



MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

B. Sc. Medical Laboratory Technology

(Three Years Program)

Notice

1. Amendments made by the Board of Management of the University in Rules/ Regulations of Graduate Medical Courses shall automatically apply to the Rules/ Regulations of the Mahatma Gandhi University of Medical Sciences & Technology.
2. The University reserves the right to make changes in the syllabus/ books/ guidelines, fee-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.
3. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

RULES & REGULATIONS OF
B.Sc. MEDICAL TECHNOLOGY COURSES
(3 Years Degree Course)

DURATION OF COURSE:

The course shall be of 3 years duration from the date of commencement of academic session

MEDIUM OF INSTRUCTION

English shall be the medium of instruction.

OBJECTIVES:

At the end of the course, the learner should be able to:

- (1) Understand, describe and summarize the basic physiological and metabolic pathways along with their inter-relationships.
- (2) Understand, describe and integrate the basic theoretical and practical aspects of Pathology, Microbiology and Clinical Biochemistry.
- (3) Understand and demonstrate all essential characteristics of a good lab technician and should apply all universal precautions of medical lab technology.
- (4) Understand, explain and demonstrate the basic as well as advanced techniques like ELISA, PCR, Chemiluminescence etc.
- (5) Understand and describe the basic blood bank procedures.
- (6) Utilize basic lab devices (both manual and automated) for the various qualitative and quantitative investigations.
- (7) Understand, describe and apply all essential protocols of Lab management and Quality control.

ELIGIBILITY FOR ADMISSION:

- For admission a candidate should have passed the 10+2 (Senior Secondary) Examination or its equivalent Examination Science stream i.e. Physics, Chemistry and Biology Subjects with 50% marks in the aggregate from any recognized Board.
- Candidate should have completed the minimum age of 17 years as on 31st December of the year of admission to BSc. Medical Technology Course.

SELECTION OF CANDIDATES:

Selection for B.Sc. Medical Technology Courses shall be done by an Admission Board strictly on merit judged on the basis of University Entrance Examination conducted in the month of July / August every year.

COMMENCEMENT OF THE COURSE

The Course shall commence from the 1st August of every Academic year.

RESERVATION:

Reservation of seats shall be applicable in accordance with Rajasthan State Government reservation policy.

ATTENDANCE:

75% in theory and 75% in practical/clinical in each year. Any one failing to achieve this, shall not be allowed to appear in the University examination.

ENROLMENT:

Every candidate who is admitted to B.Sc. Medical Technology Courses in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility/enrolment fees.

The candidate shall have to submit the application form duly filled in and forwarded to the University through Principal of the College for the enrolment/eligibility along with the original documents with the prescribed fees (upto November 30 of the year of admission without late fees and upto December 31 of the year of admission with late fees)

SCHEME OF EXAMINATION

1. Theory

- Each Theory paper examination shall be of 3 hours duration and of maxmarks 70.
- Internal assessment shall be of 30 marks for Each Theory paper.
- The number of question papers shall be in accordance with the different subjects/areas covered during each of the B.Sc. three years course. The number of question papers shall vary from course to course as per the subjects covered in different disciplines of the B.Sc. Medical Technology Courses as under :

Name of Course		Theory			Paper Set & Evaluated by	
		Total Marks	Pass Marks	Papers	First and Second Year	Third (Final) Year
1	B.Sc. Radio Imaging Technology (RIT)	400	200	4 question papers for each year	4 Internal Paper Setters	3 Internals + 1 External paper setter
2	B.Sc. Medical Laboratory Technology (MLT)	300	150	3 question papers for each year	3 Internal Paper Setters	2 Internals + 1 External paper setter
3	B.Sc. Clinical Dietetics (CD)	300	150			
4	B.Sc. Physician Assistance Technology (PAT)	200	100	2 question papers for each year	2 Internal Paper Setters	1 Internal + 1 External paper setter
5	B.Sc. Operation Theater Technology (OTT)	200	100			
6	B.Sc. Ophthalmic Techniques and Optometry (OTO)	200	100			
7	B.Sc. Surgical Assistance (SA)	200	100			

- For the First and Second year examinations – these respective above question papers (four, three or two as the case may be) shall be set by the Internal Examiners covering their respective areas of syllabus. For each question paper there shall be a separate Internal Examiner. The answer books shall be evaluated by the concerned Internal Examiners (Papers Setters).
- In Third (Final) Year examination, one of the papers shall be set and evaluated by an External Examiner. In other words, one of the Internal has to be substituted by the External Examiner. The External Examiner (Paper Setter) shall evaluate his/her paper.
- The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council. Model question paper is annexed herewith.
- It is to be noted that the Internal and External Examiners of all the three years (First, Second and Third year) shall be appointed by the President of the University. This exercise shall be conducted through the office of the Controller of the Examinations of the University. The External Examiner of Third year shall also be appointed by the President out of the panel of names submitted by the Concerned Coordinator of the

course through the Dean to the Controller of Examinations for appointment of Examiners by the President of the University.

- (h) Passing Marks: A candidate will have to obtain at least 50% marks in each Theory paper including internal assessment to pass. This means that he will have to score 50% marks in each paper. This shall include the marks obtained in Theory paper of 70 marks and internal assessment for that paper of 30 marks (Marks obtained in Theory paper + Marks obtained in internal assessment = the Total Marks obtained in respect of each paper).

2. Practical and Viva-Voce Examination

- (a) Each year there shall be one practical and viva-voce examination. It shall be conducted after the Theory examination is over.
- (b) The pattern of practical examination in different years of the course being not uniform shall vary in B.Sc. Medical Technology degree course of different disciplines.
- (c) The pattern shall be as follows –

S. No.	Name of Course	Practical		Practical Examiners		
		Total Marks	Pass Marks	First year	Second year	Third year
1	B.Sc. R.I.T.	400	200	3 Internal Examiners (+Expert(s) if needed)	4 Examiners (3 Internal+ 1 External)	4 Examiners (3 Internal+ 1 External)
2	B.Sc. M.L.T.	300	150			
3	B.Sc. C.D.	300	150			
4	B.Sc. P.A.T.	200	100	2 Internal Examiners (+Expert(s) if needed)	3 Examiners (2 Internal+ 1 External)	3 Examiners (2 Internal+ 1 External)
5	B.Sc. O.T.T.	200	100			
6	B.Sc. O.T.O.	200	100			
7	B.Sc. S.A.	200	100			

- (d) The experts: There shall be the provision for the experts where needed to be inducted as adviser(s) who shall only help the Internal Examiners to evaluate the students in adjunct areas of the course which do not warrant the appointment of separate examiners. It is to be noted that the experts shall not award any marks. The Coordinator of the course shall submit the name(s) of the expert(s) which shall be approved by the President.
- (e) Total marks of the practical examination shall be equivalent to the total marks put together of the number of Theory papers in the B.Sc. Medical Technology course.
- (f) It shall be left to the examiners – Internals and the External, as the case may be, to examine and evaluate the students in practical in the way they wish and award the marks without giving any specific details. The total marks obtained by the candidate in the practical examination shall be the aggregate of the marks awarded by all the examiners put together as one figure. This shall then be submitted to the University. For example in case of Medical Laboratory Technology having four practical examiners, if a candidate scores 60 (first examiner), 50 (second examiner), 50 (third examiner) plus 60 (fourth examiner) – total 60+50+50+60 = 220 shall be submitted as one figure to the University. The award sheet shall be signed by all the practical examiners. The experts (where inducted) shall not sign the award sheet of the practical examination.

