Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર S.Y.B.Sc. Bio-Science (Microbiology) Sem.-3 & 4 Major, Minor, MDC અને SEC નો અભ્યાસક્રમ બાયોસાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૫/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૦૩ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત ઈ.ચા.માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૧૧૮૯૯/૨૦૨૪
તા.૦૫–૦૬–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

B. Sc. Bioscience (Microbiology) Syllabus

NEP 2020

(Effective from June, 2024)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

NEP 2020, CBCS Semester system

B. Sc. Bioscience (Microbiology)

(Major)

S. Y. B. Sc. Semester III & IV (New)

(Effective from June 2024)

Paper No., Paper title, Teaching & Evaluation Scheme

Semester III

Paper No.	Paper Title	Course Credit	Hrs/week	External marks	Internal marks	Total marks	Duration of Exam
BM-MJ- 301	Prokaryotic Cell Structure	2	2	25	25	50	1 Hrs
BM-MJ- 302	Microbial Genetics	2	2	25	25	50	1 Hrs
BM-MJ- 303	Microbial Taxonomy & Virology	4	4	50	50	100	2 Hrs
BMP-MJ-301	Prokaryotic Cell StructurePractical	2	4	25	25	50	4 Hrs
BMP-MJ-302	Microbial Genetics Practical	2	4	25	25	50	4 Hrs

B. Sc. Bioscience (Microbiology)

(Major)

S. Y. B. Sc. Semester III & IV (New)

(Effective from June 2024)

Semester IV

Paper No.	Paper Title	Course Credit	Hrs/week	External marks	Internal marks	Total marks	Duration of Exam
BM-MJ- 401	Enzymology	2	2	25	25	50	1 Hrs
BM-MJ- 402	Microbial Physiology	2	2	25	25	50	1 Hrs
BM-MJ- 403	Medical Physiology	4	4	50	50	100	2 Hrs
BMP-MJ-401	Enzymology Practical	2	4	25	25	50	4 Hrs
BMP-MJ-402	Microbial Physiology Practical	2	4	25	25	50	4 Hrs

S. Y. B. Sc. Semester - III
Bioscience (Microbiology)
BM-MJ-301: Prokaryotic Cell Structure

Course Description:

Course Code	BM-MJ- 301
Course Title	Prokaryotic Cell Structure
Course Type	Core (Major)
Course Credit	02

Course Content:

Unit: I Cell Wall, Membrane & Nuclear material. [15 Hours.]

- Peptidoglycan, Gram-positive cell wall. LPS &Gram-negative cell wall.
- Cell wall Free State & functions of the cell wall. Pseudomurein & Archaeal cell wall.
- Prokaryotic Cytoplasm& cytoskeleton
- Bacterial & Archaeal membrane
- Ribosomes. Nucleoid, plasmid.

Unit: II Surface Structure & Cell Inclusions. [15 Hours.]

- Capsule slime layer, S layer. Pili &Fimbriae.
- Bacterial flagella – structure, composition & function. Flagellar motility & its mechanism.
- Twitching & gliding motility, Spirochete motility. Tactic movement – Chemotaxis.
- Inclusion bodies-Glycogen, Volutin, PHB, Cyanophycin, Carboxysome, Gas vesicles.
- Endospore structure, Sporulation & Germination.

Reference book:

- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2007), 7Ed., McGraw-Hill Science/Engineering/Math.
- **Microbiology** by Pelzar, Chan, Krieg, Tata McGraw Hill pub. New York
- **Introduction to Microbial Physiology** by P. J. Soni, Nirav Prakashan.
- **Elementary Microbiology** by Dr. H. A. Modi, Ekta Prakashan.

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S. Y. B. Sc. Semester - III
Bioscience (Microbiology)
BM-MJ-302: Microbial Genetics

Course Description:

Course Code	BM-MJ- 302
Course Title	Microbial Genetics
Course Type	Core (Major)
Course Credit	02

Course Content:

Unit: I Central dogma of the Life & Gene Structure. [15 Hours.]

- DNA is hereditary material, the flow of genetic information.
- Gene concept – classical & modern
- Protein coding genes, tRNA & rRNA.Bacterial structural gene
- Patterns of DNA synthesis. The replication machinery. DNA polymerase.
- DNA replication, Semi-conservative, Replication fork, Termination of replication.

