

BVoc Diploma PROGRAM (1 year)
Draft proforma for Syllabus framing
2020-21 onwards

SUBJECT
Diploma in Medical Lab Technology

Members of BOS(Contact details)		
Dr. P. Vijaya Nirmala HOD of Life & Health Sciences	University Nominee	Adikavi Nannaya University- Rajamahendravaram Cell:9441140857
Sri A.S.N.D.Prasad, M.Sc.,M.Sc.,B.Ed.,SET, (D.Pharm)	Member from College	MVN JS & RVR College of Arts and Science, Malikipuram. Cell:897885865
Kum.B.Prasanthi, M.Sc.	Member from College	MVN JS & RVR College of Arts and Science, Malikipuram Cell:
Sri M.Syam Babu,	Member from Other College	Lr.in Microbiology Sri YN College, Narasapuram, W.G.Dt.
Dr.R.Ramesh Babu, MBBS, DDM	Representatives of the Relevant Sector Skill Council	M.D of Vijaya Hospitals and Diagnostic Centre, Malikipuram Cell : 7998844555
Sri S.Hemasundar Rao	Representative of Industry Partner	Godavari Diagnosis Centre Malikipuram Cell: 9866182244
Dr.Ch. Suresh Babu, MD	Representative from Alumni	Sukhibava Hospital Palkollu, W.G.Dt.

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Note: BOS is to provide final soft copy in PDF and word formats and four copies of hard copies in bounded form to the office of Dean Academic affairs.

1. Resolutions of the Board of Studies

Meeting held on:.....Time:

At:

Agenda: To discuss about the UGC Sponsored B.Voc. Diploma program course structure, syllabus design, preparation of model papers and approval.

Members present:

1. **Dr. P.Vijaya Nirmala**, HOD, Associate Professor,
Department of Life and Health Sciences,
Adikavi Nannaya University, Rajahmahendravaram.
2. **Sri ASND Prasad**, HOD, Biochemistry,
MVN JS & RVR College of Arts and Science, Malikipuram
3. **Kum. B.Prasanthi**, Lr.in Biochemistry,
MVN JS & RVR College of Arts and Science, Malikipuram
4. Dr.R.Ramesh Babu, MBBS, DDM
Vijaya Hospitals
Malikipuram.

Resolutions:

1. It was resolved to adopt revised common programme structure as per the guidelines issued by UGC NSQF.
2. Resolved to adopt regulations and scheme of examinations and marks/grading system of the university Diploma program.
3. Resolved to prepare model question papers in the given prescribed format.
4. Resolved to prepare a list of equipment/software required for each lab/practicals.
5. Resolved to give the eligibility criteria of students for joining the course.
6. Resolved to give the eligibility criteria of faculty for teaching the course.
7. Resolved to prepare a list of paper setters/paper evaluators/project evaluators in the given prescribed format.

2. DETAILS OF PAPER TITLES & CREDITS

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./ Week	Credits	Max. Marks Cont/Internal/Mid Assessment	Max. Marks Sem-end Exam
I		Communication Skills	T		6	40	60
		Fundamentals of Information Technology	T		6	40	60
		Fundamentals of Medical laboratory Technology, Equipment and Reagents	T		5	40	60
		Clinical biochemistry	T		5	40	60
		Histopathology	T		5	40	60
		Practical & Field visit	L		2	40	60
		Fundamentals of Medical laboratory Technology, Equipment and Reagents Lab	L		2	50	50
		Clinical biochemistry Lab	L		2	50	50
		Field visit	P		1	50	50
II		Soft skills & Personality Development	T		6	40	60
		Biomedical Ethics	T		6	40	60
		Fundamentals of Medical Microbiology	T		4	40	60
		Hematology	T		4	40	60
		Blood banking	T		6	40	60
		Fundamentals of Medical Microbiology Lab	L		2	50	50
		Internship	P		2	50	50

Note: *Course type code: T: Theory, L: Lab, P: Problemsolving

a. Proposed combination subjects:

b. Student eligibility for joining in the course:

Candidates belonging to all categories for admission to the **Diploma in Medical Laboratory Technology** should have passed 10+2 with science or equivalent schooling from recognized Board or University with science subjects.

c. Faculty eligibility for teaching the course

The Teaching faculty should complete M.D. (Pathology/ Microbiology/ Biochemistry) / MBBS/ DHMS / DMS/ BDS/ BHP/ M.Sc.(Microbiology/ Biochemistry/ Biotechnology/

Pathology) with 55% of marks

Lab incharge should complete B.Sc.(MLT)/ DMLT (2 years lab experience)

- d. List of Proposed Skill enhancement courses with syllabus, if any
- e. Any newly proposed Skill development/Life skill courses with draft syllabus and required resources
- f. Required instruments/software/ computers for the course (Lab/Practical course-wise required i.e., for a batch of 15 students)

Sem. No.	Lab/Practical Name	Names of Instruments/Software/ computers required with specifications	Brand Name	Qty Required
1	Fundamentals of Medical laboratory Technology, Equipment and Reagents Lab	Incubator - 1 Hot air oven -1 Centrifuge -2 Microscope-10 Projection Microscope -1 Auto clave-1 Hotplate-2 Water bath-2	Kemi Remi Remi Olympus Olympus Remi Remi Kemi	1 1 2 10 1 1 2 2
2	Clinical biochemistry Lab	Haemocytometer -10 Colour meter – 2 Spectrometer -1 WBC Counters –6 Semi auto analyser- Chromatography Chamber-1 Electrophoresis-1 Analytical balance-2 Refrigerator-1	Thermo Scientific Equiptronic Equiptronic ERBA ERBA Any brand Thermo Scientific SP Biotech. LG	10 2 1 6 1 1 1 2 1
3	Fundamentals of Medical Microbiology Lab	Urino meter Fluro meter ESR tube stand Reagents Glass ware	Soft-touch ELICO Softtouch Merk Borosil	1 1 1 1 1

g. List of Suitable levels of positions eligible in the Govt/Pvt organizations

Suitable levels of positions for these graduates either in industry/govt organization like., technical assistants/ scientists/ school teachers., clearly define them, with reliable justification

