological variations.

* Anaemias - Classification.
* Haematocrit : Technical, Normal values, abnormal values.
* Red cell Indices : Normal values, abnormal values.
* Reticulocytes and sickling test : Methods, Normal values, Significance.
* Sicle cell anaemia - Classification.
* Erythrocytes Sedimentation Rate :
  Methods, Normal values, abnormal values.
  Physiological variations, significance.

4) White Blood cells

Techniques, Normal values, abnormal values, physiological variations.
Preparation of Blood films and staining various methods, methods of examination and reporting.

5) Haemostasis and Coagulation study.

Theory, Factors, investigations in bleeding disorder. B.T., C. T., Prothrombin time.

* Platelets : (Platelet count)
  Techniques, Normal values, abnormal values, physiological variations.
* Prothromibin Time / APTT (Activated Partial Thromboplastin Time)
  Techniques, Normal values, abnormal values, physiological variations.

6) Bone Marrow

Staining, Examination and report.

7) Blood Transfusion Techniques

a) Blood Banking : Elementary principles of blood grouping and factors affecting results of test. Grouping - ABO, Rh
Preparation and storage of grouping sera.

b) General principles of the care and organisation of blood bank. Government regulations. (Investigation to be done on Blood Bag - Malaria / VDRL / Australia Ag / HIV)

c) Preparation and properties of anticoagulant solutions used in blood transfusion and criteria of fitness for use / Criteria for selection of Donors.

d) Preparation of taking and giving sets, including sharpening of needless, Maintenance of blood bank records.

e) Cross Matching : (a) Saline (b) Albumin (c) Coomb's sera.

f) Coomb's Test : (a) Direct (b) Indirect.

g) Antibody Titre.

h) Investigation in Transfusion reaction, Investigation in Haemolytic disease of newborn.

Practicals :

1) General Technology : (a) Glass-ware (b) Reagents (c) Instrumentation

2) Specimen Collection : (a) Different methods of collection. (b) Types and uses of Anticoagulants.

3) Haemoglobin :
Technique, Normal values, Abnormal values, Significance, Interpretation.

4) Red blood cells :
Technique, Normal values, Abnormal values, Significance, Interpretation.

5) Haematocrit :
Technique, Normal values, Abnormal values, Significance, Interpretation.

6) Red cell indices :
Methods, Normal values, Abnormal values, Significance, Interpretation.

7) Reticulocyte count and sickling Test :
Techniques, Significance, Interpretation.

8) Erythrocyte Sedimentation rate :
Methods, Normal values, Abnormal values, Significance.

9) White Blood cells :
Total count : (a) Techniques, Normal values, Abnormal values, Significance, Interpretation.
Differential count : (a) Preparation and staining methods for blood smear.
(b) Method of counting cells. (c) Identification of cells.

10) Platelets :
Techniques, Normal values, Abnormal values, Significance, Interpretation.

11) Bleeding Time, Clotting Time :
(a)Techniques, Normal values, Abnormal values, Significance, Interpretation.
(b) Clot Retraction time.

12) Prothrombine Time / PTTK (Partial Thromboplastin Time)
Techniques, Normal values, Abnormal values, Significance, Interpretation.

13) Absolute Eosinophil count :
Techniques, Significance.

14) Bone Marrow :
Demonstration of various types from smear examination.

15) Blood Transfusion Technique :
(a) Grouping : (i) ABO (ii) R.
(b) Cross Matching (i) Saline (ii) Albumine (iii) Coomb's
(c) Antibody Titre : Techniques, Significance.

B) Clinical Pathology :

Theory :

1) Introduction : Physiology and Anatomy of Urinary tract. Formation of Urine. Physiological composition of Urine, Stools etc.
2) General Technology : (a) Glass-ware (b) Reagents (c) Instrumentation (d) Specimen collection
3) Urine : Routine tests, Physical, Chemical and Microscopic examination.
4) Urine : Special tests.
5) Faeces : Normal constitution, Physical examination, Chemical examination, Wet preparations and Microscopy, Concentration Methods, Parasitology.