Unit: II Gene Expression & Gene Mutation. [15 Hours.]

- Polycistronic mRNA, Ribozymes.The transcription machinery, RNA polymerase.
- Transcription in bacteria. Genetic code, Organization of code.
- Mutations – types, Gene mutation, Types of gene mutation. Spontaneous and induced mutations, Effects of mutation.
- Detection & Isolation of mutants, Mutant selection, Carcinogenicity testing
- DNA Repair: Excision, Direct, Mismatch & Recombination.

Reference books:

- **Prescott, Harley, and Klein's Microbiology**7th ed. by Wiley, J., & Sherwood, L. (2007), McGraw-Hill Science/Engineering/Math.
- **Genetics: A Molecular Approach** 2nd ed. by Russell, P. J. (2005)., Benjamin Cummings.
- **Cell Biology, Genetics & Molecular Biology**by Verma, (2005) S. Chand & Co. Ltd.
- **Cell & Molecular Biology**, by Sheeler & Bianchi. Biley publication.

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S. Y. B. Sc. Semester - III
Bioscience (Microbiology)
BM-MJ-303: Microbial Taxonomy & Virology

Course Description:

Course Code	BM-MJ- 303
Course Title	Microbial Taxonomy & Virology
Course Type	Core (Major)
Course Credit	04

Course Content:

Unit: 1 Microbial Taxonomy [15 Hours.]

- Introduction to Microbial Taxonomy.
- Phenetic, Genotypic, Phylogenetic classification& Taxonomic ranks.
- Classical Characteristics and Molecular Characteristics.
- Microbial phylogeny - Phylogenic tree.
- Major division of life, higher level of classification.

Unit: 1I Bacterial Diversity [15 Hours.]

- Introduction to Bergey's Manual of Systematic Bacteriology.
- Organization of Bergey's Manual of Systematic Bacteriology.
- Introduction to Archea.
- Characteristics of the major archaeal physiological groups.
- Characteristics of the major groups of gram-negative Photosynthetic bacteria.

Unit: III Introduction to Virology [15 Hours.]

- Introduction to Viruses. General Properties of Viruses
- Structure of viruses – Icosahedral, Helical, Enveloped, and complex
- Introduction to Viral taxonomy, Virus classification.
- Nucleic Acid classification.
- DNA & RNA Viruses: and important Groups.

Unit: IV Viral Multiplication & Cultivation. [15 Hours.]

- Viral life cycle, Virus multiplication.Attachment & entry into host, Synthesis, assembly & release.
- Infection of Prokaryotic Cells, Replication of T-Even phage, Lysogeny.

- Infection of Eukaryotic Cells, Types of infection & their effects.
- Cultivation of viruses.Methods for viral cultivation.Enumeration of Viruses.
- Emerging viruses, Satellites, Viroids and Prions.Human cancer viruses.

References:

1. Prescott, Harley, and Klein's Microbiology by Wiley, J., & Sherwood, L. 9th Ed., (McGraw-Hill Science/Engineering/Math)
2. Microbiology by Black, J. G., 9th edition (Wiley, John Wiley and Sons., Inc.)
3. Microbiology an Introduction by Tortora G.J., and Funke B.R., 12th Ed., (Benjamin Cummings)
4. Microbiology-Concepts and Application by Pelczar, Chan and Krieg, 5thEd (McGraw-Hill).

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S. Y. B. Sc. Semester - III
Bioscience (Microbiology)
BMP-MJ- 301: Prokaryotic Cell Structure Practical

(Time duration: 4 hours/week)

Course Content:

1. Cell wall staining by Ringer method
2. Capsule staining by Maneval method
3. Endospore staining by Dormer's method.
4. Volutin staining by Albert's method.
5. Gram's staining.
6. Acid-fast staining by ZNCF method.
7. Spirochete staining by Fontana's method.
8. Flagella staining by Loffler's method.
9. Nucleoid staining.
10. Staining of PHB granules
11. Demonstration of motility by agar slant method.
12. Study of permanent slide/specimens

References:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel&KiranPatel (Aditya Publication)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **Experiments in Microbiology, Plant Pathology and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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S. Y. B. Sc. Semester - III
Bioscience (Microbiology)
BM-MJ-302: Microbial Genetics Practical

(Time duration: 4 hours/week)

Course Content:

1. Preparation of master plate, replica plate and gradient plate.
2. Replica plating for transfer of bacterial colonies
3. Demonstration of picking and patching colonies.
4. Study of the lethal effect of ultraviolet radiation.
5. Study of UV survival in E. coli.
6. To study the effect of chemical (HNO2) & physical (UV) mutagen on bacteria.
7. Colorimetric estimation of DNA by Diphenylamine reagent.
8. Estimation of RNA by Orcinol method.
9. Isolation of inducible mutant by UV rays.
10. Determination of antibiotic-resistant mutant by gradient plate method.
11. Demonstration of direct repair in bacteria. (Photo reactivation)
12. Study of permanent slide/specimens/images.

Reference books:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel&Kiran Patel (Aditya Publication)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **Experiments in Microbiology, Plant Pathology, and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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S. Y. B. Sc. Semester - IV
Bioscience (Microbiology)
BM-MJ-401: Enzymology

Course Description:

Course Code	BM-MJ- 401
Course Title	Microbial Physiology
Course Type	Core (Major)
Course Credit	02

Course Content:

Unit: 1 Introduction to Enzymes. [15 Hours.]

- Enzymes –Introduction, Chemical Nature and General characteristic
- Enzyme structure, Coenzymes, Cofactors, Isoenzymes.
- Nomenclature (tradition & IUB system) and classification.
- Mechanism of enzyme action, Active site, Lock &Key, and Induced - Fit model
- Enzyme specificity.Factors affecting enzyme activity,Units of enzyme activity

Unit: 1I Enzyme regulation & Microbial Enzymes. [15 Hours.]

- Enzyme inhibition-competitive &noncompetitive.
- Introduction to MM constant, K_m and V_{max}&its significance.
- Regulation of enzyme activity – Allosteric Regulation & Covalent modification of Enzymes. Feedback inhibition.
- Microbial Enzymes – Extra cellular & Intracellular.
- Enzyme assay, Purification of enzymes, Immobilization of enzymes. Application of Enzymes.

Reference books:

- Biochemistry by Satyanarayan U. and Chakrapani U., (2013), , 4th ed., Upala Autor-Publisher
- Medical Biochemistry by Chatterjee and Rana Shinde Jain N., (2008), 7th ed., Jaypee Publications.
- Berg and Stryer, (2015) Biochemistry, 8th edition. W H Freeman pub.
- Introduction to Microbial Physiology by P. J. Soni, Nirav Prakashan

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S. Y. B. Sc. Semester - IV
Bioscience (Microbiology)
BM-MJ-402: Microbial Physiology

Course Description:

Course Code	BM-MJ- 402
Course Title	Microbial Physiology
Course Type	Core (Major)
Course Credit	02

Course Content:

Unit: I Bacterial Nutrition& Cultivation. [15 Hours.]

- Nutritional requirement &nutritional types of bacteria.
- Growth factors, Uptake of nutrients by cell.Membrane transport mechanisms.
- Culture media: Ingredients, types and application of media.
- Isolation of pure culture, Isolation techniques.
- Anaerobiosis: Anaerobic cultivation.Preservation & maintenance of culture.

Unit: II Bacterial Reproduction &Growth. [15 Hours.]

- Reproduction in bacteria, Binary fission.
- Mathematics of growth, Generation time and growth rate
- Normal growth curve and factors affecting growth.Diauxic growth
- Measurement of growth. Methods for measurement of cell number – Viable count Microscopic &Electronic count method.
- Methods for measurement of cell mass – Turbidometric method.

Reference book:

- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2007), 7Ed., McGraw-Hill Science/Engineering/Math.
- **Microbiology** by Pelzar, Chan, Krieg, Tata McGraw Hill pub. New York
- **Introduction to Microbial Physiology** by P. J. Soni, Nirav Prakashan.
- **Elementary Microbiology** by Dr. H. A. Modi, Ekta Prakashan.

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S. Y. B. Sc. Semester - IV
Bioscience (Microbiology)
BM-MJ-403: Medical Physiology

Course Description:

Course Code	BM-MJ- 403
Course Title	Medical Physiology
Course Type	Core (Major)
Course Credit	04

Course Content:

Unit: I Microscopic organization some organs of alimentary tract. [15 Hours.]

