BHAIKAKA UNIVERSITY

Rules/Regulations & Syllabus

For the course of

B.Sc.- Medical Technology
[Clinical Laboratory Technology]

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BHAIKAKA UNIVERSITY

F.Y.B.Sc.- Medical Technology
[Clinical Laboratory Technology]
Curriculum

Sr. No.	Subject	Course No.	Teaching Hours
Main Subjects			
1	Human Anatomy	BMT-101	60
	Practical – Anatomy	BMT-101(P)	30
2	Human Physiology	BMT-102	60
	Practical – Physiology	BMT-102(P)	30
3	Pathology	BMT-103	60
	Practical – Pathology	BMT-103 (P)	30
4	Microbiology	BMT-104	60
	Practical – Microbiology	BMT-104 (P)	30
5	Biochemistry	BMT-105	60
	Practical- Biochemistry	BMT-105(P)	30
		Main Subjects- Teaching hours	450
Subsidiary subjects			
6	English	E-101	60
	Practical-English	E-102(P)	30
7	Health-Care	BMT-S-101	30
		Subsidiary subjects- Teaching hours	120
		Teaching hours-Theory/Practicals	570
		Hospital Posting	360
		Total Teaching hours	930

BHAIKAKA UNIVERSITY

B.Sc.- Medical Technology
(First Year)

Table 1. Subjects, Credits and Scheme of Examination

Sr. No.	Subject	Course No.	No. Credits per week	Duration of Uni. Exam	External Marks	Internal Marks	Total	Grand Total
1	Human Anatomy	BMT-101	2	3	80	20	100	100
	Practical – Anatomy	BMT-101(P)	1	-	-	-	-	
2	Human Physiology	BMT-102	2	3	80	20	100	100
	Practical – Physiology	BMT-102(P)	1	-	-	-	-	
3	Pathology	BMT-103	2	3	80	20	100	100
	Practical-Pathology	BMT-103(P)	1	-	-	-	-	
4	Microbiology	BMT-104	2	3	80	20	100	100
	Practical- Microbiology	BMT-104(P)	1	-	-	-	-	
5	Biochemistry	BMT-105	2	3	80	20	100	100
	Practical- Biochemistry	BMT-105(P)	1	-	-	-	-	
6	English	E-101	2	3	80	20	100	100
	Practical-English	E-102(P)	1	-	-	-	-	
7	Health-Care	BMT-S-101	1	2	40	10	50	50
							Total	650

Rules & Regulations for the course of F.Y.B.Sc.- Medical Technology

B.Sc.- Medical Technology (First Year)

With the increasing use of advanced diagnostic and therapeutic technologies in medicine; there has been a challenging career for well-trained Medical technologists in different specialties of **Medical Technology**.

Proposed course of First Year of **B.Sc. – Medical Technology** offers a sound foundation to pursue further, in second and third year of B.Sc. MT, any of the several specialties of Medical; Technology; some of them have been mentioned here under:

a. Clinical Laboratory Technology
b. Operation Theater & Anesthesia Technology
c. Respiratory Care Technology
d. Imaging Technology
e. Cardiac Care Technology
f. Perfusion Technology
g. Neuro Science Technology
h. Renal Dialysis Technology
i. Radiotherapy Technology

R. BMT. 1: **Eligibility for the admission:**
Candidates who have passed 10+2 examination conducted by any recognized School Certification Board or Equivalent Examination; with principal subjects Physics, Chemistry, Biology/Maths and English (A or B or AB group student).

R. BMT. 2: **Duration of the course:**
Duration shall be for a period of **three years** for the course of B.Sc.- Medical Technology in *Clinical Laboratory Technology*.
All other courses will be of **four years** duration; having a compulsory stipendiary Internship during the fourth year.

R. BMT. 3: **Medium of instruction:**
The medium of instruction and examination shall be in English.

R. BMT. 4: **Attendance**
Candidate shall be required to attend at least 75% of the Lectures and Practical separately in each year.

R. BMT. 5: **Subjects, Credits and Scheme of examination**
Main and Subsidiary subjects are common in first year for all the courses of Medical Technology. The subject-wise details of examination for the first year have been given in Table 1.
There shall be three examinations one each at the end of 1st, 2nd and 3rd year.

There shall be no University Practical Exam in the First Year.
It is however necessary that candidates score at least 35% internal marks in all main as well as subsidiary subjects - theory and practical - to become eligible to appear in the University examination.

R. BMT. 6: Eligible candidate desirous for appearing in the University examination of any/all theory papers must forward his/her application in the prescribed form from the respective college to the University on or before the date prescribed for the purpose under the relevant ordinance.

R. BMT.7: **Standard of passing**:
The standard of passing the F.Y.B.Sc. degree examination will be as under:

(a) To pass the B.Sc. Degree examination, a candidate must obtain at least 3**5% marks** (aggregate of external and internal) in each of the main and subsidiary subjects **separately.**

(b) Award of class will be as per the Bhaikaka University.

R. BMT. 8: **Promotion and A.T.K.T.**

a. Candidates, who have passed separately in theory and practical of all subject heads (course) in F.Y.B.Sc. and S.Y.B.Sc. Shall be promoted to S.Y.B.Sc. And T.Y.B.Sc. Respectively.

b. Candidates, who fail in **any three** of the subject heads (courses) in F.Y.B.Sc. Or S.Y.B.Sc. Shall be granted A.T.K.T. And shall be allowed to attend S.Y.B.Sc. Or T.Y.B.Sc.; as the case may be. Candidate can re-appear in the following subject-heads in the subsequent exam.

c. Candidate would however not be allowed for the promotion from S.Y.B.Sc. to T.Y.B.Sc. unless and until s/he passes all subjects of F.Y.B.Sc.

SYLLABUS FOR F.Y.B.Sc. – Medical Technology

Course code: BMT 101

HUMAN ANATOMY

Theory classes: 60 hours, Practical classes : 30 hours

Unit 1. Introduction: human body as a whole

Theory:

- Definition of anatomy and its divisions
- Terms of location, positions and planes
- Cell and its organelles
- Epithelium-definition, classification, describe with examples, function
- Glands- classification, describe serous & mucous glands with examples
- Basic tissues – classification with examples

Practical:

- Histology of types of epithelium
- Histology of serous, mucous & mixed salivary gland

Unit 2. Locomotion and support

Theory:

- Cartilage – types with example
- Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull
- Joints – Classification of joints with examples, synovial joint (in detail for radiology)
- Muscular system: Classification of muscular tissue
- Names of muscles of the body

Practical:

- Demo of all bones showing parts, radiographs of normal bones & joints
- Demonstration of muscles of the body (as functional groups)

Unit 3. Cardiovascular system

Theory:

- Heart-size, location, chambers, exterior & interior
- Blood supply of heart
- Systemic & pulmonary circulation
- Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery
- Inferior venacava, portal vein, portosystemic anastomosis
- Great saphenous vein
- Lymphatic system- cisterna chyli & thoracic duct
- Names of regional lymphatics, axillary and inguinal lymph nodes in brief