S.No	Position	Company/ Govt organization	Remarks	Additional skills required, if any

h. List of Govt. organizations / Pvt companies for employment opportunities or internships or projects

S.No	Company/ Govt organization	Position type	Level of Position			

i. Any specific instructions to the teacher /paper setters/Exam-Chief Superintendent

60% External Examination, 40% Internal Examination

The Internal Assessment should consist of the following points for evaluation:-

i) Theory

ii) Practical /Clinical

iii) Viva/Assignments/Field visits.

(a) A minimum of two written examinations shall be conducted in each subject during a year and the average marks shall be taken into consideration for the award of Internal Assessmentmarks.

b) Practical examinations shall be conducted at the end of academic year.

c) 40% of marks in the University Theory Examinations 40% of marks in the University Practical Examinations

d) 40% of marks in the subject where internal evaluation alone is conducted 40% of marks in aggregate in Theory, Practical I.A. & Oral taken together.

3. Program objectives, outcomes, co-curricular and assessment methods

B.Voc.	DIPLOMA IN MEDICAL LAB TECHNOLOGY
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1. Aim and objectives of Diploma program in Subject:

Biochemistry is the study of biological phenomena at the molecular level. Its aim is to understand the fundamental chemical principles that govern complex biological systems. The program aims to provide an advanced understanding of the core principles and topics of biochemistry and their experimental basis to enable students acquire a specialized biological and chemical knowledge. The program also develops a foundation in the concepts and facts in biochemistry and accessing scientific knowledge

2. Learning outcomes of Subject (in consonance with the Bloom's Taxonomy):

Enrich with principles and basic mechanisms of metabolic control and molecular signaling
Use basic laboratory skills and apparatus to obtain reproducible data from biochemical experiments;
Implement experimental protocols, and adapt them to plan and carry out simple investigations;
Analyze, interpret, and participate in reporting to their peers on the results of their laboratory experiments;
Participate in and report orally on team work investigations of problem-based assignments;
Build knowledge and understanding in tackling more advanced and specialised courses, and more widely to pursue independent, self-directed and critical learning.

3. Recommended Skill enhancement courses: (Titles of the courses given below and details of the syllabus for 4 credits (i.e., 2 units for theory and Lab/Practical) for 5 hrs class-cum-lab work

4. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:

1. Assignments on:
2. Student seminars (Individual presentation of papers) on topics relating to:
3. Quiz Programmes on:
4. Individual Field Studies/projects:
5. Group discussion on:
6. Group/Team Projects on:

B General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.
5. Recommended Continuous Assessment methods:

4.Details of course-wise Syllabus

B.Voc. Diploma	Subject (Semester: I)	Credits:
Paper: 1	FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY Equipment and Reagents	Hrs/Wk:

1. Aim and objectives of Course : (Title of the course/paper):
FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY
2. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):
3. Detailed Syllabus: (Five units with each unit having 12 hours of class work)

PAPER1

[MLTSC1]

FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY Equipment and Reagents

Unit 1:

Introduction and Guidelines for medical laboratory, Basic laboratory principles - Code of conduct of medical laboratory personnel - Organization of clinical laboratory and role of medical laboratory technician - Safety measures - Medical laboratory professional and professionalism in laboratory workers - clinic borne infection and personnel hygiene

Unit 2:

Solutions and Reagents-Normal, Molar, Percent, Buffers Preparations, Indicators. Incubator, Hot Air Oven, Water Bath - Anaerobic Jar, Centrifuge, Autoclave -Microscope - Fundamentals of Microscopy, Resolution & Magnification, Light Microscopy, Electron Microscopy- Glassware – Description of Glassware, its use, handling and care

Unit 3:

The chemical composition, structure, and properties of substances. The chemical processes and transformations that they undergo including the use of chemicals and their interactions, danger signs, production techniques, and disposal methods.

Unit 4:

Definition -Classification and General Principle of Sterilization, Antiseptics &Disinfectants

Definition -Types - Mode of Action –Uses

Unit 5:

Requirement of Blood Collection - Blood collection - Phlebotomy - Sampling errors - Collection and preservation of biological fluids - Anticoagulants - Preservation of samples - Chemical preservatives - Process of analysing the specimens - The laboratory report.

REFERENCE BOOKS:

1. Fischbach,2005.Manualoflabanddiagnostictests,LippincottWilliamsWilkins, NewYork.
2. Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and leonard jarret, M.D.B.I., NewDelhi.
3. J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice,Tata McGraw- Hill, NewDelhi.
4. Kanai L. Mukherjee, 2007, Medical laboratory technology Vol.1.Tata McGrawHill

B.Voc.	DMLT (Semester: I)	Credits:
Paper: 2	CLINICAL BIOCHEMISTRY	Hrs/Wk:

1. Aim and objectives of Course : **CLINICAL BIOCHEMISTRY [MLTSC2]**

2. Learning outcomes of Course:

3. Detailed Syllabus: (Five units with each unit having 12 hours of class work)

Paper: 2

CLINICAL BIOCHEMISTRY [MLTSC2]

Unit 1: Basic Medical Laboratory Principles and Procedures, Introduction to clinical biochemistry. Equipment and Instruments – Photometer, Spectrophotometer, Fluorometer, urinometer, electrophoresis, and semi autoanalyser laminar air flow Analyzers. Quality Control.