- Esophagus and Stomach.
- Intestine: Small & large.
- Salivary gland, Pancreas.
- Liver.
- Chemical composition &physiological function of some digestive Juice: Saliva, Gastric juice, Pancreatic juice and Bile.

Unit: II Microscopic organization some organs and Gonads. [15 Hours.]

- Lung
- Heart.
- Kidney.
- Hypothalamus.
- Gonads: Testis & ovary.

Unit: III Introduction to endocrinology. [15 Hours.]

- Introduction to endocrine glands.
- Hormones – General characteristics.
- Mechanism & Regulation of hormone.
- Hypothalamic hormones.
- Gonadal hormone.

Unit: IV Endocrine glands. [15 Hours.]

- Pituitary gland.
- Thyroid & parathyroid gland.
- Thyroid abnormalities.

- Adrenal gland.
- Abnormalities of adrenal gland.

References:

1. A Text book of Histology by Bloom (W. Saunder)
2. Text book of Human Anatomy by Hamilton
3. Atlas of Histology by Victor (Williams& Wilkins)
4. Essential of Medical Physiology by K Sembulingam(Jaypee)
5. Physiological basis of Medical Practice by Best & Tailor (B.I.Waverly)

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S. Y. B. Sc. Semester - IV
Bioscience (Microbiology)
BMP-MJ-401: Enzymology Practical

Course Content:

1. Study of enzymatic activity: Starch hydrolysis test, Lipid hydrolysis test.
2. Study of enzymatic activity: Casein hydrolysis test, Gelatin hydrolysis test.
3. Study of enzymatic activity: Deamination teat, Decarboxylation test.
4. Study of enzymatic activity: Dehydrogenase test, Oxidase test.
5. Study of enzymatic activity: Catalase test, Coagulase test.
6. Study of enzymatic activity: Indole production test, H_2S production test.
7. Study of enzymatic activity: Urea hydrolysis test, Nitrate reduction test.
8. Study of enzymatic activity of bacteria by Litmus milk test.
9. Indirect estimation of Lactate dehydrogenase.
10. To study the hydrolysis of sucrose by yeast.
11. To study the hydrolysis of cellulose.
12. Determination of Km Value of Amylase.

References:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel&KiranPatel (Aditya Publication)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **Experiments in Microbiology, Plant Pathology and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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S. Y. B. Sc. Semester - IV
Bioscience (Microbiology)
BMP-MJ-402: Microbial Physiology Practical

Course Content:

1. Preparation of media: Culture media and Biochemical media.
2. Study of biochemical properties of some bacteria.
3. Study of bacterial growth curve by turbidometric method
4. Study of bacterial population count by turbidometric method
5. Effect of temperature on bacterial growth.
6. Effect of some chemical agents on bacterial growth.
7. Isolation & cultivation of bacteria. Cultivation of anaerobic bacteria.
8. Enumeration of bacteria by Heterotrophic plate count method (HPC)
9. Measurement of fungal growth by colony diameter method.
10. Determination of Thermal Death Point – TDP.
11. Determination of Thermal Death Time – TDT.
12. Study of permanent slides & specimens.

References:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel&Kiran Patel (Aditya Publication)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

NEP 2020, CBCS Semester system

B. Sc. Bioscience (Microbiology)

(Minor)

S. Y. B. Sc. Semester IV (New)

(Effective from June 2024)

Paper No., Paper title, Teaching & Evaluation Scheme

Semester IV

Paper No.	Paper Title	Course Credit	Hrs/week	External marks	Internal marks	Total marks	Duration of Exam
BM-MN- 3	Biochemistry	2	2	25	25	50	1 Hrs
BMP-MN-3	Biochemistry Practical	2	4	25	25	50	4 Hrs

S. Y. B. Sc. Semester - IV
Bioscience (Microbiology)
BM-MN-4: BIOCHEMISTRY

Course Description:

Course Code	BM-MN- 4
Course Title	Biochemistry
Course Type	Core (Minor)
Course Credit	02

Course Content:

Unit: I Carbohydrates&Lipids. [15 Hrs]

- Introduction, natural occurrence & physiological importance of carbohydrates.
- Classification: aldose & ketoses. Monosaccharide, Disaccharides – Reducing & Non reducing.Polysaccharides – Mucopolysaccharides, their structure & importance.
- Physical properties of carbohydrates, asymmetrical carbon atom, stereoisomerism & optical isomerism.Configuration in Sugar: Linear & Ring structure.
- Introduction & classification of lipids. Fatty acids - saturated & unsaturated.
- Steroids.Physiological importance of lipids.

