VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT-7

Syllabus
of
S.Y.B.Sc. Medical Technology
(As per CBCS)
2012 – 13

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

MT -05 : Microbial Metabolism and Genetics

Unit 1: Dynamics of Prokaryotic growth

1.1 Nutritional classification of microorganisms & Microbiological media
1.2 Microbial Growth and its Measurement
1.3 Factors influencing growth of microorganisms
1.4 Isolation and Cultivation of microorganisms
1.5 Maintenance and Preservation of microorganisms

Unit 2 : Microbial Metabolism

2.1 Energy Rich Compounds
  2.1.1 ATPase & Methods of ATP generation
  2.1.2 Other energy rich compounds
2.2 Methods of Energy production
  2.2.1 Electron transport Chain
  2.2.2 Fermentation

Unit 3 : Gene Expression and Regulation

3.1 Gene structure
3.2Genetic code
3.3 DNA replication
3.4 Transcription
3.5 Translation Regulation of gene expression

Unit 4 : Genetic Recombination

4.1 Mechanism of Gene transfer
4.2 Extrachromosomal genetic material
4.3 Transposable elements.
4.4 Phenotypic and genotypic changes.

References :

1) Nester Anderson, Roberts , Pearsall, Nester*; Microbiology;* International Edition; McGraw Hill Pub.
2) P.J. Soni; *Introduction to Microbial Physiology*; Second Edition; Nirav Prakashan.
3) Dr. H.A. Modi , *Elementary Microbiology, Fundamentals of Microbiology volume1*, Akta Prakashan, Nadiad.
4) Uldis N. Streips, Ronald E.Yasbin, *Modern Microbial Genetics* ,2nd Edition,Wiley-Liss publication.

MT 06 : Human Anatomy & Physiology-1

Unit 1 Introduction to anatomy and physiology

- 1.1 The Cell- Structure and functions
- 1.2 Tissues of body organs and systems
- 1.3 Homeostasis

Unit 2 Digestive System

- 2.1 Structure & functions of gastrointestinal tract
- 2.2 Composition and functions of salivary, gastric and Pancreatic juice
- 2.3 Digestion and absorption of nutrients
- 2.4 Formation and excretion of stool

Unit 3 Excretory System

- 3.1 Structure & functions of the Organs
  - 3.1.1 Renal System
    - Structure and function of urinary system
    - Process of urine formation
    - Micturation
  - 3.1.2 Skin
    - Structure of skin
    - Function of skin
- 3.2 Osmoregulation
  - 3.2.1 Formation & Excretion of Urine
  - 3.2.2 Formation & Excretion of Sweat
- 3.3 Regulation of Excretion

Unit 4 Musculoskeletal System

- 4.1 General osteology
  - 4.1.1 Structure of bones
  - 4.1.2 Histology of bones
  - 4.1.3 Bone formation
  - 4.1.4 Functions of bones
  - 4.1.5 Osteology of human skeleton-Axial skeleton and Appendicular skeleton.
- 4.2 Articulation
  - 4.2.1 Types of joints
  - 4.2.2 Movement of joints
- 4.3 Gross anatomy of muscles
  - 4.3.1 Muscles of upper and lower limbs
  - 4.3.2 Physiology of muscle contraction

References :

1) Ross and Wilson; *Anatomy and Physiology in Health and Illness*; 9th Edition; Anne Waugh; Allison Grant; Elsevier Churchill Livingstone.
2) Gerard J. Tortora , Sandra Reynolds Grabowski , *Principles of Anatomy & Physiology,10th edition*, John Wiley & Sons ,Inc. Pub.
3) B.D Chaurasia's , Human Anatomy – Regional and Applied,Volume-1 & 3,CBS publishers & distributors.

MT 07 : General Biochemistry-1

Unit 1 Carbohydrates

1.1 Introduction, nature, occurrence, classification, biological importance.
1.2 Monosaccharides & their classification, structure, properties & derivatives of monosaccharides.
1.3 Disaccharides: Classification, structure & biological importance.
1.4 Polysaccharides: Classification, structure & biological importance.

Unit 2 Lipids

2.1 Introduction, occurrence, sources, classification & biological importance.
2.2 Chemistry, properties & tests to detect:
- 2.2.1 Simple lipids.
- 2.2.2 Compound lipids.
- 2.2.3 Derived lipids.