Unit 2: Elementary classification and metabolism of carbohydrates. Regulation of blood sugar and Diabetes. Glucose Tolerance Test, Glycosylated Hemoglobin. General classification of proteins. Structure of proteins. Summary of protein digestion and amino acid metabolism. Determination of plasma proteins and its importance, General lipid metabolism, functions and disorders of plasma lipoproteins

Unit 3: Clinical Biochemistry of Enzymes, Enzymes as catalysts. structure and Functions of Isoenzymes.(LDH, CK, ALP) Enzymes classification and nomenclature. Enzymes in clinical diagnosis. Laboratory determinations of enzymes in diagnosis of Liver, Kidney, Heart, brain disorders, Clinical significance of SGOT, SGPT, S.ALP, S.ACP, Serum Amylase etc

Unit 4: Water & Mineral Metabolism and Acid-Base Balance, Body fluid distribution (Electrolyte and Water), Factors which influence the distribution of body water. Mineral metabolism-Importance of the trace elements (Cobalt, Molybdenum, Selenium and Chromium), Acid-Base balance in body, Buffer systems in body to regulate acid-base balance

Unit 5: Function Tests, Diseases of the kidneys. Creatine metabolism. Bile pigment metabolism. Disordered Bilirubin metabolism. Hepatic Jaundice and Post hepatic jaundice. Ischemic heart disease. Clinical significance of gastric analysis.

REFERENCE BOOKS:

1. Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
2. Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
3. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
4. Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
5. Robbins and Cortan, Pathologic Basis of Disease, VIII Edition.
6. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co.

Ltd.

B.Voc.	DMLT(Semester: I)	Credits:
Paper: 3	HISTOPATHOLOGY	Hrs/Wk:

1. Aim and objectives of Course : (Title of the course/paper): **HISTOPATHOLOGY [MLTSC3]**
2. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):
3. Detailed Syllabus: (Five units with each unit having 12 hours of class work)

Paper: 3

HISTOPATHOLOGY [MLTSC3]

Unit 1: Histology

Introduction - Tissue Preparation - Receipt of specimens - Labeling of specimens with numbering – Fixation - Aims and functions of a fixative - Classification of fixatives - Simple fixatives - Compound fixatives - Micro anatomical fixatives - Cytological fixatives - Histochemical fixatives - Post-chromatization - Fixation of specimens - Fixation for individual tissues – Dehydration - Ethyl alcohol – Acetone - Isopropyl alcohol – Dioxane - Clearing(Dealcoholisation)-Cedarwoodoil–Benzene–Xylene–Chloroform-Embedding Media-Paraffinwax–Paraplast-Paraplastplus–Gelatin-Watersolublewaxes–Celloidin
- Techniques of impregnation - Embedding or Blocking - Type of mould - Techniques of moulding - Decalcifying Agents - Selection of the tissues - Determination of end point - Neutralization of acid - Washing - Decalcifying agents - Use of ion exchange resins - Chelating agents - Electrophoretic decalcification - Treatment of hard tissues - Section Cutting: Microtomes, Microtome knives, Sharpening of knives, Care of microtome knives - Techniques of section cutting - Mounting of Sections - Automatic Tissue Processor (Vacuum) - Application of Microwave Technology to Histology – Principle - Applications

Unit 2:

Introduction - Labeling of Tissues - Fixation and Cutting of Small Biopsies - Renal biopsies - Intestinal biopsies - Skin biopsies - Muscle biopsies - Other tissues - Orientation of Tissue Blocks, Routine staining techniques - Special Stains

Unit 3: Frozen Technique

Introduction - Frozen Section – Overview - Use of Freezing Microtome – Fixation - Freezing Microtome - Fixing sections on slides - Staining of frozen sections (rapid staining) - Advantages

and disadvantages - Frozen Sections Using Cryostat – Uses - The Cryostat - LEICA CM 1850 Cryostat - The components - Set up of instrument prior to operation - Operation of the Cryostat - Terminating work - Trouble shooting - Cleaning, disinfection, maintenance - Staining of Frozen Sections for Rapid Diagnosis.

Unit 4:

Introduction - Specimen Collection - Specimen samples - Fine needle aspiration cytology (FNAC) – Preservation - Fresh specimen - Prefixation refers - Preparation of Smears - Viscid Secretions - Body fluids – Sputum - Precautions against infections – Fixation - Fixation method falls into one of 3 categories - Alcohol fixatives - Unstained smears which require to be mailed to a cytology laboratory – Staining - Papanicolaou method - May Grunwald giemsa (MGG) stain - Mounting - Destaining Procedures –AutomationMass screening methods for early detection of cancer, Sputum examination

Unit 5: Examination of Urine

Introduction – Collection of Urine - Special type of collection of urine - Biohazard management - Components of routine urine analysis - Colour - Clarity - Odour - Volume - Chemical Examination - Sugar in Urine - Tests for Sugar In Urine - Benedict's Test Fehling's test - Chemistrip method - Protein in Urine - Test for Protein in Urine - Heat and Acetic Acid Test - Sulphosalicylic Acid Test - Heller's Test. - Heat and Acetic Acid Test - Ketone Bodies in Urine - Test for Ketones in Urine - Rothera's Test - Gerhardt's test - Bile in Urine - Test for Bilirubin - Fouchet's Test - Test for Bile salts - Hay's Test - Blood in Urine, Test for Hematuria - Benzidine Test - Guaiacum Test - Gregersen's Test. Microscopic Examination of Urine: Crystals Found In Urine - Crystals Found In Acid Urine - Uric Acid & Urates - Calcium oxalates in Crystals - Cystine Crystals - Leucine and tyrosine crystals - Drug crystals - Crystals Found In Alkaline Urine - Ammonium magnesium phosphates - Dicalcium phosphates - Calcium carbonate - Ammonium biurate - Casts In Urine - Cells in Urine:- Red Blood cells, Pus cells, Epithelial cells, Spermatozoa, Bacteria, Tumour cells Examination of stool- physical, chemical & microscopic examination