Unit: II Proteins& Nucleic acids. [15 Hrs]

- Introduction to amino acids.Essential amino acids, structure & importance.
- Peptide bond, polypeptide –the primary, secondary&tertiary structure of protein.
- Properties, classification& importance of proteins.
- Introduction, Components, and organization of nucleic acids. Nucleoside, nucleotide, polynucleotide.
- DNA structure, properties & types of DNA. RNA structure & Types of RNA. Physiological importance of Nucleic acid.

References:

- **Biochemistry** by Satyanarayana, 3rd ed. Books & Allied Pvt. Ltd.
- **Harper's Review of Physiological Chemistry.** 6th ed. Lange med publication.
- **Fundamentals of Biochemistry** 6th ed. by Jain, J. L., & Jain, N. (2006)., S. Chand Publications.
- **Biochemistry** by Moore, Wiley Publishing, Inc.

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S. Y. B. Sc. Semester - IV
BIOSCIENCE (Microbiology)
BMP-MN-4: Biochemistry Practical

(Time duration: 4 hours/week)

Course Content:

1. Qualitative determination of monosaccharide.
2. Qualitative determination of disaccharides- Reducing Sugar
3. Qualitative determination of disaccharides- Non-reducing Sugar
4. Qualitative determination of polysaccharides.
5. Qualitative determination of protein.
6. Qualitative determination of unknown solution.
7. Qualitative determination of amino acid.
8. Detection of amino acid by paper chromatography
9. Detection of Pentose & Deoxyribose Sugar.
10. Preparation of standard solutions (Normal, molar, molal solutions)
11. Preparation of standard solutions (Part, Percentage, PPM and PPB solutions)
12. Study of permanent slide/specimen/images.

References:

- **Practical Biochemistry** by Plummer Tata McGraw-Hill.
- **Experimental physiology & Biochemistry** by Chand, Jaypee publication.
- **Experiments in Microbiology, Plant Pathology and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

NEP 20, CBCS Semester system

S. Y. B. Sc. Bioscience (Microbiology)

MDC & SEC Syllabus

Semester III & IV (New)

(Effective from June 2024)

Semester III

Paper No.	Paper Title	Credit	Hrs.
BM-MDC- 3	Instrumentation & Biostatistics	**2**	**2**
BMP-MDC- 3	Instrumentation & Biostatistics Practical	**2**	**4**
BM-SEC-3	Introduction to Haematology	**1**	**1**
BMP-SEC- 3	Introduction to Haematology-Practical	**1**	**2**

Semester IV

Paper No.	Paper Title	Credit	HRS.
BM-SEC-3	Clinical Biochemistry	**1**	**1**
BMP-SEC- 3	Clinical Biochemistry-Practical	**1**	**2**

MULTIDISCIPLINARY COURSE - MDC
S. Y. B. Sc. Semester - III
BM-MDC-3: INSTRUMENTATION & BIOSTATISTICS

Unit: I Introduction to Biophysics & Instrumentation. [15 Hrs.]

- Introduction to EM spectrum. Types, properties & application of EM Radiation.
- Introduction to Radiation & Radioactivity. Radioisotopes & their uses. Radiation hazards.
- Introduction, principle, operational technique of pH meter.
- Beer's & Lambert's law. Introduction & operational technique of photoelectric colorimeter.
- Introduction to spectrophotometer.

Unit: II Separation Techniques & Biostatistics. [15 Hrs.]

- Chromatographic technique, Types of Chromatography.
- Paper Chromatography. Thin layer Chromatography.
- Introduction, principle, operational technique of electrophoresis.
- Data, table & frequency, statistical averages; mean, mode, median.
- Graphical representation of statistical data.
- Random sampling, standard error, Variation, Standard deviation. Normal curve,

Reference books:

- **Biophysics** by Casey, East West agency.
- **Biostatistics** by Lecois, East West agency.
- **Methods in Biostatistics** by Mahajan, Jaypee publication.
- **Principles and Techniques of Biochemistry & molecular biology** by Wilson, 6th ed. Cambridge.