2.3 Fatty acids: Classifications, occurrence & biological importance.
- 2.3.1 Essential fatty acids.

2.4 Steroids & Sterols: Introduction.
- 2.4.1 Cholesterol: Occurrence, structure, properties & tests for detection.

2.5 Introduction to Glycerol, Monoacylglycerol & Diacylglycerol.

Unit 3 Amino acid and Proteins

3.1 Introduction, nature, occurrence & biological importance.
3.2 Classification of amino acids: Properties of amino acids, essential amino acids.
3.3 Proteins – Classification & properties.
3.4 Structures of proteins.
3.5 Denaturation of proteins.

Unit 4 Enzyme

4.1 Introduction, nomenclature, classification & properties.
4.2 Coenzymes & cofactors.
4.3 Enzyme specificity.
4.4 Factors affecting enzyme catalyzed reactions including enzyme inhibition.
4.5 Isoenzymes & allosteric enzymes,
4.6 Mechanism of enzyme action.

References

1) D M Vasudevan, Sreekumari S; Textbook of Biochemistry; Third Edition; Jaypee Pub.
2) U. Satyanarayana , U. Chakrapani; Biochemistry; Third Edition; Arunabha Sen and Allied (P) Ltd
3) M. N. Chatterjea , Rana Shinde ,Textbook of Medical Biochemistry, 7th edition, Jaypee Brothers Medical Publishers (P) Ltd.
4) Albert L. Lehninger , David L. Nelson ,Michael M. Cox ,Principles of Biochemistry, 3rd edition, Worth Publishers

Practicals of Semester – 3 Medical Technology

1. Enumeration of Bacteria
2. Determination of growth curve
3. Study of Enzymatic activity of Microorganisms /Enzyme production capability. - -
   - Amylase - Catalase
   - Gelatinase - Deaminase
   - Lipase - Dehydrogenase & carboxylase
   - Caseinase - Oxidase
4. Effect of Physical - Chemical factors on Microbial Growth
   - Effects of Temperature on growth.
   - Effects of P^H.
   - Effects of Osmotic Pressure.
   - Effects of U.V. rays
   - Effects of heavy metals.
   - Effects of Antiseptics & disinfectants
5. Pure Culture Study of –
   - *Eschericia coli*
   - *Enterobacter aerogenes*
   - *Klebsiella pneumoniae*
   - *Proteus vulgaris*
   - *Pseudomonas aeruginosa*
   - *Salmonella species*
   - *Shigella species*
   - *Bacillus cereus*
   - *Staphylococcus aureus*
6. General scheme for identification of Biomolecules
7. Qualitative analysis of Biomolecules
   a) Carbohydrates.
   b) Lipids & Cholesterol.
   c) Proteins.
   d) Non-protein Nitrogenous substances.
8. Paper Chromatography of Amino acids & Sugars
9. Examination of Pulse & BP measurement
10. Demonstration Practicals :
    - TLC
    - BMR & Vital capacity of lungs
    - Simple muscle curve

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

MT 08: Analytical Microbiology

Unit 1 : Drinking Water – treatment and testing

1.1 Water treatment Processes
1.2 Water testing
1.3 Indicator organisms – Characteristics & Importance

Unit 2 :Microbiology of Sewage Water & Solid Waste treatment

2.1 BOD & its significance
2.2 Individual & Municipal Sewage treatment methods
2.3 Sanitary Landfills for Solid Waste disposal
2.4 Commercial Composting

Unit 3 : Microbiology of Food

3.1 Factors influencing growth of microorganisms
3.2 Microorganisms in food & beverages
3.3 Food Spoilage
3.4 Food illness

Unit 4 : Analysis of Air & Soil

4.1 Air analysis
- 4.1.1 Enumeration of bacteria in air
- 4.1.2 Air borne Pathogenic microorganisms
- 4.1.3 Air Sanitation

4.2 Soil analysis
- 4.2.1 The Rhizosphere
- 4.2.2 Methods for studying soil microorganisms
- 4.2.3 Biofertilizers , Bioinsecticides & Biopesticides

References :

1) Nester Anderson, Roberts , Pearsall, Nester*; Microbiology;* International Edition; McGraw Hill Pub.
2) P.J. Soni; *Introduction to Microbial Physiology*; Second Edition; Nirav Prakashan.
3) Dr. H.A. Modi , *Elementary Microbiology, Fundamentals of Microbiology volume1*, Akta Prakashan, Nadiad.
4) Uldis N. Streips, Ronald E.Yasbin, *Modern Microbial Genetics* ,2nd Edition,Wiley-Liss publication.