Practical:

- Demonstration of heart and vessels in the body
- Normal chest radiograph showing heart shadows

Unit 4. Gastro-intestinal system

Theory:

- Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring)
- Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas
- Radiographs of abdomen

Unit 5. Respiratory system

Theory:

- Parts of RS, nose, nasal cavity, larynx, trachea, lungs,
- Names of paranasal air sinuses

Practical:

- Demonstration of parts of respiratory system.
- Normal radiographs of chest

Unit 6. Urinary system

Theory:

- Kidney, ureter, urinary bladder, male and female urethra

Practical:

- Demonstration of parts of urinary system
- Radiographs of abdomen-IVP, retrograde cystogram

Unit 7. Reproductive system

Theory:

- Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross)
- Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- Mammary gland – gross

Practical:

- Demonstration of section of male and female pelves with organs *in situ*
- Radiographs of pelvis – hysterosalpingogram

Unit 8. Endocrine glands

Theory:

- Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal glad – (gross)

Practical:

- Demonstration of the glands

Unit 9. Nervous system

Theory:

- Neuron
- Classification of NS
- Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (Gross Anatomy)
- Meninges, Ventricles & cerebrospinal fluid
- Blood supply of brain (In Brief)
- Cranial nerves (Only Names)

Practical:

- Demonstration of all part of brain

Unit 10.Sensory organs:

Theory:

- Skin: Skin-histology
- Appendages of skin
- Eye: Parts of eye & lacrimal apparatus
- Extra-ocular muscles & nerve supply
- Ear: parts of ear- external, middle and inner ear and contents

Practical:

- Demonstration and histology of eyeball

Unit 11.Embryology:

Theory:

- Spermatogenesis & oogenesis
- Ovulation, fertilization
- Placenta

There shall be no University Practical Examination.

REFERENCE BOOKS

1 William Davis (P) understanding Human,Anatomy and Physiology MC Graw Hill

2. Human Anatomy for Nursing & Allied Sciences - 1st edition,Dr. M.K.Anand, Dr. Meena Verma, The Arora Medical Publishers Pvt.Ltd

3. Fattana, Human anatomy,(Description and applied),Saunder's & C P Prism Publishers, Bangalore – 1991

4. ESTER . M. Grishcimer,Physiology & Anatomy with Practical,Considerations, J.P. Lippin Cott. Philadelphia

Course code: BMT 102

HUMAN PHYSIOLOGY

Theory classes: 60 hours, Practical classes : 30 hours

Theory:

Unit 1. Blood and Muscle Physiology:

- Compositin & Fucnction of Blood
- Erythropoesis and Blood group
- Hemostasis
- Neuromuscular junction

Unit 2. Digeestive System and Excretary System

- Movement and Alimentary tract
- Deglutition and Mechanism of Vomiting, Diaherrea
- Digestive juices
- Micturition
- Function of Kidney

- Regulation of acid-base balance

Unit 3. Cardiovascular and Respiratory Sustem

- Heart rate and sound
- Blood pressure
- Mechanism of breathing
- Oxygen and Carbon dioxide Transport
- Pulmonary volume and capacity

Unit 4. Endocrinology and Reproductive System

Contraceptives Measures and Menstrual cycle
Puberty
Pregnancy and Lactation
Hormones of Pituitary, Thyroid & Parathyroid Glands
Hormones of Adrenal Gland and Pancreas

Unit 5. Nervous System and Special Senses

- Neuron and Neuroglia
- Properties of nerve fibre
- Reflex mechanism and Receptors
- Mechanism of vision and hearing
- Taste and smell

Practical:

- Arterial Blood Pressure
- Pulse
- Heart rate
- Breathing rate

There shall be no University Practical Examination.

REFERENCE BOOKS

1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism publishers
2. Ganong (William F) Review of Medical Physiology. Latest Ed . Appleton
3. Jain AK, Concise Physiology, Latest Ed.

Course code: BMT 103
PATHOLOGY
Theory classes: 60 hours, Practicals: 45 hours

PATHOLOGY

Unit 1. Histo Pathology
- Introduction to Histo Pathology
- Receiving of Specimen in the laboratory
- Use & care of Microscope
- Various Fixatives, Mode of action, Preparation and Indication.
- Tissue processing for routine paraffin sections
- Section Cutting
- Staining of tissues - H& E Staining
- Bio-Medical waste management

Unit 2. Clinical Pathology
- Introduction to Clinical Pathology
- Collection, Transport, Preservation, and Processing of various clinical Specimens
- Urine Examination – Collection and Preservation of urine.
- Physical, chemical, Microscopic Examination

Unit 3. Haematology
- Introduction to Haematology
- Normal constituents of Blood, their structure and function.
- Collection of Blood samples
- Various Anticoagulants used in Haematology
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory
- Hb, PCV, ESR

Unit 4. Blood Bank
- Introduction
- Blood grouping and Rh Types

Practical: Pathology

Pathology
- Blood Grouping Rh typing.
- Hb Estimation,Packed Cell Volume[PCV], Erythrocyte Sedimentation rate{ESR]
- Bleeding Time, Clotting Time.
- Histopathlogy – Section cutting and H &E Staining.[For BSc MLT only]

- Bancroft : Theory and Practical of Histology techniques
- Textbook of Clinical Blood Banking Science by Zmijewski.
- Manual for Clinical Pathology by Sabitry Sanyal
- Practical Pathology by Dr.P.Chakraborty & Gargi Chakraborty
- Haematology for students and practitioners by Ramnik Sood
- Histological techniques by K.Laxminarayan
- Practical Pathology by Dr.K.Uma Chaturvedi & Tejsindersingh

Course code: BMT 104
MICROBIOLOGY

Theory classes: 60 hours, Practicals: 45 hours

Unit-1 Historical development & microbiology

- History and Pioneers in Microbiology: Contributions of Antony Van Leeuwenhoek, Louis Pasteur, Joseph Lister, Robert Koch (Koch's Postulates).Nobel prize awarded for research in Microbiology
- Development in medical microbiology & immunology

Unit-2 Microscopy

- Microscopy: instruments ,Types of microscopic techniques
- Details of Light Microscope (Principles, Techniques & Applications)
- Principle & Application of following microscope: Dark Field Microscopy, Phase contrast microscopy, Fluorescent Microscopy, Confocal microscopy & Electron Microscopy

Unit-3 Morohology & classification

- Nomenclature and classification of microbes (in brief)
- Size & Shape
- Morphology of bacteria: Structures of a bacterial cell and their functions
- Physiology of Bacteria: Nutrition, Gaseous requirement, temperature requirement and other growth requirements

Unit-4 Immunology

- Immunity (in brief)
- Infection: Sources of infection, Modes of transmission, Factors predisposing to microbial Pathogenicity, Types of infectious diseases
- Types of Vaccine & Immunization schedule

Unit-5 Sterilisation and Disinfection

- Sterilisation and Disinfection (in detail)
- Principles and use of equipments of sterlization (Namely Hot Air Oven, Autoclave, Inspissrator & Pasteurization)
- Anti septic and disinfectants

Unit-6 General microbiology

- Culture media in diagnostic bacteriology.
- Culture methods
- Identification of bacteria-biochemical tests
- Antimicrobial sensitivity test

Unit 7. Hospital infection

- Causative agents, transmission methods,
- Prevention and control Hospital infection.
- Blood Born Infections

Principles and practice Biomedical waste management

Practical: Microbiology

1. Compound Microscope.
2. Grams stain
3. Acid Fast staining
4. Demonstration and sterlization of equipments – Hot Air oven, Autoclave, Bacterial filters.
5. Demonstration of commonly used culture media, culture methods:
   Nutrient broth, Nutrient agar, Blood agar, Chacolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media,
6. Visit to hospital for demonstration of Biomedical waste management.

