VEER NARMAD SOUTH GUJARAT UNIVERSITY,

Surat-7

Syllabus

of

S. Y. B. Sc. Medical Technology

(As per CBCS)

Effective From June 2018

S. Y. B. Sc. Medical Technology
Semester – 3

COURSE- MT: 05	ENVIRONMENT AND FOOD MICROBIOLOGY	CREDIT- 02	2hrs/week

UNIT-1: MICROBIOLOGY OF WATER AND WASTE WATER

1.1 Sanitary analysis of water
1.2 Microbiology of waste water (sewage) treatment
    1.2.1 Reduction of BOD
    1.2.2 Large-scale Sewage Treatment methods
    1.2.3 Small-scale Sewage Treatment methods
1.3 Drinking water treatment and testing
1.4 Microbiology of solid water treatment
    1.4.1 Sanitary Landfills for Solid Waste disposal
    1.4.2 Commercial Composting

UNIT-2: AEROBIOLOGY

2.1 Number and Kinds of organisms in air.
2.2 Enumeration of Bacteria in air.
2.3 Effect of atmospheric temperature and humidity on air microorganisms.
2.4 Role of microorganisms in air

UNIT-3: FOOD MICROBIOLOGY

3.1 Factors influencing Growth of microorganisms in Food
    3.1.1 Intrinsic Factors
    3.1.2 Extrinsic Factors
3.2 Microorganisms in food and Beverage production
3.3 Food spoilage and Preservation
3.3 Food Borne Disease Outbreaks
    3.3.1 Food borne infection
    3.3.2 Food intoxication
3.4 Detection of Food Borne Pathogens
3.5 Probiotics

UNIT-4: SOIL MICROBIOLOGY

4.1 Microorganisms in soil
4.2 Functions of microorganisms in soil
4.3 Nitrogen Cycle and Nitrogen fixation
4.4 Rhizosphere
4.5 Biofertilizers, Bioinsecticides and Biopesticides

REFERENCES:

1) Purohit S. S. (2006). *Microbiology: Fundamentals and Applications*, 7th ed., Agrobios(India).
2) Wiley J. & Sherwood L. (2007). *Prescott, Harley, and Klein's Microbiology*, 9th ed., McGraw-Hill Science/Engineering/Math.
3) Pelczar M. J. & Chan E. C. S. (1998). *Microbiology*, 5th ed., Tata-McGraw-Hill.
4) Powar C. B. & Daginawala H. F. *General Microbiology*, Vol. II, Himalaya Publishing House.
5) Tortora G. J. & Funke B. R. (2006). Microbiology: An Introduction, 9th ed., Benjamin Cummings.
6) Salle A. J. (1984). *Fundamental Principles of Bacteriology*, 7th ed., Tata-McGraw-Hill.

COURSE-MT: 06	**HUMAN ANATOMY AND PHYSIOLOGY-1**	**CREDIT- 02**	**2hrs/week**

UNIT: 1 INTRODUCTION TO HUMAN BODY

1.1 The Cell- Structure and Function
1.2 Tissues
  1.2.1. Epithelial Tissue
  1.2.2. Connective Tissue
  1.2.3. Muscle Tissue
  1.2.4. Nervous Tissue
1.3 Homeostasis
  1.3.1. Positive Feedback Mechanism
  1.3.2. Negative Feedback Mechanism

UNIT: 2 CIRCULATORY SYSTEM

1.1 Cardiovascular System

2.1.1. Structural difference among Arteries, Veins and capillaries
2.1.2. Structure of heart
2.1.3. Flow of blood through hearth
2.1.4. Cardiac cycle
2.1.5. Conducting system of heart

2.2 Lymphatic System
2.2.1. Functions of Lymphatic system
2.2.2. Structure and function of Lymphatic organs and tissues

UNIT: 3 NERVOUS SYSTEM

3.1 Central Nervous System
3.1.1. Meninges and Cerebrospinal Fluid (CSF)
3.1.2. Structure and Function of Brain: Cerebrum, Diencephalon, Brain stem, Cerebellum
3.1.3. Structure of Spinal cord: Grey matter & White matter