3. Result:

1. A candidate will have to obtain at least 50% marks separately in each Theory paper including internal assessment and a minimum of 50% marks in the practical examination for him to be declared pass.
2. A Candidate who has failed in theory paper/s will reappear in respective theory papers/s in supplementary examination.

3. Candidate who has failed in Practical examination only will reappear only in practical examination in Supplementary examination.
4. **Supplementary Examination:**
- (a) Eligibility for the failed candidates to appear at the supplementary examination shall be as below –
 - i. Failed in Theory Paper(s) and failed in Practical – shall reappear in the respective failed Theory paper(s) and Practical examination.
 - ii. Failed in Theory paper/papers and passed in Practical examination – shall reappear only in the concerned failed Theory paper(s).
 - iii. Passed Theory papers but failed in Practical – shall reappear only in the Practical Examination.
 - (b) There shall be a supplementary examination within two months of the declaration of the result of the main examination. Internal assessment marks obtained in main examination in the concerned failed paper/papers shall be carried forward for working out the result of supplementary Theory paper(s) examination. Such candidate who has secured less than 50% marks in the internal assessment will be allowed to improve his internal assessment marks in the repeat supplementary internal assessment examination.
 - (c) Marks secured by the candidate in passed main examination/supplementary examination Theory paper(s) and/or practicals, as the case may be, will be carried forward for working out his result.
 - (d) Result:
 - i. A candidate obtaining at least 50% marks in the supplementary Theory paper(s) and 50% marks in the supplementary practical examination, as the case may be, shall be declared successful.
 - ii. A candidate who has failed in supplementary theory paper(s) examination shall have to reappear only in the failed theory paper(s) at the subsequent examination.
 - iii. A candidate who has failed in supplementary practical examination shall have to reappear both in theory (all papers) and practical at the next main examination.
5. **Promotion to Second/Third Year**
- A candidate failed in theory paper(s) /Practical examination only shall be promoted to next year.
- (b) A candidate will be allowed to appear for the Final (3rd)year examination only when the backlog of all papers (theory and practical) of 1st and 2nd year Exams is cleared
 - (c) The student is required to complete the course within 6 years from the joining of the course

6. **Result - Division:** Successful candidates will be categorized as under-

1.	Those, securing 50% and above but less than 60% in the aggregate marks of First, Second & Third year taken together	Pass
2	Those, securing 60% and above but less than 75% in the aggregate marks of First, Second & Third year taken together	Pass with I Division
3	Those, securing 75% and above in the aggregate marks of First, Second & Third year taken together	Pass with Honors

PAPER SETTER/EXAMINER

1. All the examiners, paper setters, theory examination answer books evaluators, Internal and External Examiners for Practical examinations shall be appointed by the President of the University.
2. Qualification of the Paper setter / Examiner: Senior Demonstrator and above.
3. Paper setter can be an examiner

REVALUATION / SCRUTINY

Re-evaluation of answer book(s) of the B.Sc.Medical Technology courses may be permissible in not more than 25% of the theory papers within 15 days from the date of declaration of examination result on submission of his/her application on the prescribed form alongwith the requisite fees. Such answer book(s) shall be re-evaluated as per university rules. Reevaluation of answer book(s) shall not be permitted for second attempt in any paper. Scrutiny (re-totaling) of answer book(s) of the B.Sc.Medical Technology courses may be permissible within 15 days from the date of declaration of examination result on submission of his/her application on the prescribed form alongwith the requisite fees as per University Rules.

GRACE MARKS

1. A student who appears in the whole examination in first attempt and obtains the required minimum pass marks in the total aggregate of an examination but fails to obtain the minimum pass marks in one subject (in theory and / or practical as the case may be) will be awarded the grace marks up to a maximum of 05 marks according to the following scale, provided the candidate passes the examination by award of such grace marks:

Marks obtained by the candidate above the required minimum aggregate pass marks		Grace marks can be given up to
Up to 6 marks	-	02
Up to 12 marks	-	03
Up to 18 marks	-	04
19 marks and above	-	05

2. No grace marks would be awarded to a candidate who appears in part/ supplementary/remand examination. Non appearance of a candidate in any part of the examination on account of any reason will make him ineligible for grace marks.
3. A candidate who passes the examination after the award of grace marks in a paper/practical or the aggregate will be shown in the marks sheet to have passed the examination by grace. Grace marks will not be added to the marks obtained by a candidate from the examiners.
4. A candidate who is awarded grace marks in any subject to pass the examination will not be entitled for distinction in any subject.

Selection of Generic Elective and skills Enhancement Courses

Every student has to select any one elective subject out of seven elective subjects mentioned below at the beginning of the academic year during his/her course duration. The Examination of these subjects shall be conducted at the college level.

Sr. No.	Subject	Teaching hours		
		Theory	Practical	Total
1	Disaster Management	45	15	60
2	Information and Communication Technology in Health Education	45	15	60
3	Clinical Nutrition	70	30	100
4	Yoga	70	30	100
5	Effective English	50	50	50
6	Health Care	50	-	50
7	Constitution of India	45	-	45

Distribution of marks

S. No.	Subject	Theory	Internal Assessment	Total
1	Disaster Management	70	30	100
2	Information and Communication Technology in Health Education	70	30	100
3	Clinical Nutrition	70	30	100
4	Yoga	70	30	100
5	Effective English	70	30	100
6	Health Care	70	30	100
7	Constitution of India	70	30	100

A candidate can appear in the elective subject examinations to be conducted at the college level before the University examinations at the end of I year or II year or III year. Only such candidates shall be eligible to fill University examination form of III year (final year) who have passed their elective subject. It shall be mandatory to obtain 50% marks in the aggregate of prescribed total marks (i.e. 50 out of 100) to pass the elective subjects. Marks of all such candidates who have passed their elective subject shall be sent in the following format by the Principal of the college to the University while sending their examination forms of III year (final year) :

S. No.	University Roll No.	Name of the student	Father's Name	Name of elective subject	Marks obtained	Result

Those candidates who do not pass their elective subjects shall not be eligible to submit their III year (final year) University examination form and accordingly they will not be permitted to appear in the University examination of III year (final year) of the course.