There shall be no University Practical Examination.

REFERENCE BOOKS

- Anathanarayana & Panikar Medical Microbioloty
- Roberty Cruckshank – Medical Microbiology – The Practice of Medical Mircrobiology
- Chatterjee – Parasitology – Interpretation to Clinical medicine.
- Rippon – Medical Mycology
- Monica Cheesebrough
- Silvertone : Introduction to Medical Lab. Technology

Course code: BMT 105
BIOCHEMISTRY

Theory classes: 60 hours, Practical classes : 30 hours

Theory

Unit.1 Introduction, specimen collection and Handling

- Introduction to Bio-chemistry including code of ethics for Medical Lab technicians and Medical Lab Organization.
- Reception, Registration and Bio-chemical parameters investigated.

- Types of vials used in blood /specimen collection
- Anticoagulants
- Preservatives
- Blood collection
- Precautions
- Safety, first aid, Biological and chemical hazards
- Processing of samples
- Preservation
- Disposal of samples
- Introduction to laboratory apparatus :
    1. Pipettes - different types (Graduated, volumetric, Pasteur, Automatic etc.,), Calibration of glass pipettes
    2. Burettes, Beakers,Flasks,Funnels, Cuvettes,

Unit 2. Units of measurements and Basics of Instrumentation

- Conventional and SI units
- Molecular weight, equivalent weight of elements and compounds, normality, molarity,
- Preparation of molar solutions,normal solutions,Percent solutions

Unit.3 Carbohydrates :

Definition, biological importance, classification, qualitative tests, Digestion & Absorption

Unit.4 Lipids :

Definition, biological importance, classification, Acid value, Iodine value, saponification value, Digestion & Absorption.

Unit.5 Aminoacids and Proteins :

Definition, biological importance, classification, qualitative tests, Digestion & Absorption.

Unit.6 Vitamins :

Vitamins : Classification of Vitamins, Sources, Daily requirements, Deficiency diseases. (In Brief)

Unit.7 Enzymes

Nature, Classification, Factors affecting enzyme activity, Enzyme Inhibition

Unit.8 Nucleic acids- Chemistry and functional aspects

Purine bases, Pyrimidine bases, nucleosides, Nucleotides, DNA & RNA, Their functions

Practical:

- Reception and registration
- Collection of Capillary blood
- Collection of Venous blood
- Separation of Serum from clotted blood
- Separation of plasma from blood
- Lab glass ware
  a) Identification b) Handling c) Care and Maintenance d) Uses
- Lab instruments
  a) Centrifuges b) Balances c) Photo Electric colorimeter d) Spectrophotometer
- Preparation of
  a) Percentage solutions b) Normal solutions c) Molar solutions

1. Qualitative identification of tests of sugars
2. Qualitative identification of tests of proteins
3. Qualitative identification of tests for amino acids

There shall be no University Practical Examination.

REFERENCE BOOKS

- Text book of Biochemistry by Satynarayan
- TEITZ – Clinical chemistry
- Vasudevan (DM) Sreekumari(S) Text book of
- Biochemistry for Medical students ,Latest Ed
- Varley – Clinical chemistry
- Kaplan – Clinical chemistry

Course code: BMT-S-101
HEALTH CARE

Theory classes: 30 hours

Unit 1. Introduction to Health

- Definition of Health
- Determinants of Health
- Health Indicators of India
- Health Team

Unit 2. Health Policy and Programmes

- Concept.
- National Health Policy
- National Health Programmes (Briefly Objectives and scope)
- Population of India and Family welfare programme in India

Unit 3. Introduction to Nursing

- What is Nursing ? Nursing principles.
- Inter-Personnel relationships.
- **Bandaging :** Basic turns; Bandaging extremities; Triangular Bandages and their application.
- Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.
- **Lifting And Transporting Patients**: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.

Unit 4. Bed Side Management:

- Giving and taking Bed pan, Urinal :
- Observation of stools, urine.Observation of sputum,
- Understand use and care of catheters, enema giving.
- **Methods Of Giving Nourishment**: Feeding, Tube feeding, drips, transfusion
- Recording of body temperature, respiration and pulse,
- **Simple aseptic technique**: Sterlization and disinfection.
- Surgical Dressing: Observation of dressing procedures

Unit 5. First Aid :

- Syllabus as for Certificate Course of Red Cross Society

Course Code: E - 101

ENGLISH

Theory classes: 60 hours
Practical classes: 30 hours

There will be two papers in English at the FYBSc as per the revised syllabus E-101 (Theory) will be taught for two hours a week and E-102 (Practical) will also be taught for two hours a week/per Batch each form the academic year 2009-10

Language Skills like Reading and Writing will be covered in E-101 and Listening and Speaking will be covered in E-102 which will also have Lab Session of two hours per week.

Aim

These two course will aim at helping the course participants develop their communication skills in English by training them in handling all the four language skills effectively. The learners will be able to listen, speak, read and write in English adequately so that they could participate in various activities and perform satisfactory the different tasks listed below.

Overall Objectives

The objectives are to develop abilities

- To process information using a variety of media
- To use appropriate phrases for performing language functions
- To edit, select and present information in a format / perspective
- To listen and reduce information to a point form
- To read and to expand from points to paragraph
- To predict, comprehend, infer and synthesize information
- To question, probe and arrive at information through discussions, dialogues and interviews
- To answer questions, choose and provide data etc.

E-101 (Theory) : 2 Credits : 2 hours week

A. Reading

The objectives are to enable the students to

- Read for information news features, articles, newspaper and text
- Read intensively a collection of short stories given in a complied text (See for the text and the lessons selected from it below)

Book prescribed

L.A.Hill (1970), **Contemporary Short Stories.** Chennai: Oxford University Press. The following stories have been selected for use on the course.

- The happy Prince
- A Horseman in the sky
- The wolves of cernogratz
- The Mark of Vishnu
- The Trust Property

B. Writing

The objectives are to enable the students to

- Form words properly using prefixes / suffixes (See list 4 in the Appendix)
- Use phrasal verbs (See list 3 in the Appendix)
- Use appropriate and related registers (See list 5 in the Appendix)
- Writing paragraphs, developing points / ideas
- Writing resume, job applications, letters of invitations (inviting / accepting/ declining), letters of complaint to civil authorities, Note taking

- Answering questions based on the prescribed text: **Contemporary Short Stories**

Books Recommended

- Champa Tickoo and Jaya Sasikumar (2000). **Writing with a Purpose**, Chennai, OUP
- David Jolly (1988). **Writing Tasks**: An authentic task approach to individual writing needs.