MT 09 : Human Anatomy & Physiology-2

Unit 1 Respiratory System

- 1.1 Structure of respiratory organs
- 1.2 Function of respiratory organs
- 1.3 Respiratory process
  - 1.3.1 Structure and functions of Haemoglobin
  - 1.3.2 Gaseous exchange and transport
  - 1.3.3 Mechanism of breathing-Mechanical and Biochemical
- 1.4 Regulation of breathing

Unit 2 Circulatory system

- 2.1 Circulatory System
  - 2.1.1 Structure of Heart
  - 2.1.2 Blood flow and blood supply
  - 2.1.3 Cardiac cycle and cardiac output
  - 2.1.4 Structure and functions of Blood vessels
  - 2.1.5 Components of blood and its functions
  - 2.1.6 Circulation of blood
- 2.2 The lymphatic System
  - 2.2.1 Structure of lymphnodes and lymphoid organs
  - 2.2.2 Function of lymphnodes and lymophoid organs
  - 2.2.3 Circulation of lymph

Unit 3 Central Nervous System

- 3.1 Organization and components
  - 3.1.1 Brain and its different parts
  - 3.1.2 Spinal cord
  - 3.1.3Peripheral nerves
- 3.2 Functions of nerve components
  - 3.2.1 Excitation and transmission of impulses
  - 3.2.2 Reflex action
- 3.3 Sense organs
  - 3.3.1 Structures and functions of :
    Ear , Eye, Nose & Tongue

Unit 4 Endocrine and Reproductive system

4.1 Structure and functions of endocrine glands
- 4.1.1 Pituitary
- 4.1.2 Thyroid and parathyroid
- 4.1.3 Pancreas
- 4.1.4 Adrenal

4.2 Male reproductive System
- 4.2.1 Structure of reproductive organs
- 4.2.2 Functions of reproductive organs
- 4.2.3 Spermatogenesis

4.3 Female reproductive system
- 4.3.1 Structure of reproductive organ
- 4.3.2 Functions of reproductive organ
- 4.3.3 Menstrual Cycle / Ovarian Cycle, Uterine Cycle
- 4.3.4 Oogenesis

References :

5) Ross and Wilson; *Anatomy and Physiology in Health and Illness*; 9th Edition; Anne Waugh; Allison Grant; Elsevier Churchill Livingstone.
6) Gerard J. Tortora , Sandra Reynolds Grabowski , *Principles of Anatomy & Physiology,10th edition*, John Wiley & Sons ,Inc. Pub.
7) B.D Chaurasia's , *Human Anatomy – Regional and Applied,Volume-1 & 3*,CBS Publishers & distributors.

MT 10 : General Biochemistry -2

Unit 1 Nucleic acids

1.1 Introduction.
1.2 Purine & Pyrimidine bases in nucleotides.
1.3 Nucleosides, Nucleotides, Nomenclature & structure of nucleotides.
1.4 Nucleic acids: RNA & DNA – their types, chemical structures & functions

Unit2 Vitamins

2.1 Introduction
2.2 Classification
2.3 Dietary sources
2.4 Structures & functions
2.5 Requirements
2.6 Deficiency
2.7 Manifestations of water soluble & fat soluble vitamins.

Unit 3 Hormones

3.1 Introdution
3.2 Classification of hormones
3.3 Mechanism of Hormones
3.5 Hormonal Disorders

Unit 4 Minerals & Trace elements

4.1 Introduction
4.2 General function
4.3 Classification. (Na, K, Ca, Cl).

References

1) D M Vasudevan, Sreekumari S; Textbook of Biochemistry; Third Edition; Jaypee Pub.
2) U. Satyanarayana , U. Chakrapani; Biochemistry; Third Edition; Arunabha Sen and Allied (P) Ltd
3) M. N. Chatterjea , Rana Shinde ,Textbook of Medical Biochemistry, 7th edition, Jaypee Brothers Medical Publishers (P) Ltd..
4) Albert L. Lehninger , David L. Nelson ,Michael M. Cox ,Principles of Biochemistry, 3rd edition, Worth Publishers

Practicals of Semester - 4 Medical Technology

1. Microbiological analysis of Air
2. Microbiological analysis of Water
3. Microbiological analysis of Food
4. Microbiological analysis of Soil
5. Physical & Chemical analysis of Body Fluids
    a) Blood.
    b) Urine.
    c) Saliva.
    d) Gastric Juice.
    e) Bile.
6. Isolation of Actinomycetes from Soil
7. Isolation of Anaerobic organisms from Soil
8. Isolation of Bacteriophage from Sewage
9. Collection of blood
10. Identification of Different Blood Cells
11. Determination of Blood groups
12. Estimation of Haemoglobin
13. Paper Chromatography of Amino-acids and Sugars.
14. Thin Layer Chromatography (Demonstration).