3.2 Peripheral Nervous System: List of Spinal, Thoracic & Cranial nerves
3.3 Action Potential and Neurotransmitters

UNIT: 4 SKELETAL SYSTEM

4.1 Types and function of Bone
4.2 Structure of bone
4.3 List of Axial and Appendicular skeleton bones
4.4 Joints
4.4.1. Fibrous Joint
4.4.2. Cartilaginous Joint
4.4.3. Synovial Joint and its types

REFERENCE:

1) Anne W. & Allison G. (2010). Ross and Wilson; *Anatomy and Physiology in Health and Illness*, 11th ed., Elsevier Churchill Livingstone.
2) Tortora G. J. and Willey B. D. (2014). *Anatomy and Physiology*, India Edition.
3) Chaurasia B. D. (2013). *Human Anatomy*, 6th ed., vol 1,2,3, CBS Publisher & Distributor Pvt Ltd.
4) Andras C. (1999). *Anatomy of the Living Human*, Atlas of Medical Imaging, Konemann.

COURSE-MT: 07	GENERAL BIOCHEMISTRY-1	CREDIT- 02	2hrs/week

UNIT: 1 CHEMISTRY OF CARBOHYDRATE

1.1 Function of carbohydrate
1.2 Classification of carbohydrate
1.3 Monosaccharide:
- 1.3.1 Classification
- 1.3.2 Isomerism
- 1.3.3 Chemical properties: Oxidation, Reduction, Reducing property, Osazone formation & Glycoside formation

1.4 Disaccharide: Classification and structure
1.5 Polysaccharide: Homopolysaccharide (Starch and glycogen), Heteropolysaccharide

UNIT: 2 CHEMISTRY OF LIPID

2.1 Introduction, classification & Biological functions
2.2 fatty acids: Classification, Structure and Biological functions
2.3 Triglyceride: Structure and Properties
2.4 Phospholipid: Classification, structure and functions
2.5 Cholesterol: Structure and properties
2.6 Amphipathic lipids

UNIT: 3 AMINO ACID AND PROTEINS

3.1 Classification of Amino acid
3.2 Classification of Protein
3.3 Structure of protein
- 3.3.1 Bonds responsible for protein structure
- 3.3.2 Primary structure
- 3.3.3 Secondary structure
- 3.3.4 Tertiary structure
- 3.3.5 Quaternary structure

3.4 Properties of protein
3.5 Denaturation of protein

UNIT: 4 ENZYME

4.1 Nomenclature, Classification and Property
4.2 Mechanism of Enzyme action
4.3 Factors affecting Enzyme activity
4.4 Co enzyme: Classification
4.5 Enzyme inhibition
4.6 Units of Enzyme activity
4.7 Isoenzymes: LDH and ALP

REFERENCES:

1) Satyanarayana U. & Chakrapani U. (2013). *Biochemistry*; 4th ed, Arunabha Sen and Allied (P) Ltd.
2) Vasudevan D. & Sreekumari S. (2005). *Textbook of Biochemistry*; 4th ed, Jaypee Pub
3) Chatterjae M. N. and Shinde R. (2007). *Textbook of Medical Biochemistry*, 7th ed., Jaypee Brothers Publishers.
4) Nelson D. L. & Cox M. M. (2000). *Lehninger Principles of Biochemistry*, 3rd ed., Macmillan Worth Publishers.
5) Rastogi S. C. (2003). *Biochemistry*, 2nd ed., Tata McGrow Hill Publishing Company Limited.

PRACTICAL: SEMESTER III

1) Study of Enzymatic Activity of Microorganisms/Enzyme Production capability: Dehydrogenase, Decarboxylase, Deaminase, Catalase, Oxidase.
2) Microbiological Analysis of Air.
3) Microbiological Analysis of Water.
   -Detection of Colifoms.
   -Enumeration of Coliforms.(MPN Technique)
4) Microbiological Analysis of Food.
5) Microbiological Analysis of Soil
6) Isolation of Actinomycetes from Soil.
7) Isolation of Anaerobic organisms from Soil.
8) Collection of Blood (Demonstration).
9) Identification of Blood Cells.
10) General scheme for identification of Biomolecules.
11) Qualitative analysis of Carbohydrates
12) Qualitative analysis of Proteins
13) Qualitative analysis of Lipids and Cholesterol
14) Qualitative analysis of Non Protein Nitrogenous Substances
15) Determination of Growth Curve (Demonstration).
16) Isolation of Bacteriophage from Sewage (Demonstration).
17) Examination of Pulse and Blood Pressure (Demonstration).