Marks obtained by the candidates in their elective subject shall be mentioned separately in the marks sheets of the University examinations. These marks shall not be counted for preparing the merit list.

B.Sc. Medical Laboratory Technology

Recommended Teaching Hours of Instruction for each subject

First Year B.Sc. Medical Laboratory Technology Course

S. No.	Course Title	Theory Hours	Practical Hours
1.	Fundamentals of Physiology & Basics of Biochemistry	80	20
2.	Hematology & Clinical Pathology	80	20
3.	General Microbiology	80	20
	Total hours	240	60

Second Year B.Sc. Medical Laboratory Technology Course

S. No.	Course Title	Theory Hours	Practical Hours
1.	Clinical Biochemistry	100	80
2.	Histopathology & Cytology	100	80
3.	Immunology, Serology & Parasitology	100	80
4.	Clinical Posting	-	510
	Total hours	300	750

Third Year B.Sc. Medical Laboratory Technology Course

S. No.	Course Title	Theory Hours	Practical Hours
1.	Advanced Biochemistry & Automation	100	80
2.	Coagulation studies & Blood Bank procedures	100	80
3.	Systematic Bacteriology, Mycology & Virology	100	80
4.	Clinical Posting	-	510
	Total hours	300	750

Marks Distribution

First Year B.Sc. Medical Laboratory Technology Course

Code No	Subject	Written			Practical		
		Theory	I.A. Theory	Total Theory	Practical + Oral	I.A. Practical	Total Practical
7231	Fundamentals of Physiology & Basics of Biochemistry	70	30	100			
7232	Hematology & Clinical Pathology	70	30	100			
7233	General Microbiology	70	30	100			
7234	Practical	-	-	-	210	90	300
Total		210	90	300	210	90	300

Second Year B.Sc. Medical Laboratory Technology Course

Code No	Subject	Written			Practical		
		Theory	I.A. Theory	Total Theory	Practical + Oral	I.A. Practical	Total Practical
7235	Clinical Biochemistry	70	30	100			
7236	Histopathology & Cytology	70	30	100			
7237	Immunology, Serology & Parasitology	70	30	100			
7238	Practical	-	-	-	210	90	300
Total		210	90	300	210	90	300

Third Year B.Sc. Medical Laboratory Technology Course

Code No	Subject	Written			Practical		
		Theory	I.A. Theory	Total Theory	Practical + Oral	I.A. Practical	Total Practical
17010	Advanced Biochemistry & Automation	70	30	100			
17020	Coagulation studies & Blood Bank procedures	70	30	100			
17030	Systematic Bacteriology, Mycology & Virology	70	30	100			
17040	Practical	-	-	-	210	90	300
Total		210	90	300	210	90	300

Total Marks- 600+600+600=1800

First Year B.Sc. Medical Laboratory Technology

(1 Year Duration)

Paper-I

Fundamentals of Physiology & Basics of Biochemistry

Theory Hours:80

Practical Hours:20

Total:100

Fundamental of Physiology

General outline along with the functional anatomy of various body systems

1. Cell: Structure & function
2. Tissue: Epithelium, Connective, Sclerous, Muscular & Nervous
3. Blood: Blood cells, Hemoglobin, Blood groups, Coagulation Factors, Anemia & Immunoglobulins
4. Cardiovascular system: Heart rate, cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse, Measurement of pulse, blood pressure, Auscultation for Heart Sounds.
5. Respiratory System: Ventilation, Functions, Lungs Volumes and capacities
6. Gastrointestinal System: Process of digestion in various parts
7. Endocrinology: Endocrine Glands, Hormones - Their secretion and functions
8. Excretion system: Structure of nephron, Urine formation
9. Central Nervous System: Parts, Sliding Filament Theory, Neuromuscular Junction, Wallerian Degeneration, Motor Nervous system, Sensory nervous system, Sympathetic Nervous system, Parasympathetic nervous system
10. Reproductive System: Male and Female reproductive systems
11. Skin: Structure & Function
12. Muscular System : Classification of muscles & their functions
13. Special Senses : Eye & ear (in brief)

Basics of Biochemistry

1. Introduction to Apparatus, Chemical Balance: Different types, Principles and Practice.
2. Concepts of Molecular weight, Atomic weight, Normality, Molarity, Standards,
3. Atomic structure, Valence, Acids, Bases, Salts, & Indicators.
4. Chemistry of carbohydrates & their related metabolism: Introduction, definition, classification, biomedical importance & properties.
5. Brief outline of metabolism: Glycogenesis & glycogenolysis, Glycolysis, Citric acid cycle & its significance, HMP shunt & Gluconeogenesis, regulation of blood glucose level, Hyperglycemia & hypoglycemia, Diabetes mellitus - definition, types, features, gestational diabetes mellitus , glucose tolerance test, glycosurias, Hypoglycemia & its causes
6. Amino acids: Definition, classification, essential & non essential amino acids.
7. Chemistry of Proteins & their related metabolism: Introduction, definition, classification, biomedical importance.
8. Metabolism: Transamination, Decarboxylation, Ammonia formation & transport, Urea cycle, metabolic disorders in urea cycle, catabolism of amino acids especially Phenylalanine, Tyrosine & Tryptophan, Creatine, Creatinine, Proteinuria.
9. Chemistry of Lipids & their related metabolism: Introduction, definition, classification, biomedical importance, essential fatty acids.

10. Brief outline of metabolism: Beta oxidation of fatty acids, Fatty acid synthesis, Ketosis, Cholesterol & its clinical significance. Lipoproteins- composition & functions, Fatty liver & Atherosclerosis.
11. Chemistry of Nucleic acids: DNA Structure and function, RNA Types: Structure and function.
12. Vitamins: Fat & water soluble vitamins, sources, requirement, deficiency disorders & biochemical functions.
13. Enzymes: Introduction, definition, classification, coenzymes, isoenzymes, properties, factors affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes

Paper-II

Hematology & Clinical Pathology

Theory Hours:80
Practical Hours:20
Total:100

Hematological Disorders

1. Classification of Anemia (Morphological & etiological), Definition, causes, classification & lab findings of Iron Deficiency Anemia, Megaloblastic Anemia, Hemolytic Anemia
2. Bone Marrow : Cell composition of normal adult Bone marrow
3. Leukemia: Classification, Blood Picture, Differentiation of Blast Cells.