REFERENCES

1. Teitz, *Clinical Chemistry*. W.B. Saunders Company Harcourt (India) Private Limited New Delhi.
2. KAPLAN, *Clinical Chemistry*, Mosby Company, St. Louis Washington, D.C. Toronto.
3. Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd. Kolkata-India
4. Ramanic Sood, *Laboratory Technology (Methods and interpretation)* 4th Ed. J.P. Bros, New Delhi
5. Mukharji, *Medical Laboratory Techniques*, Vol - I, II & III, 5th Edn. Tata McGrawHill, Delhi.

Details of Lab/Practical/Experiments/Tutorials syllabus:

LAB:1

Fundamentals of Medical laboratory Technology, Equipment and Reagents Lab

1. Handling common laboratory equipment's
2. Preparation of various reagents.
3. Responsibilities of a technician in the maintenance of the analyzers.
4. Use and care of microscopes.
5. Measurement of microbes by micrometry.
6. Simple staining methods and gram stains
7. Preparation of media.
8. Using of autoclave hot air oven, other common laboratory equipment etc.
9. Disinfection practices in laboratory and wards.
10. Techniques of cultivation of bacteria.
11. Isolation of bacteria from clinical specimens.
12. Standard Plate Count.
13. Antibiotic sensitivity test
14. Techniques in tissue culture. (Demonstration)
 - a. Demonstration of Cytopathogenic effect (CPE)
 - b. Haemagglutination test.
 - c. Haemagglutination inhibition test.
 - d. Viral Serology, PCR

(Perform Minimum 10 practical

LAB: 2

Clinical biochemistry Lab

1. Glucose Determination - Body Sources of Glucose - the Clinical Significance Of Abnormal Blood Sugar Levels - The Glucose Oxidase Method Of Glucose Determination -The Colormetric Method--Ortho-Toluidine –
 2. The Glucose Tolerance Test (GTT) - Glycated Hemoglobin
 3. Enzymatic using urease - 'Neseler's Method - Berthelot Reaction - In the urease/glutamate dehydrogenase method - Kinetic Method - GLDH method
 4. Colorimetric Method - Estimation of Serum Creatinine
 5. Liver function Tests
 6. Widal Tests,
 7. IgM.IgG Testing
 8. Tests for malaria
 9. Tri-dot test
 10. Lipid profile - Total lipids –Phospholipids
 11. Estimation of Serum HDL cholesterol
 12. Collection of specimen and its preservation - Preservatives used - Physical examination of urine - Colour - Appearance - Turbidity - Specific gravity - Volume - Polyuria - Oliguria - Anuria - PH - Chemical Examination - Proteins - Glucose / Reducing Substances - Ketone Bodies - Blood - Bilirubin - Urobilinogen -Tests - For Proteins - Heat test - TCA test - For Sugars - Benedict's Tests - For Blood/Haemoglobin - Benzidine test - For Ketone bodies: Rothera's nitroprusside test- Gerhardt's Test. For Bile Salts: Hay's Test - For Bile Pigments - Fouchet's Test
- (Perform Minimum 10 practical)

Field Visit: 50 marks

The Field visit should be helpful to the students for acquiring the practical knowledge on histopathology.

MODEL QUESTION PAPER (Sem-end. Exam)

Model Paper

FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY Equipment and Reagents [MLTSC1]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Describe the basic principles of medical laboratory and role of technician

(Or)

b) Describe Clinic borne infection and personnel hygiene in clinical lab

2. a) Write about the Molarity, normality, percentage of laboratory reagents.

(Or)

b) Describe the Compound microscope.

3. a) Write about the chemical composition, structure, and properties of Laboratory substances

(Or)

b) Describe the disposal of laboratory chemicals and reagents.

4. a) Describe the Sterilization methods

(Or)

b) Write about disinfectants and antiseptics.

5. a) Write about the phlebotomy.

(Or)

b) Describe Anticoagulants and preservation of blood sample

Section-B

Answer any FIVE Questions

5×2=10

1) UTI

2) Indicators

3) Hot air oven

4) Danger sign of Reagents

5) Antiseptics

6) CSF

7) The lab Report

8) Water both

Model Paper
CLINICAL BIOCHEMISTRY [MLTSC2]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Describe the Spectrophotometer and applications
(Or)
b) Describe the semi autoanalyser and applications
2. a) Describe the Diabetes and Diagnosis methods
(Or)
b) Describe the plasma proteins and their importance
3. a) Write about role of iso enzymes in clinical diagnosis
(Or)
b) Describe the enzymes in diagnosis of liver disease.
4. a) Describe the acid-base balance in human body
(Or)
b) Write about the importance of trace elements
5. a) Describe the renal diseases
(Or)
b) Describe the Jaundice

Section-B

Answer any FIVE Questions

5×2=10

1. Fluorometer
2. Urinometer
3. GTT
4. LDH
5. Serum amylase
6. Buffers
7. Gastric juice
8. SGOT

Model Paper
HISTOPATHOLOGY [MLTSC3]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Describe the sample receiving and tissues preparation