REFERENCES:

1) Patel R. J. & Patel R. K. (2015). *Experimental Microbiology*, Vol. 1, 9th ed, Aditya.
2) Patel R. J. & Patel R. K. (2015). *Experimental Microbiology*, Vol. 2, 9th ed, Aditya.
3) Chawla R. (2014). *Practical Clinical Biochemistry: Methods and Interpretation*, 4th ed., Jaypee Brothers

S. Y. B. Sc. Medical Technology
Semester – 4

COURSE-MT: 08	MICROBIAL METABOLISM AND GENETICS	CREDIT- 02	2hrs/week

UNIT: 1 INTRODUCTION TO METABOLISM

1.1 Introduction
1.2 ATP: The major energy currency of cells
1.3 Redox Reaction
1.4 Methods of energy Production
    1.4.1 ETC and Oxidative Phoshorylation
    1.4.2 Fermentation
1.5 Regulation of Metabolism

UNIT: 2 CATABOLISM AND ANABOLISM

2.1 Anabolism Vs catabolism
2.2 Nutritional Types
2.3 Phototropic fueling reactions
2.4 Chemoorganotrophs
2.5 Chemolithotrophy
2.6 Principles governing biosynthesis

UNIT: 3 GENOME REPLICATION AND EXPRESSION

3.1 DNA as a genetic material
3.2 DNA replications
3.3 Genetic code
3.4 Transcription
3.5 Translation
3.6 Regulation of gene expression

UNIT: 4 MECHANISM OF GENETIC VARIATION

4.1 Introduction to mutation (Definition, Types in brief)
4.2 Recombination methods

4.2.1 Transformation
4.2.2 Transduction
4.2.3 Conjugation
4.3 Transposable elements
4.4 Evolution in Action: The development of Antibiotic resistance in Bacteria

REFERENCE:

1) Willey J. & Sherwood L. (2013). Prescott, Harely and Klein's Microbiology, 9th ed., McGraw-Hill Science/ Engineering /Math.
2) Jain J. L. & Jain N. (2006). Fundamentals of Biochemistry, 6th ed., S. Chand publications.
3) Satyanarayana U. & Chakrapani U. (2013). *Biochemistry*; 4th ed, Arunabha Sen and Allied (P) Ltd.
4) Chatterjae M. N. and Shinde R. (2007). *Textbook of Medical Biochemistry*, 7th ed., Jaypee Brothers Publishers.

COURSE-MT: 07	**HUMAN ANATOMY AND PHYSIOLOGY-2**	**CREDIT- 02**	**2hrs/week**

UNIT: 1 DIGESTIVE SYSTEM

1.1 Overview of Structure of Digestive organs
1.2 Function of Digestive organs
1.3 Composition and function of Salivary gland & Saliva, Gastric Juice & Pancreatic Juice
1.4 Digestion and absorption of Nutrients
1.5 Defaecation

UNIT: 2 EXCRETORY SYSTEM

2.1 Structure and function of organs of urinary system: Kidney, Ureter, Urinary bladder, Urethra
2.1.1. Process of Urine formation
2.1.2. Micturation
2.2 Structure and function of Skin

UNIT: 3 RESPIRATORY SYSTEM

3.1 Overview of Structure of Upper and Lower Respiratory organs
3.2 Function of Respiratory organs
3.3 Breathing process
3.4 Gaseous exchange
3.5 Regulation of Respiration

UNIT: 4 REPRODUCTIVE SYSTEM

4.1 Structure of Male Reproductive organs
4.2 Spermatogenesis
4.3 Structure of female Reproductive organs
4.4 Oogenesis

REFERENCE:

1) Anne W. & Allison G. (2010). Ross and Wilson; *Anatomy and Physiology in Health and Illness*, 11th ed., Elsevier Churchill Livingstone.
2) Tortora G. J. and Willey B. D. (2014). *Anatomy and Physiology*, India Edition.
3) Chaurasia B. D. (2013). *Human Anatomy*, 6th ed., vol 1,2,3, CBS Publisher & Distributor Pvt Ltd.
4) Andras C. (1999). *Anatomy of the Living Human*, Atlas of Medical Imaging, Konemann.