Basic Hematological Techniques

1. Blood collection
2. Anticoagulants used in Hematology
3. Normal values in Hematology
4. Basic Hematological Techniques: RBC count, Hemoglobin estimation, Packed cell volume.
5. Calculation of absolute indices: WBC counts-Total and differential, Absolute eosinophil count, Platelet count, Erythrocyte sedimentation rate, Reticulocyte count
6. Preparation of blood films
7. Stains used in Hematology
8. Morphology of red cells
9. Morphology of Leukocytes and platelets
10. Bone marrow: Techniques of aspiration, preparation and staining of films, Bone marrow biopsy
11. Laboratory methods used in the investigation of anemia.

Clinical Pathology

1. Urine examination: Physical, Chemical & Microscopic
2. Examination of body fluids, cell counts
3. Semen analysis
4. CSF (Cerebrospinal Fluid)
5. Stool Examination.

Paper - III
General Microbiology

Theory Hours:80

Practical Hours:20

Total:100

1. Introduction & History of Microbiology

Development of microbiology as a discipline, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Edward Jenner.

2. Microscopy

Study of compound microscope-magnification, numerical aperture, resolution and components of microscope, different types of microscopy-Bright field microscope, Dark field microscope, Phase contrast microscope, Electron Microscope-Transmission & Scanning Electron Microscope, Precautions and care of microscope

Bacteria

1. General characters and classification.
2. Morphology: Shape, Capsule, Flagella, Inclusion, Granule, Spore.

Growth and Maintenance of Microbes

1. Bacterial division, Batch Culture, Continuous culture, bacterial growth- total count, Viable count, bacterial nutrition, oxygen requirement, CO₂ requirement, temperature, pH, light.

Sterilization and Disinfection

1. Physical agents- Sunlight, Temperature less than 100°C, Temperature at 100°C, steam at atmospheric pressure and steam under pressure, irradiation, filtration.
2. Chemical Agents- Alcohol, aldehyde, Dyes, Halogens, Phenols, Ethylene oxide.

Culture Media

1. Definition, uses, basic requirements, classification, Agar, Peptone, Transport
2. Media, Sugar Media, Anaerobic Media, Containers of Media, Forms of Media

Staining Methods

1. Simple, Grams staining, Ziehl-Nelsen staining or AFB staining, Negative Impregnation

Collection and Transportation of Specimen

1. General Principles, Containers, Rejection, Samples- Urine, Feces, Sputum, Pus, body fluids, Swab, Blood.

Care and Handling of Laboratory Animals

1. Fluid, Diet, Cleanliness, Cages, ventilation, Temperature, Humidity, handling of animals, Prevention of disease.

Disposal of Laboratory/Hospital Waste

1. Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal.

Nosocomial Infections/ Hospital Acquired Infections (HAI)

1. Causative methods, transmission methods, investigation, prevention and control of Hospital Infection

Practical

Paper- I

Fundamentals of Physiology & Basics of Biochemistry

1. Introduction to apparatus, Instruments and use of Chemical Balance.
2. Preparation of solutions, calculation of Molecular Weights and Equivalent Weights,
3. Preparation of Normal solutions, Molar solutions, percent solution and reagents, dilution techniques.
4. Maintenance of Laboratory Glassware and apparatus.
5. Centrifugation: Principle, types & applications.
6. Titration of simple acid-base and calculation of Normality.
7. Measurement of hydrogen ion concentration.
8. Qualitative analysis. Identification of Carbohydrates, Proteins & substances of biochemical importance.
9. Urine analysis – normal & abnormal constituents of urine.
10. Demonstration of colorimeter, spectrophotometer, pH meter, single pan balance.
11. Chromatography: Definition, types, RF value, description of paper chromatography & applications.
12. Electrophoresis: Principle, Types & Applications.

Paper - II

Hematology & Clinical Pathology

Hematology

1. Study of Microscope and its use
2. Glassware for Hematology.
3. Equipments for Hematology.
4. Anticoagulant vial preparation.
5. Determination of Blood group
6. Complete Blood Counts.
7. Determination of Hemoglobin.
8. TRBC Count by Hemocytometers.
9. TLC by Hemocytometer.
10. Differential Leukocyte count.
11. Determination of Platelet Count.
12. Determination of ESR by Wintrobe's.
13. Determination of ESR by Westergreen's method.
14. Determination of PCV by Wintrobe's.
15. Erythrocyte Indices- MCV, MCH, MCHC.
16. Reticulocyte Count.
17. Absolute Eosinophil Count.
18. Morphology of Red Blood Cells

Clinical Pathology

- (1) Urine examination: Physical, Chemical and Microscopic

Paper - III

General Microbiology

- a. Preparation of swabs/sterile tubes & bottles.
- b. Preparation of media
- c. Identification of Culture media & its uses
- d. Demonstration of Autoclave & sterilization of media
- e. Preparation of culture plates
- f. Demonstration of glasswares used in microbiology
- g. Preparation of smear.
- h. Staining: Gram & Ziehl-Nelson staining.
- i. Identification of instruments.
- j. Identification of common microbes.
- k. Operation of microscope and handling of equipment's and instruments required for routine lab work.
- l. Visit to hospital for demonstration of Biomedical Waste Management

Second Year B.Sc. Medical Laboratory Technology
(1 Year Duration)
Paper – I
Clinical Biochemistry

Theory Hours:100
Practical Hours:80
Total:180

Photometry

1. Definition,
2. Laws of photometry, absorbance, transmittance, absorption maxima,
3. Instruments,
4. Parts of photometer, types of photometry–colorimetry, spectrophotometry,
5. Flame photometry,
6. Fluorometry, choice of appropriate filter,
7. Measurements of solution,
8. Calculation of formula, applications.

Water & Mineral Metabolism

1. Distribution of fluids in the body,
2. ECF & ICF,
3. Water metabolism, dehydration,
4. Mineral metabolism, macronutrients (principal mineral elements) & trace elements.

Acid base balance concepts & disorders

1. Concepts of Acid Base reaction and hydrogen ion concentration. pH meter & pH buffer.
2. pH, Buffers, Acidosis, Alkalosis

Organ Function Tests

1. Liver Function Tests, Renal Function Tests,
2. Thyroid function tests and Pancreatic Function tests

Cardiac Profile

1. Hypertension, Angina, Myocardial Infarction,
2. Pattern of Cardiac Enzymes in heart diseases.

Diabetic Profile

1. Regulation of Blood Glucose,
2. Glucose tolerance test,
3. Glycosylated Hemoglobin,
4. Microalbuminuria etc.

Endocrinology

1. Classification of hormones;
2. Regulation and general mechanism of action of hormones;
3. Pituitary gland & hypothalamus;
4. Hormones of the Anterior Pituitary, neurohypophysis,
5. Thyroid gland,
6. Adrenocortical hormones, Adrenal medulla,
7. Gonads & Pancreas.