E-102 (Practicals) : 2 hours week

C. Listening

The objectives are to enable the students to listen and understand

- Short lecture, descriptions, and narrations, rapid talks, passages read aloud and/or dictated and identify Language functions (See list 2 in the Appendix)
- Conversions based on familiar situations, and
- Note Making

Books Recommended

- Spoken English-D Sasikumar and PV Dhamija (with Audio Cassette) Tata Mcgraw Hill

D. Speaking

The objectives are to enable the students to

- Use greeting and formula in everyday conversations.
- Use various notions and function of everyday usage (See list 2 in the Appendix)
- Use grammatically correct and appropriately structures to organize thought (See list 1 Containing Syntactic items in the Appendix)
- Give short formal and informal talks, speeches

Books Recommended

- Grant Taylor. English Conversation Practice. New Delhi: Tata McGraw Hill
- R.P.Bhatnagar and R.T.Bell (1999) **Communication in English**, Hyderabad: Orient Longman

Testing: Division of Marks

E – 101 (Theory)

Q.1	Answer in Brief. (In not more than three sentences)	14 marks
Q.2	Short Notes (Any Two)	06 marks
Q.3	Multiple Choice	
	• Content based questions	05 marks
	• Expressions / Idioms / Difficult words	05 marks
	• Connectives	04 marks
	• Concord	04 marks
Q.4	**(A)** Comprehension (Unseen Passage) OR Paragraph Writing	08 marks
	(B) Letter Writing	08 marks
	• Formal Letters- Letters of complaint, Invitation- Extending/declining, Resume building/ Applications	
Q.5	**(A)** Phrasal Verbs	04 marks
	(B) Registers	02 marks

E – 102 (Practical)

• Listening	15 marks
• Dictation	05 marks
• Reading A loud	10 marks
• Viva + Journal	10 + 5 marks
• Note Making	10 marks
• Vocabulary	05 marks
	60 marks (60/2 = 30)

BHAIKAKA UNIVERSITY

S.Y. B. Sc.- Medical Technology
in
Clinical Laboratory Technology

Curriculum

Sr. No.	Subject	Course No.	Teaching Hours
Main Subjects			
1	Pathology	BMT-CLT-201	60
	Pathology-Practical	BMT-CLT-201(P)	45
2	Microbiology	BMT-CLT-202	60
	Microbiology-Practical	BMT-CLT-202-(P)	45
3	Biochemistry	BMT-CLT-203	60
	Biochemistry-Practical	BMT-CLT-203-(P)	45
		Main Subjects- Teaching hours	315
Subsidiary subjects			
4	Bio-ethics	BMT-S-201	20
5	Computer Organization & PC Software	BMT-S-202	25
	Computer Organization & PC Software-Practical	BMT-S-202-(P)	25
		Subsidiary subjects- Teaching hours	70
		Teaching hours-Theory/Practicals	385
		Laboratory Posting	530
		Total Teaching hours	915

S. Y. B.Sc.- Medical Technology
(in Clinical Laboratory Technology)

Table 1. Subjects, Credits and Scheme of Examination

Sr. No.	Subject	Course No.	No. Credits per week	Duration of Uni. Exam	External Marks	Internal Marks	Total	Grand Total
1	Pathology	BMT-CLT-201	2	3	80	20	100	150
	Practical – Pathology	BMTCLT-201(P)	1	1 day	40	10	50	
2	Microbiology	BMT-CLT-202	2	3	80	20	100	150
	Practical – Microbiology	BMTCLT-202(P)	1	1 day	40	10	50	
3	Biochemistry	BMT-CLT-203	2	3	80	20	100	150
	Practical-Biochemistry	BMT-CLT-203(P)	1	1 day	40	10	50	
4	Bioethics	BMT-S-201	1	2	40	10	50	50
	No practical Exam	-	1	-	-	-	-	
5	Computer Organization & PC Software	BMT-S-202	1	2	40	10	50	80
	Practical-Computer Organization & PC Software	BMT-S--202(P)	1	1 day	25	5	30	
							Total	580

S.Y. B. Sc- Medical Technology
in
Clinical Laboratory Technology

Course code: BMT-CLT-201

PATHOLOGY

Teaching Hours: **Theory: 60 hours**
Practicals: 45 hours

Theory:

Unit 1. Hematology

- Hemopoiesis, Stem cells, formed elements and their functions
- Anticoagulants used in various hematological studies
- Routine hematological tests and normal values
- Determination of Hemoglobin and Hematocrit
- Enumeration of RBC, WBC & Platelets
- Absolute Eosinophil count
- Reticulocyte count
- Calculation of Red cell Indices
- Preparation of staining of blood film for morphology of red cells and differential count.
- Automated Hematology cell counter

- **Special Hematological tests:**
- Sickling tests
- Osmotic fragility test
- Determination HbF and HbA2
- Hemoglobin Electrophoresis
- Investigation of G6PD deficiency
- Plasma haptoglobin and demonstration of hemosiderin in urine
- Tests for Autoimmune hemolytic anemia

- **Hemostasis and Coagulation**
- Normal hemostasis, mechanism of blood coagulation and normal fibrinolytic system
- Collection of blood and anticoagulants used in coagulation studies
- Investigation of hemostatic mechanism-BT, CT, whole blood coagulation time test, PT, PTT.
- Thrombin Time, Plasma Firinogen, FDP, D-Dimer
- Demonstration of LE cells.

Unit 2. Immunohematology

1. ABO Blood group and Rh system
2. Subgroups of A and B , Other blood groups and Bombay group
3. Cross matching

Unit 3. Histopathology

Instrumentation:(a) Automated Tissue Processor
(b) Microtome, Microtome-knives, Knife sharpener
(c) Freezing microtome and Cryostat

Techniques : (a) Routine paraffin section cutting
(b) Frozen section and Cryostat section studies

Mounting techniques: Various mountants and mounting techniques

Unit 4. Cytology

1. Normal cell structure, functions, cytologic criteria of malignancy
2. Instruments in Cytology
3. Types of specimens, methods of collection & preparation of cell block
4. Different fixatives and methods of fixation
5. Staining : (a) Papanicoloau's stain- principle , preparation and staining techniques
(b) May Grunwald Giemsa stain
(c) H & E stain

Female Genital tract

1. Normal cytology
2. Techniques of collection of specimen for cervical cytology study
3. Hormonal cytology and cytological indices

Respiratory tract and Urinary tract

1. Normal cytology
2. Collection of sample, preparation of smears and staining

PRACTICALS

1. Determination of Hemaglobin and Hematocrit
2. Red blood cell count
3. Total white blood cell count
4. Platelet count
5. Differential count of white blood cells
6. Absolute Eosinophil count
7. Reticulocyte count
8. Paraffin section cutting
9. Staining by Hematoxylin & Eosin and other special stains

Course code: BMT-CLT-202
MICROBIOLOGY
Teaching Hours: Theory: 60 hours, Practicals: 45 hours

Theory:

Unit 1. Immunology:

- Antigens
- Immunoglobulins
- Complememt System
- Structure & Function of Immune system (Including Monoclonal Antibody)
- Antigen and antibody reactions
- General Features of antigen-antibody reaction
- Precipitation, Agglutination
- Neutralisation, Opsonisation
- Immunofluorescence, RIA, EIA
- Western Blot
- Immunochromatograghy

UNIT-2 Bacterial genetics

- Structure & functions of genetic material
- Extrachromosomal genetic eliments
- Genotypic & Phenotypic varation
- Genetics mechanism of drug resistance in bacteria

Unit 3. Mycology.