(Or)

b) Describe Techniques of moulding

2. a) Fixation and Cutting of Small Biopsies

(Or)

b) Describe the staining techniques

3. a) Write about use of Freezing Microtome

(Or)

b) Write about the advantages and disadvantages of Cryostat

4. a) Describe the FNAC

(Or)

b) Mass screening methods for early detection of cancer

5. a) Write about the routine urine examination

(Or)

b) Microscopic Examination of Urine:

Section-B

Answer any FIVE Questions

5×2=10

1. Mould
2. Specimen
3. Biopsy
4. Microtome
5. Rapid stain
6. Sputum
7. Benedicts test
8. Hematuria

B.Voc.	DMLT (Semester: II)	Credits:
Paper-4	FUNDAMENTALS OF MEDICAL MICROBIOLOGY [MLTSC4]	Hrs./Wk.:

1. Aim and objectives of Course:**FUNDAMENTALS OF MEDICAL MICROBIOLOGY [MLTSC4]**
2. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):
3. Detailed Syllabus: Five units (i.e., each unit having 12 hours of class work)

Paper: 4

FUNDAMENTALS OF MEDICAL MICROBIOLOGY [MLTSC4]

Unit 1:

Historical Aspect -Branches of Microbiology-Prokaryotic Organisms -Prokaryote Vs Eukaryote-Cell Wall, Structures external to Cell Wall, Structures internal to Cell Wall, Spores.- Eukaryotic Organisms - Structure of eukaryotes, Characteristics of eukaryotes.

Unit 2:

Nutritional requirement of microorganisms-Types of media-Microbial growth and growth Curve Collection, Transportation and processing of clinical samples for Microbiological Investigations.

Unit 3:

Definition - Bacteria – General characteristics of Bacteria -Classification and morphology of Bacteria - Staphylococcus, Streptococcus, Pneumococcus, Neisseira gonorrhoea, Neisseira meningitis, Cornybacterium diptheriae, Mycobaterium, Clostridium, E.coli, Klebsiella, Salmonella, Proteus, Pseudomonas, Vibrio & Spirochaetes with reference to their : - Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis.

Unit 4:

Definition - General Introduction of Virus - Phsiochemical characteristic of Viruses - Isolation of Viruses in Laboratory by tissue culture -Cell and tissue culture technology - Embryonated Egg - Principles of animal cell culture and their use in Virology - Retro viruses - HIV, Hepatitis virus , Pox virus , Picrona virus - Polio - Orthomyxo virus - Influenza - Arbo virus - Chikungunya, Dengue - Herpes and Adeno virus with reference to their mode of infection, pathogenesis and diagnosis-Bacteriophages

Unit 5:

Introduction -Non specific resistance to infection -Specific immunity. Antigens. Antibodies- Structure and function.- Complement and antigen-antibody reaction. Hybridoma and Monoclonal antibodies.

Applied immunology -Hypersensitivity. -Autoimmunity. -Transplantation and Tumour immunity.

REFERENCE BOOKS:

1. Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
2. Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
3. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
4. Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
5. Robbins and Cotran, Pathologic Basis of Disease, VIII Edition.
6. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

B.Voc.	DMLT (Semester: II)	Credits:
Paper-5	HAEMATOLOGY [MLTSC5]	Hrs./Wk.:

Paper: 5
HAEMATOLOGY [MLTSC5]

1. Aim and objectives of Course:**HAEMATOLOGY [MLTSC5]**
2. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):
3. Detailed Syllabus: Five units (i.e., each unit having 12 hours of class work)

Unit 1:

Introduction to practical's in clinical laboratory, Assessment of a patient and brief history collection. Collection of blood, sputum, urine and stool specimens, packing of equipments for CSSD, Develop specific goals and plans to prioritise, organise, and accomplish work, Specimen Collection - Methods - venipuncture - Patient Identification - Site selection - Tourniquet application - Cleansing the Venipuncture site - Sample Collection - Specimen Collected by skin puncture - Collection from indwelling catheters- Use basic non-automated tests to assess blood cells- See and analyse details at close range- Collect, receive and conduct a pre-analytical processing of clinical laboratory specimens.

Unit 2:

Composition of blood, Haemoglobin synthesis. Various haemoglobins, Haemopoietic system of the body. . Erythropoiesis, Leucopoiesis and development of blood corpuscles. Thrombopoiesis, Blood cell counts: Clinical significance of Total erythrocyte count, total leucocyte count, differential count, Erythrocyte sedimentation rate and platelet count.

Unit 3:

General consideration of blood coagulation, Mechanism of coagulation. The fibrinolytic mechanism. Clinical significance of routine coagulation tests, Anaemia. Various types of anaemias – Iron deficiency anemia, Aplastic anemia, Perinicious anemia, Sideroblastic anemia and Sickel cell anemia, Other hematological diseases – HDNB, Thalassaemia, Leukemia

Unit 4:

Specimen - Advantages of EDTA blood - Disadvantages of EDTA blood - Blood Smear Method - Cover slip method - Spreader slide method - Wedge method - Characteristics of a Proper Wedge Film - Types of Smear - Thick Smear - Thin Smear - Common causes of a poor blood smear - Biological (in diseased condition) causes of a poor smear - Precautions - Drying of Smears - Staining Of the Blood Films - Preparation of Stains - Leishman's stain - Wright's Stain - Field's stain - Romanowsky stains - Steps for staining - Manual staining methods - Rack method - Dip method. General consideration- Blood cell counters. Flow through cytochemical differential counter. Automated coagulated systems, automation in serum analysis.