Paper – II
Histopathology & Cytology

Theory Hours:100

Practical Hours:80

Total:180

1. Introduction to Histopathology, Exfoliative cytology.
2. Basic steps for Tissue Processing: Fixing, Embedding, Microtomy, Staining, Mounting, methods of decalcification.
3. Laboratory requirements for Histopathology & Cytology: Chemicals & Reagents
4. Equipments - Microscope, Microtome: Types, Uses, Parts, different types of microtome knives, care & maintenance. Automated tissue processor - components, working & precautions during use, Tissue floating bath.
5. Staining Methods
 - a) Hematoxylin & Eosin stain,
 - b) Reticulin stain
 - c) PAP staining
6. Museum Techniques
 - a) The mounting of pathological specimens: Introduction, Preparation of specimen, Fixation of specimen
 - b) Precaution taken for the Fixation of Specimens.
 - c) Storage of Specimens.
 - d) Mounting of Museum Specimens.
 - e) Routine Mounting of Specimens.
 - f) Filling and Scaling.

Paper – III
Immunology, Serology & Parasitology

Theory Hours:100
Practical Hours:80
Total:180

Immunology & Serology

1. Immunity - Definition and classification, General Principles of Innate & Acquired Immunity.
2. Immune Response - Humoral immunity & cell mediated immunity.
3. Antigen - Definition, classes, properties.
4. Antibodies/Immunoglobulins - Definition, Properties, Sub types of Immunoglobulins, Introduction of hybridoma technology, monoclonal antibodies, polyclonal antibody
5. Antigen/Antibody Reaction/ Serological Refractions
6. Features of antigen/antibody Reaction- Precipitation, Agglutination, ELISA, RIA, Complement fixation test, Neutralization, Opsonization, Immune adherence, Immuno fluorescence, Immuno electron microscopic test
7. Structure and functions of Immune System
 - a) Parts of Immune system
 - b) T/B cells, Natural Killer cells, other cells & their functions
8. Hyper sensitivity Reactions
 - a) General Principles of different types of hypersensitive reactions i.e., type 1, 2, 3, 4.
 - b) Auto immune disorders
9. ELISA
10. Vaccination- Immunoprophylaxis schedule in neonates, children and in pregnancy

Parasitology

1. Definition - parasitism, Host, Vectors etc.
2. Classification of Parasites.
3. Lab diagnosis of parasitic infections.

Protozoa: Life cycle, Morphology, Disease & Lab Diagnosis

1. Intestinal Amoebae: *E. histolytica*, *E. coli*
2. Flagellates of intestine/genitalia: *Giardia lamblia*, *Trichomonas vaginalis*
3. Malarial Parasite: *Plasmodium vivax* ; Differences between *P. vivax*, *P. malaria*, *P. falciparum* & *P. ovale*.

Nematodes: Intestinal Nematodes:

1. *Ascaris*: Life cycle, Morphology, disease & lab diagnosis
2. *Enterobius vermicularis* (Thread worm) and *Ancylostomaduodenale* (Hook worm) (in brief)
3. Tissue Nematodes: *W. bancrofti* - Life cycle, Morphology, Disease & Lab Diagnosis

Phylum Platyhelminths

1. Cestodes - *T. solium*, *T. saginata* & *E. granulosus*.
2. Trematodes - *S. haematobium* & *F. hepatica*

Practical

Paper – I

Clinical Biochemistry

Estimation using Colorimeter / Spectrophotometer & auto analyzer

1. Blood Glucose & Glucose Tolerance Test
2. RFT: Blood Urea, S. Creatinine, S. uric acid
3. LFT: S. Bilirubin (Total, Direct, Indirect), SGOT, SGPT, ALP, S. Total Protein,
4. S. albumin, A:G ratio
5. Lipid Profile: Total Cholesterol, Triglyceride, HDL (Direct)
6. Electrolytes: Sodium, Potassium, Chloride, Calcium, Magnesium
7. S. Amylase, S. Lipase
8. Cardiac Enzymes

Endocrinology

1. Estimation using ELISA & Chemiluminiscent analyzer: T3, T4, TSH, FSH, LH, hCG, Cortisol, Progesterone, Testosterone

Paper – II

Histopathology & Cytology

1. Parts of microtome
2. Tissue processing
3. H&E staining
4. PAP staining.

Paper – III

Immunology, Serology & Parasitology

Immunology & Serology

1. WIDAL Test
2. VDRL Test,
3. RA Test
4. CRP Test
5. Pregnancy Test & HIV Test

Parasitology

1. Stool examination -Identification of different ova & cysts in stool samples.

ELISA Tests

1. HIV
2. Hepatitis B (HBsAg)
3. Hepatitis C (HCV)
4. Malaria antigen
5. Tuberculosis-IgG/IgM

Third Year B.Sc. Medical Laboratory Technology
(1 Year Duration)
Paper – I
Advanced Biochemistry & Automation

Theory Hours:100

Practical Hours:80

Total:180

Latest advances in clinical Biochemistry

1. Laboratory Automation: Principle & Standard Operating procedures including calibration
2. Use of Auto analyzers and Chemiluminiscent analyzers,
3. ABG and Electrolytes analyzers
4. Latest trends in Automation, Biochips, Lab on a chip (LoC)

Quality Laboratory Management

1. Introduction to Quality control
2. Quality laboratory processes, Quality assurance, Quality assessment, Quality control,
3. Quality planning and Quality improvement
4. Internal quality control, basic steps, sources of error and their correction methods,
5. Sources of variation in laboratory results, CAPA - corrective action & preventive action
6. Quality control charts, Levy- Jennings and Cusum charts, West guard Rules
7. External quality control
8. Current trends in laboratory accreditation, ISO certificate, West guard Rules
9. Document Control in Laboratory

Tumor & Cancer Markers

1. Carcinogens, Oncogene, Clinical applications of tumor markers.
2. Immunodiffusion Techniques, Radioimmunoassay & ELISA
3. Polymerase Chain Reactions Principle & Applications

Paper – II

Coagulation studies & Blood Bank procedures

Theory Hours:100

Practical Hours:80

Total:180

Coagulation studies

1. Hemostasis: Definition, Basic concept and principle, Basic steps involved in Hemostasis.
2. Coagulation:
 - a) Basic Physiology, coagulation factors.
 - b) Mechanism of blood coagulation.
 - c) Extrinsic Pathway.
 - d) Intrinsic Pathway.
 - e) Regulators of blood coagulation.
3. Testing of blood coagulation:
 - a) Bleeding Time, Duke's method.
 - b) Clotting Time- Capillary tube method & Lee white's method.
 - c) PT, APTT
 - d) Clot retraction time
 - e) Determination of fibrinogen.
4. Quality Assurance for routine Hemostasis Laboratory:
 - a) Introduction.
 - b) Sample collection technique (Phlebotomy)
 - c) Sample preparation, Anticoagulant used, Importance of use of Sodium Citrate.
5. Role in Diseases, Bleeding disorders
 - a) Platelet disorder - Thrombocytopenia - causes including aplastic anemia
 - b) Hemophilia