- The morphology and reproduction in fungi
- Classification of fungi
- Morphology, diseases caused and lab diagnosis of:-
- Opportunistic fungi- Cryptococcus, Candidiasis, Aspergillus, Zygomycetes.
- Fungi causing superficial mycoses- Dermatophytes, Tinea Nigra
- Subcutaneous mycoses- Mycetoma.
- Systemic Mycosis

4. Parasitology

Protozology-

- *Entamoeba histolytica*
- *Giardia*
- *Toxoplasma*
- Malaria
- *Leishmania*
- *Trichomonas*

Helminthology

- Cestodes - *Taenia, E. granulosus, D.latum, H.nana*
- Trematodes – *Schistosoma Fasciola*
- Nematodes – *Ascaris*, *Ancylostoma deudenale, Strongyloides,Trichuris, Trichinella*, Filarial worms

PRACTICALS: Microbiology

General Microbiology:

- Staining: Gram's , Acid fast
- Sterilization methods
- Media preparation
- Culture methods

Parasitology:

1. Stool examination for parasitic eggs/cysts
    a. Saline mount
    b. Iodine mount
    c Concentration methods

Mycology:

1. Slide culture technique
2. KOH mount
3. Identification of fungal cultures:
    - Colony characteristics and Microscopic examination of Candida, *Aspergillus Species*

Course code: BMT-CLT-203

BIOCHEMISTRY
Teaching Hours: Theory: 60 hours
Practicals: 45 hours

UNIT 1. Basic Instrumentation

- Colorimetry : Photoelectric methods, instrumentation, principles and laws involved, Operation, maintenance, applications.
- Spectrophotometry : Principle ,types and applications.
- Weighing : Different types of balances used, care and maintenance.
- pH meter-Principle, Use, care and maintenance of pH meter and electrodes
- Basic lab operations like -Separation of Solids from liquids,
  a) Centrifugation : Principle, Different types of Centrifuges, care and maintenance, applications
  b) Filtration using funnel

UNIT 2. Carbohydrates

- Carbohydrate Metabolism: Glycolysis, TCAMajor metabolic pathways,and it's importance
- Gluconeogenesis
- Glycogen Metabolism
- HMP Shunt Pathway
- Galactose Metabolism
- Fructose Metabolism
- Amino sugars Metabolism

UNIT 3. Lipids

- Fatty acid oxidation
- Fatty acid synthesis
- Metabolism of Phospholipid
- Cholesterol metabolism

UNIT 4. Proteins

- Protein metabolism : Transamination, Deamination, Decarboxylation of amino acid
- Formation of ammonia, Detoxification of ammonia
- Urea cycle & disorders (Hepatic Coma)
- Special products formed from amino acids- in brief
  (**Glycine**-Haeme, Purines, Glutathione, **Serine**-Choline, **Glutamic acid**- GABA, **Tyrosine**- Melanin, Epinephrine, Non epinephrine, Dopamine, **Tryptophan**- Serotonin and **Histidine**- Histamines)

UNIT 5. Nucleic acids

- Nucleobases, Nucleosides, Nucleotides
- Replication, Transcription, Translation

UNIT 6. Vitamins & Minerals

- Minerals : Calcium, Iron, Phosphorus, Iodine, Sodium & Potasium.
- Vitamins : Water soluble and Fat soluble (Including Deficiency Disease)

UNIT 7. Biophysics

- Viscosity, Surface tension, colloids, Osmotic pressure
- Donnan membrane equilibrium

Unit 8.

- PH, buffers, acid-base balance, disorders.
- Digestion and absorption of Biomolecules
- Water, Chemicals and related substances
- Purity of chemicals
- Corrosives

PRACTICALS: Biochemistry

1. Qualitative analysis of carbohydrates, proteins, amino acids.
2. Estimation blood sugar and Blood Urea
3. CSF Analysis
4. Bile Analysis
5. Acid hydrolysis of starch
6. Enzyme hydrolysis of starch
7. Qualitative screening test for normal and abnormal urine sample.
8. Protein precipitation, separation of proteins, electrophoresis of serum
9. Colour reaction of protein.

SUGGESTED BOOKS :

1. Dr. Praful B. Godkar,Text Books of Medical Laboratory Technology
2. Anathanarayana & Panikar – A Text Book of Medical Microbiology
3. Monica Cheesbrough, District Laboratory Practice in Tropical countries – PartI & Part II
4. P. Chakraborthy- A Text Book of Microbiology
5. Chatterjee , KD – Parasitology
6. Vasudevan & Shreekumar : Biochemistry for Medical students
7. Dacie, Practical Haematology
8. K.Laxminarayan : Histological techniques
9. Dr. Mukherjee, Medical Laboratory Technology, Volume I , II & II
10. Silvertone : Introduction to Medical Lab. Technology
11. Manual for Clinical Pathology by Sabitry Sanyal
12. Harper's Biochemistry

BHAIKAKA UNIVERSITY

S.Y.B.Sc. - Medical Technology

Bioethics

(Common to all specializations of Medical Technology)

Course Code: BMT-S-201

Goals

1. Provide a sense of responsibility and professionalism when interacting with patients, peers, fellow employees, and other health care providers.
2. Communicate effectively and professionally.
3. Instill the importance of honesty and professionalism in the workplace.

By the end of this module, the student should be able to:

1. Exhibit behavior consistent with the ethical practice of Medical Technologist.
2. Maintain confidentiality of all patients and test results.
3. Demonstrate an appreciation for the special knowledge and talent of other members of the health care team.
4. Explain the transmission of the AIDS/HIV and state how the virus affects the Immune system.