Unit 5:

Human Blood Group Systems (random and cross check). Inheritance of blood group systems. Collection of blood components for fractional transfusion-Platelets packed Red Cell, Platelet rich Plasma, Platelets concentrate-Preparation of concentrated (packed) Red cells- Techniques of preparation

REFERENCES

1. Ramanic Sood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, NewDelhi
2. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros, NewDelhi
3. Shirley Mitchell Lewis, Barbara J. Bain, Imelda Bates (2006) Dacie And Lewis Practical Haematology, 10th Ed, ChurchillLivingstone/Elsevier.
4. Barbara A. Brown(2008) Hematology: principles and procedures 6th Ed Lea &Febiger.
5. Bernadette F. Rodak, George A. Fritsma, Kathryn Doig (2007) Hematology: Clinical Principles and Applications 3rd Ed, Elsevier HealthSciences.

B.Voc.	DMLT (Semester: II)	Credits:
Paper-6	BLOOD BANKING [MLTSC6]	Hrs./Wk.:

Paper: 6

BLOOD BANKING [MLTSC6]

1. Aim and objectives of Course:**HEAMATOLOGY [MLTSC5]**
2. Learning outcomes of Course (in consonance with the Bloom's Taxonomy):
3. Detailed Syllabus: Five units (i.e., each unit having 12 hours of class work)

Unit 1:

Principal & Practice of blood Transfusion-Blood Transfusion service at District level- Guide lines for the use of Blood, Appropriate use of Blood, Quality Assurance-Antilogous Blood Transfusion practices-Objectives of Quality Assurance in Blood Transfusion services, Standard operating procedures for usage, donation & storage of blood, screening of donor, compatibility testing, safety, procurement of supplies. Investigation of Transfusion reaction-Hemolytic transfusion reaction-Actions to take when transfusion reaction occurs.

Unit 2:

Introduction -Blood donor requirements - Criteria for selection & rejection-Medical history & personal details -Self-exclusion-Health checks before donating blood-Screening for TTI. Blood Collection -Blood collection packs-Anticoagulants-Taking & giving sets in Blood transfusion- Techniques of collecting blood from a doctor- Instructions given to the donor after blood donation-Adverse donor reaction.

Unit 3:

Screening donor's blood for infectious agents - HIV, HCV, HBV, Trepanoma palladium, Plasmodium, HTLV-Bacterially contaminated Blood. Blood donation record book-Recording results- Blood donor card- Documentation in blood bank- Types of documents. Blood bank temperature sheet. Blood bank stock sheet. Blood transfusion request form-Record Maintenance-Period of record archival- Process information by compiling, coding, categorising, calculating, tabulating, auditing or verification of data- The standard protocol for documenting the data in the patient's files and in the computer for future records- Evaluate the completeness of patient data-Monitor quality control data to rapidly identify analytical deficiencies- Document errors and note the remedial actions they have taken

Unit 4:

Storage of Blood and its components - Whole Blood - Platelets - Leucocytes - Plasma - Fresh Frozen Plasma- Anticoagulant & Preservatives -- Whole Blood - Red Cells - Red Cells- Frozen State - High glycerol solution. - Low glycerol solution. – Changes in blood after storage- labelling of blood units-Gas refrigerator-Lay out of a blood bank refrigerator Packing and Transportation.

Unit 5:

Introduction to a microscope - Parts of a microscope - Centrifuge - Automated Cell Counter

- Urine Analyser - Maintenance of equipments in the hematology lab - Coagulometer Responsibilities of a labtechnologist

- Assessment of a patient and brief history collection. Collection of blood, sputum, urine and stool specimens, packing of equipments for CSSD, Develop specific goals and plans to prioritise, organise, and accomplish work

REFERENCES

1. Ramanic Sood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, NewDelhi
2. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros, NewDelhi Shirley Mitchell Lewis,Barbara J. Bain,Imelda Bates (2006) Dacie And Lewis Practical Haematology, 10th Ed, ChurchillLivingstone/Elsevier.
3. Barbara A. Brown(2008) Hematology: principles and procedures 6th Ed Lea &Febiger.
4. Bernadette F. Rodak,George A. Fritsma,Kathryn Doig (2007) Hematology: Clinical Principles and Applications 3rd Ed, Elsevier HealthSciences.

4. Details of Lab/Practical/Experiments/Tutorials syllabus:

Microbiology Lab

1. Collection of BloodSamples
2. Obtaining peripheral BloodSmear
3. Staining Of BloodSmear
4. Obtaining Cell Counts – Rbc, Wbc, Platelets both manual and automated
5. Absolute EosinophilsCount
6. Estimation ofHaemoglobin
7. Packed Cell Volume, ErythrocyteIndices
8. ESR
9. ReticulocyteCount
10. DifferentialCount
11. BleedingTime
12. Clotting

Practical Lab Model Paper

Time: 3 hrs

Max marks: 50

1. Major Experiment -20marks
2. Minor Experiment – 10 marks
3. Sports $5 \times 2 = 10$ marks
4. Record-5 marks
5. Viva voce-5 marks



Internship: 100 marks

- Number of days 15 days (minimum) and maximum 30days
 - Area of Internship: Hematology Laboratories/Biochemistry Laboratories/Blood Bank (private or Govt)
5. Recommended Co-curricular activities:(Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)
- A. Measurable:
1. Assignments on:
 2. Student seminars (Individual presentation of papers) on topics relating to:
 3. Quiz Programmes on:
 4. Individual Field Studies/projects:
 5. Group discussion on:
 6. Group/Team Projects on:
- B. General
1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
 2. Group Discussions on:
 3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
 4. Any similar activities with imaginative thinking.
6. Recommended Continuous Assessment methods:



MODEL QUESTION PAPER (Sem-End. Exam)