Blood Bank Procedures

1. Principles and practice of:
 - a) Blood Grouping
 - b) Blood Transfusion
 - c) Blood Donation
 - d) Blood Collection
 - e) Storage & Transport
 - f) Maintenance of Blood Bank Records
 - g) Compatibility Testing
 - h) Blood Components
 - i) Blood Transfusion Reactions

Paper-III

Systematic Bacteriology, Mycology & Virology

Theory Hours:100

Practical Hours:80

Total:180

Systematic Bacteriology

1. Morphology, cultural characteristics,
2. Biochemical reaction,
3. Pathogenesis/ disease caused & lab diagnosis of:
 - a) Staphylococcus,
 - b) Streptococcus,
 - c) Pneumococcus,
 - d) Neisseria gonorrhoeae,
 - e) Neisseria
 - f) meningitidis,
 - g) Corynebacteriumdiphtheriae,
 - h) Mycobaterium,
 - I) Clostridium,
 - j) E.coli,
 - k) Klebsiella,
 - l) Salmonella,
 - m) Proteus,
 - n) Pseudomonas,
 - o) Vibrio
 - p) Spirochaetes.
4. Molecular techniques in diagnostic microbiology -PCR, DNAhybridisationMycology
 - a) Morphology and Structure of fungi
 - b) Classification of fungi
 - c) Nutrition and cultivation of fungus
 - d) Cutaneous, Subcutaneous and Systemic Mycosis
 - e) Lab diagnosis of fungal Infections
 - f) Opportunistic fungal infections

Virology

1. General characters of viruses
2. Classification of viruses
3. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses
4. Lab diagnosis of viral infections
5. Cultivation of viruses
6. Bacteriophages.
7. Retro viruses - HIV, Hepatitis virus, Pox virus
8. Picorna virus - Polio
9. Orthomyxo virus - Influenza
10. Arbo virus - Chikungunya, Dengue
11. Herpes and Adeno virus

Practical

Paper –I

Advanced Biochemistry & Automation

Estimation of Tumor & Cancer markers

1. Alpha feto proteins
2. Carcino embryogenic antigen
3. CA-125 etc.

Operation on various semi and auto analyzers

Quality control procedures

Paper – II

Coagulation studies & Blood Bank procedures

1. Precautions to prevent hemolysis
2. Storage of blood specimens
3. Bleeding time & clotting time estimation
4. Prothrombin time estimation
5. APTT (activated partial thromboplastin time) estimation.
6. Clot retraction time
7. Blood grouping & Cross Matching

Paper-III

Systematic Bacteriology, Mycology & Virology

Systematic Bacteriology

1. Culture Techniques
 1. Anaerobic culture methods
 2. Introduction of Biochemical Reactions
 3. Identification of Bacterial culture
 4. Colony characteristics
 5. Morphological characteristics
 6. Motility-Hanging drop preparation
 7. Interpretation of Biochemical Test
 8. Antibiotic sensitivity testing.

Mycology & Virology

1. Culture Media used for fungus
2. Identification of Fungal culture
 - a) KOH mount
 - b) Colony characteristics & microscopic examination of *Aspergillus niger*, *A.fumigatus*, *Rhizopus*, *Penicillium*, *Candida* etc.
3. Methods of lab diagnosis & virology.

B.Sc Medical Laboratory Technology
Part-I (Main) Examination Month Year

Paper I

Fundamentals of Physiology And Basics of Biochemistry

Time: Three Hours

Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order

Student shall be allowed to take only one supplementary copy along with
one main answer book.

Q.1 Define carbohydrates. Classify them giving suitable examples. Write a note on Mucopolysaccharides. 20

OR

Describe the sources, daily requirement, functions and deficiency manifestations of Vitamin A.

Q.2 Mention the steps of Krebs's Cycle with the help of a flow chart. Describe its energetics. 20

OR

Describe the various factors affecting enzyme action.

Q.3 Write short notes on: (any five) 40

(a) ABO Blood groups

(b) Types of RNA

(c) Structure of Nephron

(d) Essential fatty acids

(e) Iso electric pH

(f) Cardiac cycle

(g) Lipoproteins

B.Sc Medical Laboratory Technology
Part-I (Main) Examination Month Year

Paper II
Hematology & Clinical pathology

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

- Q.1 Define Anemia. Discuss the morphological classification of anemia. 20
OR
Describe the principle, method and interpretation of Benedict's test for glycosuria.
- Q.2 Describe briefly the manual methods of Hemoglobin estimation and Total Leucocyte count. 20
OR
Describe the causes and PBF findings of megaloblastic anemia and chronic myeloid leukemia.
- Q.3 Write short notes on: (any five) 40
(a) Erythrocyte Sedimentation Rate
(b) Semen Analysis
(c) Reticulocyte count
(d) Staining of Blood film
(e) CSF examination
(f) Anticoagulants used in hematology
(g) Absolute Eosinophil count

B.Sc Medical Laboratory Technology
Part-I (Main) Examination Month Year

Paper III
General Microbiology

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

Q.1 Define Sterilization & Disinfection. Enumerate the methods of sterilization & disinfection. 20

OR

Discuss the structure of a bacterial cell with the help of a suitable diagram. Write a note on the Bacterial growth curve.

Q.2 Describe the various categories of Biomedical waste and methods of disposal of waste in different categories. 20

OR

Enumerate the different staining methods of Bacteria. Discuss the principle & procedure of Gram's staining with examples of gram positive & gram negative cocci & bacilli.