Methods of Presentation

Lecture, Discussion, Audio-Visual materials

Duration : 20 hours

COURSE CONTENT

1. Definition of medical ethics. **1 hour**
2. History of Medical Ethics: **2 hour**
   - Indian perspectives : Charaka,Susruta,Code of ethics
   - The Hippocratic Oath
   - International & Indian code of Medical Ethics

3. Ethical problems of life **2 hour**
   - Right to life, prenatal screening / sex selection Abortion, feticide
   - Assisted reproductive technologies
   - Care of terminally ill
   - Euthanasia
4. Family and society in medical ethics: **1 hour**
   - HIV / AIDs
5. Etiquette and mannerism **2 hour**
6. Good communication skill **2 hour**
   - Truthfulness, Building trust, Honesty with patients
   - Communication with colleagues, seniors and subordinates

7. Confidentiality **1 hour**
   - Malpractice, negligence
8. Code of ethics: (Please refer Annexure for elaborations)
   - Duties to Patients **1 hour**

- Duties to Colleagues and other Professionals: **1 hour**
- Duties to Yourself: **1 hour**
- Duties to Society: **1 hour**
- Duties to your Profession: **1 hour**
- Specific issues: **1 hour**

Internal Evaluation:
(Problem based questions, Short notes, MCQ, Viva) **2 hour**

EVALUATION : TOTAL: 50 marks

Internal evaluation: **10 marks**
External Exam (One paper of 2 hours): **40 marks**

- Problem oriented question
- Short notes
- Short answer questions

There will no Practical Exam for this course.

SUGGESTED BOOKS/LITERATURE:

1. MEDICAL ETHICS, by C.M.Francis, Jaypee Brothers
2. Current Problems in Medical ethics, by George V. Lobo, St. Paul's Society, Allahabad.
3. Ethics for Doctors, Nurses & Patients by H.P. Dunn, St. Pauls Bandar,Mumbai.

ANNEXURE

CODE OF ETHICS: Medical Technology

Code of Ethics, under different categories, has been elaborated hereunder as applied to the profession of Medical Technician/Technologist. It is however suggested that these elaborations are only indicative and not exclusive. There could be many more situations/events, depending on the nature of work involved in different types of specialization of Medical Technology; which would also be deemed to be a part of the curriculum as and when identified.

1. Code of Ethics: Duties to Patients:
    - accountability for the quality and integrity of the services they provide.
    - respect patients' privacy and dignity
    - treat patients politely and with consideration
    - apply the principle of informed consent as an on-going process
    - recognize the rights of patients to maintain confidentiality of information in the course of professional duties, unless they agree to disclosure or the law demands
    - patients' permission before sharing information with their spouses, partners or relatives.
    - always seek to give priority to the service to be provided to patients solely on the basis of clinical need.

- Code of Ethics: Duties to Colleagues and other Professionals:
    - Should not make a patient doubt a colleagues' knowledge or skills by making comments about them that cannot be fully justified.
- Work with and respect other health care professionals in pursuit of the best health care possible for all patients.
- Should not discriminate against colleagues, including professionals applying for posts, because of views of their race, culture, ethnicity, social status, lifestyle, perceived economic worth, age, gender, disability, communicable disease status, sexual orientation, religious or spiritual beliefs, or any condition of vulnerability.
- Refrain from speaking ill of colleagues or other health care professionals.
- Actively strive to establish cooperative and respectful working relationships with other health care professionals with the primary objective of ensuring a high standard of care for the patients they serve.
- Share their knowledge with colleagues and promote learning.

- Code of Ethics: Duties to Yourself :
- Maintain and improve the standard of your performance by keeping your professional knowledge and skills up to date throughout your working life. In particular, regularly take part in educational activities that relate to medical laboratory science.
- Acknowledge the limits of your professional knowledge and competence. Do not pretend to know everything.
- Use equipment and laboratory ware correctly and with care.
- Refrain from engaging in activities that may affect your health and lead to impairment.
- Aware laws and regulations governing medical laboratory technology and shall apply them in the practice of your profession.
    - Not wasting reagents and other laboratory supplies unnecessarily.
    - Never taking anything from place of work that does not belong to you

- Code of Ethics: Duties to Society
    - Refrain from providing a service that is not needed, whether it provides financial gain or not.
    - Refrain from unnecessary wastage, and from participating in improper financial arrangements, especially those that escalate costs and disadvantage individuals or institutions unfairly.
    - Dedicate to serve the healthcare needs of the public

- Code of Ethics: Duties to your Profession
    - Uphold and maintain the dignity and respect of medical laboratory profession and strive to maintain a reputation of honesty, integrity and reliability.
    - Contribute to the advancement of the profession by improving the body of knowledge, adopting scientific advances that benefit the patient, maintaining high standards of practice and education, and seeking fair socioeconomic working conditions for members of the profession.

- Specific issues: Any other issues specific to a particular specialization of Medical Technology profession not categorized in any of the above.

BHAIKAKA UNIVERSITY

S.Y.B.Sc. - Medical Technology

Computer Organization and PC Software

(Common to all specializations of Medical Technology)

Course Code: BMT-S-202

Objective:

At the end of this course, a student would be able to :

- identify various components of computer hardware and
- use some software in order to manage data related to the profession.

Teaching hours: Theory: 25 hours
Practicals: 25 hours

Theory

BMT-S-202

Unit 1. Computer Organization -I

Generations of a computer, types of a computer, some important terms: hardware, software, program, operating system, interpreter, compiler, assembler, high level languages, bits and bytes.

Introduction to number systems

Unit 2. Computer Organization -II

Processors, CPU organization, primary memory, memory addresses, secondary memory, memory hierarchies, magnetic disks, CDROMs, DVDs, input/output devices: keyboards, monitors, mice, printers, modems

The concept of character codes

Practical: Computer

BMT-S-202 (P)

Unit 1: PC Software- I

Introduction to spreadsheets, the concept of cells and cell addresses, formulas, some important functions, introduction to charts

Introduction, features and applications of a DBMS

Database objects

Tables – creation, modification, deletion

Working with data – insertion, modification, finding, sorting, grouping, viewing and sharing data

Unit 2. PC Software- II

Forms – creation of forms; modification, viewing and validating data using forms, subforms

Reports – creation, modification, opening, viewing

Creating mailing labels

REFERENCE BOOKS:

1. Tanenbaum A. S., Structured Computer Organization, 4th Edition, Prentice-Hall of India Pvt. Ltd., 2002.
2. Elmasri, Navathe, Somyajulu, Gupta, Fundamentals of Database Systems, Pearson Education, 2006.
3. Progue, Irwin, Roardon, Microsoft Office Access 2007 Bible, Wiley Publishing Inc., 2007.
4. Taxali R. K., P C Software for Windows 98 Made Simple, Tata McGraw-Hill, 2001.
5. Hall D. V., Microprocessors and Interfacing, McGraw-Hill Book Company, 1986.
6. Desai Bipin C., An introduction to Database Systems, 7th Edition, Pearson Education Asia, 2001.