B.Voc.	DMLT (Semester: II)	Max. Marks:
Paper: 1	FUNDAMENTALS OF MEDICAL MICROBIOLOGY [MLTSC4]	3Hrs

Model Paper

FUNDAMENTALS OF MEDICAL MICROBIOLOGY [MLTSC4]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Write about the historical aspects of microbiology
(Or)
b) Describe the prokaryotic cell structure
2. a) Describe the nutritional aspects of microorganisms
(Or)
b) write about cultivation techniques of microbes
3. a) Describe the general characters of bacteria
(Or)
b) Write about the pathogenicity of salmonella
4. a) Describe the physicochemical characters of virus
(Or)
b) Write about the HIV Virus
5. a) Describe the classification of Antibodies
(Or)
b) Write about the hybridoma technology

Section-B

Answer any FIVE Questions

5×2=10

1. Cell membrane
2. Spore



3. Media
4. Mycobacterium
5. Hepatitis
6. Arbovirus
7. E.coli
8. Hypersensitivity

Model Paper

HEAMATOLOGY [MLTSC5]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Write about assessment of a patient and brief history
(Or)
b) Write about blood sample collection
2. a) Write about the blood composition
(Or)
b) Write about the RBC count and it's clinical importance
3. a) Write about blood coagulation
(Or)
b) Write about the Types of Anemia
4. a) Write about the advantages and disadvantages of EDTA blood
(Or)
b) Write about the Flow through cytochemical differential counter.
5. a) Write about the Human blood group system
(Or)
b) Describe the platelets separation



Section-B

Answer any FIVE Questions

5×2=10

1. Tourniquet
2. Thrombopoiesis
3. ESR
4. Leukemia
5. SCA
6. Blood smear
7. Packed RBC
8. Blood cell counter

Model Paper

BLOOD BANKING [MLTSC6]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Describe the Blood Transfusion
(Or)
b) Write about the blood transfusion reactions
2. a) Write about the blood donor requirements
(Or)
b) Write about the techniques of blood collection
3. a) Write about screening of donor blood
(Or)
b) write about documentation and records of blood donor
4. a) Write about the storage of Blood components
(Or)
b) Write about the transportation of blood
5. a) Write about the automated cell counter
(Or)



b) Write about maintenance of hematology lab

Section-B

Answer any FIVE Questions

5×2=10

1. Donor
2. Blood
3. HCV
4. ELISA
5. WBC
6. Anticoagulants
7. Urine analyzer
8. Microscope

6. DETAILS OF SYLLABUS ON SKILL ENHANCEMENT COURSES AND MODEL QUESTION PAPERS FOR THEORY AND LAB

Paper: 1

COMMUNICATION SKILLS [DCGED1]

Unit I: Vocabulary Building, Grammar

Prefixes and Suffixes, Conversion, Compounding, Analogy, One-Word Substitutes, Words Often, Confused, Synonyms and Antonyms, Phrasal Verbs, Types of Verbs, Subject-Verb, Agreement

Unit II: Grammar – 2

Meanings of Modals, Tense (Present and Past) and Aspect, The Several Possibilities for Denoting Future Time, Articles and Prepositions

Unit III: Listening & Reading Skills

The Importance of Listening, Types of Listening, Barriers/Obstacles to Effective Listening, Strategies for Effective Listening, Skimming, Scanning, Intensive Reading and Extensive Reading, Comprehension

Unit IV: Pronunciation & Speaking skills-1

The Sounds of English, Word Accent, Intonation, Conversation Skills, Interview Skills, Presentation Skills, Public Speaking



Unit V: Speaking Skills -2 & Writing skills

Role Play, Debate, Group Discussion, Spelling, Punctuation, Information Transfer, Tables, Bar Diagrams, Line Graphs, Pie Diagrams, Flow Charts, Tree Diagrams, Pictures

Model Paper

COMMUNICATION SKILLS [DCGED1]

Time: 3 Hours

Maximum Marks: 60

Part - A

1. Comprehension - 5 Marks (Five Multiple Choice Questions)

Part - B

2. Objective Type Questions - 20 Marks (Twenty Multiple Choice Questions)

Part - C

3. One Word Answers - 10 Marks (Ten Questions)

Part - D

4. One Sentence Answers - 10 Marks (Five Questions)

Part - E

5. Matching - 5 Marks (5=6)

Part-F

6. Writing Skills Bar/pie Diagram - 10 marks (5×2=10)



Paper:2
Fundamentals of information technology[DCGED2]

Unit-I:

Basics of Computers :Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working – Central Processing Unit – I/O Devices.

Unit-II:

Primary, Auxiliary and Cache Memory – Memory Devices. Software, Hardware, Firmware and Peopleware – Definition and Types of Operating System – Functions of an Operating System – MS-DOS – MS Windows – Desktop, Computer, Documents, Pictures, Music, Videos, Recycle Bin, Task Bar – Control Pane.

Unit-III: MS-Word

Features of MS-Word – MS-Word Window Components – Creating, Editing, Formatting and Printing of Documents – Headers and Footers – Insert/Draw Tables, Table Auto format –Page Borders and Shading – Inserting Symbols, Shapes, Word Art, Page Numbers, Equations –Spelling and Grammar – Thesaurus – Mail Merge

Unit-IV: MS-PowerPoint

Features of PowerPoint – Creating a Blank Presentation - Creating a Presentation using aTemplate - Inserting and Deleting Slides in a Presentation – Adding Clip Art/Pictures -Inserting Other Objects, Audio, Video - Resizing and Scaling of an Object – Slide Transition – Custom Animation,WWW-Web Applications, Web Terminologies, Web Browsers,URL – Components of URL, Searching WWW – Search Engines and Examples

Unit-V: MS-Excel

Overview of Excel features – Creating a new worksheet, Selecting cells, Entering and editing Text, Numbers, Formulae, and Referencing cells – Inserting Rows/Columns –Changing column widths and row heights, auto format, changing font sizes, colors, shading.
E-mail: Definition of E-mail - Advantages and Disadvantages – UserIds, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management, Email Inner Workings.