Q.3 Write short notes on: (any five) 40
(a) Autoclave
(b) Ziehl-Nelson staining
(c) Surface active antigen
(d) Lowenstein-Jensen medium
(e) Bacterial spore
(f) Pasteurization
(g) Acid fast staining

B.Sc Medical Laboratory Technology
Part-II (Main) Examination Month Year

Paper I
Clinical Biochemistry

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

- Q.1 Describe the indications and steps of Glucose tolerance test (GTT). Describe the normal GTT curve with the help of a suitable diagram. 20
OR
Classify Jaundice. Give an account of the investigations which help in differentiating between the types of jaundice.
- Q.2 Describe the various Renal Function tests. 20
OR
Enumerate the enzymes used in diagnosis of myocardial infarction. Explain the variation in serum levels of these enzymes following acute infarction.
- Q.3 Write short notes on: (any five) 40
(a) ELISA
(b) Thyroid stimulating hormone
(c) Glycosylated hemoglobin
(d) Parts of a colorimeter
(e) Mechanism of action of steroid hormones
(f) Beer-Lambert's law
(g) Polymerase Chain reaction

B.Sc Medical Laboratory Technology
Part-II (Main) Examination Month Year

Paper II
Histopathology and Cytology

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

- Q.1 Draw a labeled diagram and describe the different parts of a microscope. 20
OR
Describe the various types of fixatives used in histopathology.
- Q.2 Describe the procedure for Papanicolaou staining for cytology smears. 20
OR
Discuss the various steps required for monitoring of museum specimens.
- Q.3 Write short notes on: (any five) 40
(a) Methods of decalcification
(b) Cleaning agents
(c) Embedding
(d) Progressive H/E staining
(e) Borin's fluid
(f) Types of microtomes
(g) Preparation of neutral formalin

B.Sc Medical Laboratory Technology
Part-II (Main) Examination Month Year

Paper III
Immunology, Serology and Parasitology

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer book.

Q.1 Define antibodies. Name the various classes of antibodies along with their properties. 20

OR

Describe the different types of cells in relation to cell mediated immunity.

Q.2 Name the parasite causing malaria. Describe its life cycle and laboratory diagnosis. 20

OR

Describe the life cycle, morphology, disease caused and lab diagnosis of *Ascarislumbricoides*.

Q.3 Write short notes on: (any five) 40

- (a) Vaccines
- (b) WIDAL test
- (c) Active & Passive immunity
- (d) Stool examination
- (e) Structure of Ig G
- (f) VDRL test
- (g) Hypersensitivity reaction

B.Sc Medical Laboratory Technology
Part-III (Main) Examination Month Year

Paper I

Advanced Biochemistry and Automation

Time: Three Hours

Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

Q.1 Describe the basic concepts of Quality control in clinical Biochemistry. 20

OR

Describe the components and working of an Autoanalyzer. Enumerate the basic steps
of its daily maintenance.

Q.2 Describe the concept of External Quality Assurance. Write a note on corrective
actions. 20

OR

Describe the various types of carcinogens. Write a note on clinical applications of
tumor markers giving suitable examples.

Q.3 Write short notes on: (any five) 40

- (a) Dry Chemistry
- (b) Levy-Jennings Charts
- (c) West guard rules
- (d) Lab Accreditation
- (e) Blood Gas Analyzers
- (f) Coefficient of variation (CV)
- (g) Oncogenes

B.Sc Medical Laboratory Technology
Part-III (Main) Examination Month Year

Paper II

Coagulation studies and Blood Bank procedures

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

- Q.1 Describe the preparation of various blood components and their rationale uses. 20
OR
How will you investigate a case of hemorrhagic disorder?
- Q.2 Describe the ABO Blood groups. Write a note on methods of cross matching of blood. 20
OR
Describe adverse transfusion reactions.
- Q.3 Write short notes on: (any five) 40
(a) Partial Thromboplastin time (PTT)
(b) Clotting time
(c) Selection of blood donor
(d) Fibrinogen Degradation products
(e) Diseases transmitted by blood transfusion
(f) Fibrinolytic system
(g) Hemophilia

B.Sc Medical Laboratory Technology
Part-III (Main) Examination Month Year

Paper III
Systematic Bacteriology, Mycology and Virology

Time: Three Hours
Maximum Marks: 80

Attempt all questions

All the parts of one question should be answered at one place in sequential order
Student shall be allowed to take only one supplementary copy along with one main answer
book.

Q.1 What is the causative organism of tuberculosis. Describe its pathogenesis and lab
diagnosis. 20

OR

Describe the structure of HIV virus with the help of a labeled diagram. Write a note
on lab diagnosis of HIV infection.

Q.2 What are the various diseases caused by Candida and describe its lab diagnosis. 20

OR

Enumerate the causes of Urinary Tract Infection. Describe its lab diagnosis.

Q.3 Write short notes on: (any five) 40

- (a) Classification of fungi
- (b) Pyrexia of unknown origin
- (c) Staphylococcus
- (d) Anaerobes
- (e) Hepatitis B virus
- (f) Food poisoning
- (g) Lab diagnosis of fungal infection

Elective Paper- Non – University Examination
DISASTER MANAGEMENT

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

Introduction to Disasters

- a. Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)
- b. Disasters
- c. Classification Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.)
- d. Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters. urban disasters, pandemics, complex emergencies, Climate Change

Approaches to Disaster Risk reduction

- a. Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- non structural ensures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake- holders.

Inter-relationship between Disasters and Development

- a. Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

Disaster Risk Management in India

- a. Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management institutional Arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

Project Work: (Field Work, Case Studies)

- a. The project /fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located

Suggested Reading list:

- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
- Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Coppola P Damon, 2007. Introduction to International Disaster Management,
- Cuny, F. 1983. Development and Disasters, Oxford University Press.

INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH EDUCATION

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

Learning objectives

Upon successful completion of this subject, students should

1. To obtain the basic knowledge on computer, devices used in computers.
2. To know the uses of computers like MS office, Power point Presentations, Excel documents.
3. To know about uses of internet, its advantages in regular updating the knowledge in Occupational therapy profession.

SYLLABUS

Introduction

1. Introduction to computers-History of Computer, Generation of Computer, Classification of Computers, Input Devices, Output Devices, Central Processing Unit, Components of CPU, Memory Unit, Peripheral Devices
2. Introduction to M.S. Windows
3. Internet and its applications
4. MGUMST web forum & portal
5. Google Applications
6. Introduction to M.S. Office - Word, Power Point, Excel,
7. Publisher

The Digital Age

Computer and communications, the five operations of a computer-and communication system- input, processing, output, storage and communications as well as the corresponding categories of hardware, five major categories of computers, development I communication Technology.

Applications Software

Applications and systems software, ethics of copying software, four types of applications software, entertainment education and reference, productivity and business and specialized, key functions of word processors, spreadsheets, database managers, graphics programs and suites, group-ware, and internet web browsers.

Storage Devices

Units of storage capacity, primary and secondary storage, data compression, data storage on diskette, hard disks, optical disks, and magnetic tape and describe the purposes of storage media.

Communications

Usage of communications technology, telephone-related services, online information services, the internet

Multimedia

What is multimedia – Multimedia PC– Multimedia Hardware - Central processor – color display, Multimedia accessories – CD ROM – Digital Audio – Audio speakers – Digital video– MIDI – deodisc Read/write storage device- Multimedia software

Radio propagation:

Use of computers in physical therapy – Application Packages used in statistical analysis.