BHAIKAKA UNIVERSITY

T.Y. B. Sc.- Medical Technology
in
Clinical Laboratory Technology

Curriculum

Sr. No.	Course Code	Subject	Credit per week	Teaching Hours
1	BMT-CLT-301	Pathology - I	2	60
2	BMT-CLT-302	Pathology - II	2	60
3	BMT-CLT-303(P)	Pathology-Practical	1	45
4	BMT-CLT-304	Microbiology - I	2	60
5	BMT-CLT-305	Microbiology - II	2	60
6	BMT-CLT-306-(P)	Microbiology-Practical	1	45
7	BMT-CLT-307	Biochemistry	2	60
8	BMT-CLT-308	Biochemistry	2	60
9	BMT-CLT-309-(P)	Biochemistry-Practical	1	45
Teaching hours-Theory/Practical				**435**
Laboratory Posting				**600**
Total Teaching hours				**1035**

T. Y. B.Sc.- Medical Technology
(in Clinical Laboratory Technology)

Table 1. Subjects, Credits and Scheme of Examination

Sr. No.	Subject	Course code No	Duration of Uni. Exam	External Marks	Internal Marks	Total
1	Pathology - I	BMT-CLT-301	3 Hrs	80	20	100
2	Pathology - II	BMT-CLT-302	3 Hrs	80	20	100
3	Pathology - Practical	BMT-CLT-303(P)	1 day	80	20	100
4	Microbiology - I	BMT-CLT-304	3 Hrs	80	20	100
5	Microbiology - II	BMT-CLT-305	3 Hrs	80	20	100
6	Microbiology - Practical	BMT-CLT-306(P)	1 day	80	20	100
7	Biochemistry - I	BMT-CLT-307	3 Hrs	80	20	100
8	Biochemistry - II	BMT-CLT-308	3 Hrs	80	20	100
9	Biochemistry - Practical	BMT-CLT-309(P)	1 day	80	20	100
					Grand total	**900**

BHAIKAKA UNIVERSITY

Curriculum of

T.Y. B. Sc- Medical Technology

in

Clinical Laboratory Technology

BMT-CLT-301

PATHOLOGY-I

Hematology and Immunohematology

Hematology

Anemias

Classification, Clinical Features, Cause, and Investigation of Iron deficiency anemia, Megaloblastic anemia, Haemolytic Anemia.

Leukemias

Classification, Clinical Features, Cause, and Investigation of all leukemia
Hematology and Quality Control.

- **Hemostasis and Coagulation**
  Assay of clotting factors
- **Bone marrow Examination**
  (a) Needle aspiration and surgical biopsy technique
  (b) Preparation of smears and staining

Immunohematology (Blood Banking)

Principles of Blood transfusion:
(a) Blood donor selection
(b) Methods of bleeding donors
(c) Blood containers, anticoagulants and storage of blood
(d) Coomb's test and its significance
(e) Screening of blood for infective material
(f) Blood components, preparation & component therapy
(g) Autologus Blood transfusion
(h) Transfusion reactions
(i) Haemolytic Disease of Newborn

- Blood Bank organization, Standards, Procedures, Techniques and Quality control

BMT-CLT-302

PATHOLOGY-II

Clinical Pathology, Histopathology, Cytology and Cytogenetics

Clinical Pathology, Histopathology, Cytology and Cytogenetics

Clinical Pathology

Complete examination of Urine, all body fluids, C.S.F and Stool.

Histopathology

Staining techniques: Special stains for Carbohydrates, Connective tissue,

- Nervous tissue, Bone tissue, Collage fibers, Elastic Fibers, Lipids, Organisms, fungi, parasites, pigments and deposits in tissues
- Maintenance of records and filing of slides
- Application of computers in Pathology
- IHC, Quality Control, Automation in Histopathology

Cytology

Female Genital tract

Cervical cytology screening for malignant and nonmalignant conditions, raditation changes follow up.

- **C S F and Effusions**
  1. Cytology of CSF in inflammatory, nonmalignant & malignant Conditions
  2. Cytology of effusions in nonmalignant and malignant conditions

- **Glands – Breast, Thyroid and Lymph nodes**
  Fine needle aspiration cytology of glands and other soft tissue mass

Cytogenetics

- Introduction to cytogenetics, terminology , classification and nomenclature of human chromosomes
- Sex chromatin identification

List of Reference Books:

- Clinical haemotology : Wintrobe's
- De-Gruchy's Clinical haemotology in medical practice : Franki
- Practical haemotology : Dacie & Lewis
- Blood banking and transfusion medicine : Makroo
- Haemotology for students and practitioners: Dr. Ramnik Sood
- Clinical Diagnosis and management by laboratory methods: John Bernard Henry (20^{th} Edi)

BMT-CLT-303

PRACTICALS

HEMATOLOGY

- RBC count
- WBC count
- Platelet Count
- P.C.V and Blood Indices
- ESR
- Differential WBC count
- PS Examination – I
- PS Examination – II
- Sickling Tests
- Hb. Electrophoresis

BLOOD BANKING

- Cross Match Test
- Coomb's Control Cell preparation
- D^u Test
- Direct Coomb's Test
- Indirect Coomb's Test
- Anti D Titer
- Screening of Donor's blood for infective agents(HIV, Hepatitis B, Syphilis, Malaria)
- Transfusion reaction work up
- Preparation of blood components

CLINICAL PATHOLOGY

- Urine examination R & M
- CSF Examination R & M
- Pleural Fluid Examination R & M
- Ascitic Fluid R & M
- Synovial Fluid R & M
- Stool for R & M

HISTOPATHOLOGY & CYTOLOGY

- Hematoxylin & Eosine Stain
- PAS & Other special Stain
- Papanicoloau's stain
- May Grunwald Geimsa staining
- Tissue Processing
- Block Making

BMT.CLT.304

MICROBIOLOGY-I
IMMUNOLOGY AND SYSTEMIC BACTERIOLOGY

IMMUNOLOGY

Immune System

- Major Histocompatibility Complex
- Immune Response:
  - Humoral Immune response, Primary & secondary immune response, Fate of antigen in tissue, Production of antibodies
  - Cellular Immune Response: Scope of CMI, Indication of CMI & Cytokines
  - Immunological tolerance

Hypersensitivity Reactions, Auto-immunity & Immunodeficiency disease

- Hypersensitivity: Classification and Immunological basis
- Auto-immunity: Mechanisms and classification of auto immune disorders
- Immunodeficiency Diseases: Immunological basis of Primary and secondary Immunodeficiency Diseases

Basic of Tumor & Transplantation Immunology

- Classification of transplants, Allograft reaction
- Graft-vs-host reaction
- Tumor immunology: Tumor antigens Immunological surveillance.