Reference Books:

1. Fundamentals of Computers by ReemaThareja, Publishers : Oxford University Press, India
- 2.Fundamentals of Computers by V.Raja Raman, Publishers : PHI
3. Microsoft Office 2010 Bible by John Walkenbach, Herb Tyson, Michael R.Groh and FaitheWempen, Publishers : Wiley



Model Paper

Fundamentals of information technology[DCGED2]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. a) Write about the basics of computers
(Or)
- b) Write about classification of computers
2. a) Write about the memory devices
(Or)
- b) Describe the operating system
3. a) Write the features of MS-Word
(Or)
- b) Describe the mail merge
4. a) Write about power point features
(Or)
- b) Describe the web and it's applications
5. a) Describe the features of Excel
(Or)
- b) Write about e-mail and it's functions

Section-B

Answer any FIVE Questions

5×2=10

1. Block diagram
2. RAM
3. Recycle bin
4. Mail merge
5. Search engine
6. Header
7. Draw the Excel formatting toolbar



8. OS

Semester-II

Paper: 3

Personality development and soft skills[DCGED3]

Unit-1:

Introduction to Personality development, definition, Factors influencing personality, assessment of personality, self-concept, self-awareness-the johari window, Self-Esteem-formation and development, Self Confidence.

Unit-2:

Introduction and Elements interpersonal communication, Development of interpersonal skills, steps to improve interpersonal skills, use of interpersonal skills, and barriers to effective communication.

Unit-3:

Introduction to Emotions, affects, emotions and moods, Basic sets, functions and understanding of emotions, Mood as positive and negative affect, managing emotions, Anger and Anxiety management.

Unit-4:

Introduction-Verbal Communication skills, Effective Listening, Questioning, Speaking, Non-Verbal communication, Barriers to Effective Communication, Thinking-Critical, Creative, Reasoning, Decision making, Problem solving and Goal Settings.

Unit-5:

Communication guidelines, Resume, cover letter, Interview and GD, Digital communication, Social media, Positive behaviour, values in action project, Virtues and Strengths-Wisdom, knowledge, courage, humanity, Justice, Temperance and Transcendence.



Model Paper

Personality development and soft skills[DCGED3]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. A)

(or)

B)

2. A)

(or)

B)

3. A)

(or)

B)

4. A)

(or)

B)

5. A)

(or)

B)

Section-B

Answer any FIVE Questions

5×2=10

1.

2.

3.

4.

5.

6.

7.



8.

Paper: 4

BIOMEDICAL ETHICS [MLTGE4]

Unit-I: Introduction to Value Education

1. Value Education, Definition, Concept and Need for Value Education
2. The Content and Process of Value Education
3. Self-Exploration as a means of Value Education
4. Happiness and Prosperity as parts of Value Education

Unit-II: Professional Ethics

1. Value Based Life and Profession
2. Professional Ethics and Right Understanding
3. Competence in Professional Ethics
4. Issues in Professional Ethics – The Current scenario
5. Vision for Holistic Technologies, Production System and Management Models

Unit-III

1. Co-operation and working relationship with other health professionals
2. Confidentiality of patient information and test result
3. Dignity and privacy of patient
4. Responsibility from acquisition of the specimen to the production of data
5. Accountability for quality and integrity of clinical laboratory services
6. Institutional ethical committee and its role
7. Health & Medical surveillance

Unit-IV

1. Laboratory ethics of Bio-Safety.
2. Code of good and safe laboratory practice for support staff and responsibilities of the workers regarding Biosafety.
ISO rules for laboratory medicine.
3. Set up of a laboratory on the basis of safety priority and Laboratory Biosafety Guidelines.
4. Laboratory Biosafety Level Criteria (BSL-1-4).
5. Handling, transfer and shipment of specimen. Decontamination and disposal. Treatment and disposal technologies for health- care waste.

Unit-V

1. Wastes management, life cycle of bio-medical wastes.
2. Reduce recycle and reuse of wastes, technology used for bio-medical wastes treatment and disposal.
3. Chemical, electrical, fire and radiation safety. Safety organization
4. General Safety checklist
5. Hazardous properties of instruments and Laboratory chemicals. Laboratory first-aid measures and kit.



6. Safety equipment. Safety signs.

Model Paper

BIOMEDICAL ETHICS [MLTGE4]

Time: 3hrs

Max marks: 60

Section-A

Answer all Questions

5×10=50

1. A) Describe Concept and Need for Value Education
(or)
B) Write about the happiness and Prosperity as parts of Value Education
2. A) Write about the Value Based Life and Profession
(or)
B) Write about the vision for Holistic Technologies, Production System and Management Models
3. A) Write about Co-operation and working relationship with other health professionals
(or)
B) Write about health & Medical surveillance
4. A) Write about the Code of good and safe laboratory practice
(or)
B) Write about the Handling, transfer and shipment of specimen
5. A) Write about the biomedical waste management
(or)
B) Write about hazardous properties of instruments and Laboratory chemicals

Section-B

Answer any FIVE Questions

5×2=10

1. Self-exploration
2. Value of education
3. Professional Ethics
4. Medical surveillance
5. ISO
6. BSL



7. Healthcare waste
8. Safety sign.