COURSE-MT: 10	**GENERAL BIOCHEMISTRY-2**	**CREDIT- 02**	**2hrs/week**

UNIT: 1 HORMONE

1.1 Introduction
1.2 Classification
1.3 Mechanism of action of Steroid Hormone
1.4 Mechanism of action of Non-steroid Hormone through cAMP & cGMP as a secondary messenger
1.5 Mechanism of action of Non-steroid Hormone through Phosphatidyl inositol/ Calcium as a secondary messenger
1.6 Nuclear receptor mechanism of Non-steroid hormone

UNIT: 2 MINERALS

2.1 General Function and Classification
2.2 Calcium: Biochemical function, Dietary requirement, Source, Adsorption, excretion and Disease state
2.3 Hormonal regulation of blood calcium
2.4 Biochemical function, Dietary requirement, Source, Adsorption, excretion and Disease state of: Sodium, Potassium and Chloride

UNIT: 3 NUCLEIC ACID

1.1 Introduction
1.2 Nucleoside: Components, Nomenclature and Structure
1.3 Nucleotide: Components, Nomenclature and Structure
1.4 Structure and types of DNA
1.5 Structure and types of RNA

UNIT: 4 VITAMINS

4.1 Introduction
4.2 Classification
4.3 Structure, daily requirements, dietary sources, biological functions and deficiency manifestation of fat soluble vitamins
4.4 Structure, daily requirements, dietary sources, biological functions and deficiency manifestation of water soluble vitamins

REFERENCES:

1) Satyanarayana U. & Chakrapani U. (2013). *Biochemistry*; 4th ed, Arunabha Sen and Allied (P) Ltd.
2) Vasudevan D. & Sreekumari S. (2005). *Textbook of Biochemistry*; 4th ed, Jaypee Pub
3) Chatterjae M. N. and Shinde R. (2007). *Textbook of Medical Biochemistry,* 7th ed., Jaypee Brothers Publishers.
4) Nelson D. L. & Cox M. M. (2000). *Lehninger Principles of Biochemistry,* 3rd ed., Macmillan Worth Publishers.
5) Rastogi S. C. (2003). *Biochemistry,* 2nd ed., Tata McGrow Hill Publishing Company Limited.

PRACTICAL: SEMESTER IV

1) Isolation and Identification of pathogens from Urine sample based on morphological, cultural and biochemical characteristics (*Staphylococcus aureus, Escherichia coli, Enterobacter aerogenes, Klebsiella pneumoniae, Proteus vulgaris, Pseudomonas aeruginosa*)
2) Isolation and Identification of pathogens from Stool sample based on morphological, cultural and biochemical characteristics (*Staphylococcus aureus, Escherichia coli, Enterobacter aerogenes, Proteus vulgaris, Bacillus cereus, Salmonella spp*)
3) Isolation and Identification of pathogens from Sputum sample based on morphological, cultural and biochemical characteristics (*Klebsiella pneumoniae, Staphylococcus aureus, Enterobacter aerogenes, Pseudomonas aeruginosa*)
4) Isolation and Identification of pathogens from Pus sample based on morphological, cultural and biochemical characteristics (*Pseudomonas aeruginosa, Staphylococcus aureus*)
5) Isolation and Identification of pathogens from CSF sample based on morphological, cultural and biochemical characteristics (*Klebsiella pneumoniae*)
6) Physical and Chemical Analysis of Blood.
7) Physical and Chemical Analysis of Saliva.
8) Physical and Chemical Analysis of Gastric Juice.
9) Physical and Chemical Analysis of Bile Juice.
10) Physical and Chemical Analysis of Urine.

REFERENCE:

1) Patel R. J. & Patel R. K. (2015). *Experimental Microbiology*, Vol. 1, 9th ed, Aditya.
2) Patel R. J. & Patel R. K. (2015). *Experimental Microbiology*, Vol. 2, 9th ed, Aditya.
3) Chawla R. (2014). *Practical Clinical Biochemistry: Methods and Interpretation*, 4th ed., Jaypee Brothers