6) Sputum : Collection, Preparation of smear, staining cytology.
7) Semen : Physiology, Collection methods, Chemical examination, Microscopic examination, Complications.
8) Cerebro Spinal fluid : Physiology, collection methods, gross examination, differentation between subarachnoid haemorrhage and traumatic tap, Dry tap. Chemical examination protein globulin, Sugar, Chlorides.
9) C.S.F. : Microscopic examination. V.D.R.L.
10) Body fluid : Aspiration, Gross finding, chemical examination, Microscopic examination
11) Pregnancy test : Methods (a) Animal (b) Immunological.
12) Gastric analysis : Physiology, Collection, Gross Examination, Chemical examination, Microscopic examination.

Practicals :

1) Introduction
2) General Technology : (a) Glass-ware (b) Reagents (c) Instrumentation (d) Specimen collection
3) Urine examination : (a) Physical examination (b) Chemical examination (c) Microscopic examination
4) Faeces examination : (a) Methods of preparing wet smears (b) Physical examination (c) Chemical examination (d) Microscopic examination.
5) Sputum examination : (a) Gross examination (b) Physical examination (c) Chemical examination (d) Microscopic examination (e) Cytology.
6) Semen examination : (a) Gross examination (b) Chemical examination (c) Microscopic examination.
7) Cerebro Spinal Fluid : (a) Gross examination (b) Chemical examination (c) Microscopic examination (d) V.D.R.L. Test.
8) Body fluids : (a) Gross examination (b) Chemical examination (c) Microscopic examination (d) V.D.R.L. Test.
9) Pregnancy test : (a) Immunological test.

C) Histopathology

1) Principles of tissue processing : Fixation and fixatives and their uses. Methods of decalcification. Selection of tissue for processing.
2) Paraffin embedding methods : dehydration, clearing and impregnation. Vaccum embedding. Preparation of blocks.
3) Paraffin section cutting : Use of microtome and knives. Sharpening of knives-honing, stropping, automatic sharpeners. Difficulties in section cutting and fault finding, Mounting sections on slides.
4) Other methods of embedding : celloiding, gelation. Techniques of cutting frozen sections.
5) Theory of staining : Routine H & E staining. Special stains for paraffin and frozen sections. Elementary histochemistry.
6) Cytology techniques : Preparation of smears, fixation and staining. Papanicolaou staining and other stains for hormonal study and study of sex chromatin.

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Chairman BOS Path

7) Museum methods : Preservation and display of specimens. Methods of mounting in jars. Museum indexing.

3) Pattern of theory question paper

Section A

Q.No.1) Multiple choice questions (MCQ) (30) 30 Marks

a) Best response type - 10
b) True / False type - 10
c) Matching type - 10

Section B

Q.No.2) Long descriptive (Essay type) : any one out of two 14 Marks

Q. No. 3) Short descriptive (Notes type) : any two out of three 20 Marks (2 X 10)

Section C

Q. No. 4)Short answer type : any SIX out of EIGHT 12 Marks (6 X2)

Q. No. 5) Short answer type : any SIX out of EIGHT 1 Marks (6X :)

Q. No. 6) Short answer type : any SIX out of EIGHT 1 Marks (6X :)

4) Pattern of Practical Examination Question Paper

Q.No.1) 10 Marks
Find out minimum two abnormalities in given urine sample.

Q.No.2) 20 Marks
a) Find out Hb % of the given sample 5
b) Find out the blood group of given sample. 5
c) Find out the total leucocyte count of the given sample. 5
d) Prepare and stain the blood smear and find out the differential leucocyte count. 5

Q.No.3) Histo technique 10 Marks
a) Section cutting 5
b) Staining 5

Q.No.4) Spot identification and suitable answer type 20 Marks
Ten spots of two marks each

Q.No.5) Viva voce examination 20 Marks

Q.No.6) Internal Assessment 20 Marks
- Practical record book evaluation (10)
- Technical skill proficiency evaluation (training period - (5)
- Theory / practical / viva-voce performance evaluation at term ending and preliminary examination (5)

5) Books recommended

a) Clinical laboratory methods by John D. Bauer

b) Manual of Histological Techniques and their diagnostic Application (Churchill livingstone) by John D. Bancroft, Harry C. Cook

c) Clinical diagnosis by laboratory examination by John A. Kolmer

Dr S S Salgare
Chairman
BOS Para.