SYSTEMIC BACTERIOLOGY

Classification, Morphology, culture characteristics, Pathogenesis,Disease caused, Lab Diagnosis & Prophylaxis

Gram Positive Bacteria

- Staphyloccus
- Streptococcus
- Pneumococcus
- Corynebacteria
- Clostridia

Gram Negative Bacteria

- Enterobactreacae (E.coli, Klebsiella,Proteus, Salmonella, Shigella)
- Neisseria
- Vibrio
- Pseudomonas
- Brucella
- Haemophilus

Spirocheates

Treponema
Leptospira

Mycobacteria

M. tuberculosis
M. leprae
Atypical Mycobacteria

BMT.CLT.305

MICROBIOLOGY-II
VIROLOGY AND APPLIED MICROBIOLOGY

Virology

- General properties of virus,
- Lytic Cycle and Lysogeny, One step Growth curve
- Cultivation of viruses,
- Cytopathic effect
- Classification of Virus, Vrioids & Prions

Morphology, Cultivation, Pathogenesis, Clinical Feature, Lab Diagnosis & Prophylaxis of Following Viruses

Herpes virus, Adenovirus, Polio virus, Influenza virus, Mump, Measles, Rubella, Rabies Virus, Dengue virus, Hepatitis viruses, Oncogenic viruses, and HIV, ARBO virus, Rotavirus

APPLIED MICROBI0LOGY

Clinical Microbiology applied to Tropical Medicine and Recent advances:

- Aetiology and Laboratory diagnosis of Respiratory infections, Urinary tract infections, Pyrexia of unknown origin, Meningitis, Septicemia, Diarrhoeal diseases & food poisoning, STI
- Prevention and Control of Hospital acquired infections
- Immunoprophylaxis: Newer vaccines
- Principal and Practice of Hospital waste disposal
- Automation in Microbiology
- Bacteriology of Water, Milk and Air.
- Bio-terrorism

Emerging and Re emerging Infectious disease

Re – Emerging and Resurging disease, Factors responsible for emergence and re emergence of infectious disease.

Reference Book:

1. Text book of microbiology: Anant Narayan & Paniker's
2. Text book of microbiology: Chakraborty
3. Microbiology: Prescoot, Harly and klein's
4. Parasitology: K.D. Chatterjee
5. Medical Lab. manual for Tropical countries: Monica Chessbrough
6. Practical Medical Microbiology: Mackey & Mac Cartney

BMT-CLT-306

PRACTICALS

BACTERIOLOGY

1. Staining-
    - Grams staining
    - b. ZN staining
    - c. Alberts staining
2. Hanging drop preparation(Motility of Bacteria)
3. Culture methods of Bacteria
4. Biochemical reactions of Gram Negative and Gram Positive Bacteria.
5. Identification of bacterial culture
    - a. Colony characteristics
    - b. Morphological characteristics
    - c. Motility study
    - d. Interpretation of Biochemical reactions
6. Antibiotic sensitivity testing- Kirby Bauer method

Applied bacteriology- Practical

- Immunology: Serological tests:
- Specimen collection
- Principle
- Methods.
- Procedure
- Normal values/ Significant titer
- Interpretations

Limitations: of all the following tests

- Widal (Slide and Tube)
- ASO
- CRP
- RPR/VDRL/TRUST
- RA
- ELISA for detection of HBsAg /p 24 Ag. and anti HIV antibody detection
- Rapid test for detection of Malaria, Typhoid, AIDS, and Hepatitis

BMT.CLT.307

BIOCHEMISTRY - I

Theory:
General Biochemistry

UNIT 1. Instrumentation

- Chromatography, Flame photometry, Fluorimetry
- Autoanalysers, electrolyte analyzer, Gas analyzer
- RIA, Isomers , ELISA , Chemiluminance, Electrophoresis

UNIT 2. Nucleotides

- Metabolism of Purine & Gout
- Metabolism of Pyrimidines

UNIT 3. Hormones

- Classification of Hormones
- Hypothalamic Hoormones
- Anterior Pitutary Hormones
- Posterior Pitutary Hormones
- Thyroid stimulating Hormones
- Hormones of adrenal Cortex
- Hormones of Gonads
- Gastrointestinal Hormones

UNIT 4. Nutrition and Xenobiotics

- Basal Metabolic Rate (BMR)
- Measurement of BMR
- Factors affecting BMR
- Significance of BMR
- Balance Diet
- Glycemic index

2. Nutrition Disorders

Protein Energy malnutrition

- Kwashiorkor
- Marasumus

UNIT 5. genetics

- Brief history of development of genetics- Basic principles of heredity in humans, Pattern of inheritance, Genetic disease in human, Eugenetics
- Pedigree analysis

UNIT 6. Biological membrane and transport

- Structure of plasma membrane
- Transport mechanism: Active transport, passive diffusion, facilitated transport, Transport system: uniport, symport, antiport, Cotransport, proton pump, Transport of macromolecules

UNIT 7. Miscellaneous

- Tissue proteins- collagen, elastin

BMT.CLT.308

BIOCHEMISTRY – II

Clinical and Applied Biochemistry

Theory:

UNIT 1. Carbohydrates

- Blood sugar regulation (Hormonal)
- Abnormalites - Diabetes mellitus
- Gulcose Tolerance Test
- Glycated-Hemoglobin

UNIT 2. Lipids

- Lipoprotein metabolism in health and disease -Chylomicrons, VLDL, IDL, LDL and HDL
- Lipid profile and Atherosclerosis
- Fatty liver

UNIT 3. Proteins

- In born errors of amino acid metabolism

1. Homocystinuria,
2. Alkaptonuria,
3. Phenylketonuria
4. Albinism
5. Plasma proteins and associated disorders.
6. Immunoglobulins

UNIT 4. Clinical enzymology

- Diagnostic importance of enzymes
- Isoenzymes

UNIT 5. Function Test

- Liver function test
- Renal function tests
- Thyroid function tests
- Cardiac function test
- Pancreatic function test

UNIT 5. Molecular Biology

- Replication, Transcription, Translation
- Nucleic acid isolation: DNA isolation, RNA isolation
- Electrophoretic separation of Nucleic acid
- Amplification techniques: Target amplification (PCR, Reverse-transcriptase PCR, Real time PCR)
- DNA recombinant Technology
- Blot techniques, RFLP, VNTR, Gene Library

UNIT 6. Miscllaeneous:

- Free radicals and antioxidants
- Cancer and Tumour markers - Biochemical aspects

UNIT 7. Quality Control and Biostatistics

- **Quality Control:**

- Defination: Precision, accuracy , Specificity, Sensitivity, Standard and Control
- Quality Control Programme
- Levy – Jenning Chart
- Internal Quality Control
- External Quality Control
- Basic Components of Quality Control

a) Pre analytical components
b) Analytical components
c) Post analytical components

- **Biostatistics**
- Defination
- Population mean
- Correlation Coefficient
- Standard Deviation and Standard error.

BMT-CLT-309 (P)
Biochemistry-Practical

PRACTICALS:

- Specimen Collections: Urine, Blood, Gastric juice,
- Accuracy, precision and quality control – L. J. Chart
- Enzymes: Amylase (salivary and Pancreatic), Alkaline Phosphatase, Acid Phosphatase, SGOT, SGPT, LDH and CPK- demonstration on auto analyzer.
- Liver function tests: Estimation of Bilirubin – total conjugate and unconjugate, Urobilinogen,
- Determination of serum lipids – cholesterol, triglycerides and lipoprotein fractionation.
- Inorganic ions – Determination of calcium in serum, serum phosphates,chloride sodium and potassium.
- RFT, Creatinine clearance test
- Cardiac markers
- GTT
- Electrophoresis (Protein)

List of Reference Books :

Textbook of Biochemistry : D.M Vasudevan, Sree Kumari S
Textbook of Biochemistry : U. Sataynarayan
Medical clinical biochemistry : M.N.Chatterjee
Clinical guide to lab test : M.M. Tietz.
Biochemistry made easy : N.Haridas