Recommended books

1. Free T. Hotstetter, —Multimedia Literacy‖ M<egraw Hill,
2. Simon J. Gibbs, Dinoysios C. Tschritziz, —Multimedia programming‖, Addison Wesley
3. John F.Koefgel Buford, —Multimedia Systems‖, Addison Wesley
4. John Vince, —Virtual Reality Systems‖ Addison Wesley.
5. AndressF.Molisch, —Wideband Wireless digital communication‖ Pear Education Asia

CLINICAL NUTRITION

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

COURSE OBJECTIVE:

The objective of this course is that after 30 hours of L, D, P the student shall be able to understand the basic knowledge about Diet, balanced diet, metabolism, malnutrition, under nutrition, over nutrition, deficiency disease.

COURSE OUTCOME:

1. Become familiar about the nutritive values of food.
2. Explain about the food sources from which we obtain vitamins.
3. Become familiar with various compositions of food.
4. Well versed with digestion at each stages of digestive system.
5. Become familiar with different cooking methodologies.
6. Know and explain about food preparations by food manufacturer.
7. Explain thoroughly about the advantages and disadvantages of various convenience foods.

UNIT ISOURCES OF FOOD

1. Nutritive value of foods,
2. Food Sources from which key vitamins are derived

UNIT II DIGESTIVE SYSTEM

1. Digestion and absorption –Digestion at each stage of the digestive system
2. Dietary guidelines- Factors affecting food requirements. Planning and serving of family meals. Meals for all ages and occupations.

UNIT III COMPOSITION OF FOOD

Composition and value of the main foods in the diet - Milk, meat, fish, cheese, eggs, margarine and butter cereals (wheat, rice, maize, millets, oats) fruits and vegetables

UNIT IV PROCESSING OF FOOD

1. Cooking of food -Transfer of heat by conduction, convection and radiation.
2. Principles involved in the different methods of cooking – boiling, stewing, grilling, baking, roasting, frying, steaming, pressure cooking, cooking in a microwave oven.

FOOD PREPARATION

1. Convenience foods- Foods partly or totally prepared by a food manufacturer – dehydrated, tinned, frozen, ready to eat. Intelligent use of these foods.
2. Advantages and disadvantages

Text Book:

1. Agarwal, Textbook of human nutrition, JP, 1 Ed, 2014

Reference:

1. Kenneth F. Kiple, Kriemhild Coneè Ornelas, The Cambridge world history of food, Cambridge University Press, 1st ed, 2000

YOGA

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

COURSE OBJECTIVE:

The objective of this course is that after 30 hours of lectures & demonstrations, the student will be able to understand the basic concepts about Asanas and its effects, therapeutics effects of Yoga

COURSE OUTCOME:

1. Demonstrate the introduction and principles of yoga.
2. Knowledge of history of yoga and yoga in modern India.
3. Outline of yoga background and importance of yoga in modern world.
4. Learning the types and forms of Asanas and description of physiological effect of yoga.
5. Understanding the role of yoga in Occupational Therapy

UNIT-I Introduction to Yoga

1. Introduction to Yoga
2. Principles of Yoga

UNIT- II Patanjali

1. History of Yoga
2. Yoga in Ancient and Modern India

UNIT- III Folds of Yoga

1. Types & Forms of Yoga
2. Asanas & its physiological effects

UNIT- IV Yogic Science

1. Scientific background of Yoga
2. Yoga in modern world

UNIT -V Advantages of Yoga

1. Physiological Effects of Yoga
2. Therapeutic Uses of Yoga

Textbook:

1. BKS Iyengar, Light of Yoga, JP, 1st Ed, 2012.

Reference:

1. PayalGidwaniTiwari, Body Gaurders, CBS, 2nd Ed, 2009

EFFECTIVE ENGLISH

Theory Hours: 60

Total Hours: 60

Course Objective:

The objectives of this course is that after 40 hours of lectures, demonstrations and practicals the student will be able to Speak fluently, intelligibly and appropriately to teachers, Colleagues, Doctors, Patients and friends at the college, Hospital and hostel etc. about academic or (occupational) areas of interest. Course Outcome:

1. Students can gain knowledge about the various traditions writer and followed in English
2. Individuals can gain self – confidence in their own voice and speak out their opinions with confidence
3. Students will gain the ability to become a accomplished active readers
4. Helps to build the knowledge and understanding simultaneously through listening and give their point of view
5. Students will be able to write effectively in variety of professional and social setting
6. Acquire the ability to read and understand the literature and have the ability to identify the topics and formulate questions
7. Good communication skills which helps in easy rapport between the patient and therapist
8. Gain the fluency in speaking which helps in easy teaching method and presentation

UNIT – I INTRODUCTION

1. History of the language
2. Regional distribution
3. Variation in dialect and accent

UNIT – II PHONOLOGY

1. Consonants and vowels
2. Phontactics
3. Stress, rhythm and intonation
4. Regional variation

UNIT – III GRAMMER

1. Noun, Pronoun
2. Verb, Tense
3. Adjuncts
4. Adjectives

UNIT – IV SYNTAX

1. Clause syntax
2. Auxillary verbs
3. Vocabulary
4. Word formation
5. Pronunciation

UNIT – V PRESENTATION

1. Oral presentation & Panel discussion
2. Interview preparation
3. Clarity and specificity

Text Book:

1. O' Connor, I.D., Better English Pronunciation - Cambridge, Cambridge University.2009

Reference:

1. Water F.V.A , Proficiency Course in English – Hodder and Stronghton, London.1994
2. Tone Daniel, I.M. , English Pronouncing Dictionary –Dent and sons Ltd. London.2004

HEALTH CARE

Theory Hours: 50

Total Hours: 50

Introduction to Health

1. Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.
2. National Health Policy
3. National Health Programmes (Briefly Objectives and scope) Population of India and Family welfare programme in India

Introduction to Nursing

1. What is Nursing? Nursing principles. Inter-Personnel relationships. Bandaging: Basic turns; Bandaging extremities; Triangular Bandages and their application.
2. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.
3. Lifting and Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.
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.
5. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion Care of Rubber Goods
6. Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

First Aid:

1. Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

Reference Books:

1. Preventive and Social Medicine by J.Park
2. Text Book of P & SM by Park and Park
3. Counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

Constitution of India

Theory Hours: 50

Total Hours: 50

Unit-I:

Meaning of the term 'Constitution'. Making of the Indian Constitution 1946- 1950.

Unit-II:

The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III:

Fundamental Rights and Duties their content and significance.

Unit – IV:

Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit – V:

Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI:

Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit – VII:

The Election Commission and State Public Service commissions.

Unit – VIII:

Method of amending the Constitution.

Unit – IX:

Enforcing rights through Writs:

Unit – X:

Constitution and Sustainable Development in India.

Reference Books:

1. J. C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.
2. J. N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution – Corner Stone of a Nation-Oxford, New Delhi, 2000.