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Multidisciplinary Course - MDC
S. Y. B. Sc. Semester - III
BM-MDCP-3: Instrumentation & Biostatistics Practical

(Time duration: 4 hours/week)

1. Introduction to principle & operational technique of pH meter.
2. Measurement of pH – tomato juice, lemon juice, detergent, spinach leaf extract, soapy water, whey, mild HCl, acetic acid, NaOH etc.
3. Introduction to principle & operational technique of electrophoresis.
4. Introduction to principle & operational technique of photoelectric colorimeter.
5. Preparation of standard graph of sugar solution/dye by colorimetric measurement.
6. Preparation of standard graph of protein by colorimetric measurement.
7. Unidimentional paper chromatography of amino acids.
8. Unidimentional paper chromatography of sugars.
9. Unidimentional paper chromatography of unknown amino acid mixture.
10. Separation of chlorophyll by ascending chromatography.
11. Introduction to data collection & Tabulation
12. Graphical representation of biological data.

Reference books:

- **Practical Biochemistry** by Plummer Tata McGraw-Hill.
- **Experimental physiology & Biochemistry** by Chand, Jaypee publication.
- **Experimental Microbiology** vol. I & II by Rakesh Patel, Aditya publication.
- **Practical Clinical Biochemistry: Methods and Interpretation** By R. Chawla, 4th ed. Jaypee Brothers.
- **Experiments in Microbiology, Plant Pathology and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)
- **Analytical Biochemistry** by David Holme and Hezal Peak, Prentice hall.

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Skill Enhancement Course - SEC
S. Y. B. Sc. Semester - III
BM-SEC-3: Introduction to Haematology

Unit: I Blood **[15 Hrs.]**

- Blood constituent-Blood Plasma, Serum. Blood cells – RBC, WBC, Thrombocytes.
- Structure, functions & types of hemoglobin, Abnormal Hb.
- Transport of Oxygen & Carbon dioxide.
- Introduction to Homeostasis, Blood Coagulation Mechanism.
- Blood pressure - Systolic, diastolic. Measurement of blood pressure.

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S. Y. B. Sc. Semester - III
Skill Enhancement Course - SEC
BMP-SEC-3: Introduction to Haematology Practical
(Time duration: 2 hours/week)

1. Determination of blood groups.
2. Blood cell count: RBC count.
3. Total WBC count.
4. Differential counts (DC).
5. Estimation of hemoglobin by Sahli's method.
6. Preparation of hemin crystals.
7. Measurement of blood pressure.
8. Determination of clotting time by capillary method.

Reference books:

- **Practical Hematology** by Davis.
- **Physiological basis of medical practice** by Best & Tailor, B. I. Waverly Publications.
- **Anatomy & Physiology for Nurses** by Smith.
- **Medical Physiology** by Sembulingam, 5th ed. Jaypee Publications.

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S. Y. B. Sc. Semester - IV
Skill Enhancement Course - SEC
BM-SEC-4: Clinical Biochemistry

Unit - I Body fluid analysis & Organ function tests. **[15 Hrs.]**

- Collection, preservation & types of urine specimen.
- Physical, chemical & microscopic examination of urine.
- Physiology, collection & analysis of CSF & Seminal fluid.
- Classification & types of LFT & KFT.
- Pancreatic function test & Cardiac profile test

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S. Y. B. Sc. Semester - IV
Skill Enhancement Course - SEC
BMP-SEC-4: Clinical Biochemistry Practical

1. Physical, chemical & microscopic examination of Urine.
2. Physical, chemical & microscopic examination of Cerebrospinal fluid.
3. Physical, chemical & microscopic examination of Semen.
4. Estimation of serum billirubin.
5. Estimation of serum total protein & albumin.
6. Estimation of serum creatinine.
7. Estimation of serum uric acid.
8. Estimation of serum urea & urea nitrogen.
9. Estimation of serum glucose.
10. Estimation of serum cholesterol.

References:

1. Medical Laboratory Technology by Praful Godkar (Bhalani pub.)
2. Medical Laboratory Science by Kolhatkar (Tata McGraw-Hill)
3. Clinical Laboratory Methods by Ackermann (Mosby pub.)
4. District Laboratory Practice in Tropical Countries Part – I & II by Monika Cheesbraugh (Cambridge)
5. Textbook of Medical Biochemistry by Chatterjee, 7th ed. (Jaypee)

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