B.Sc. (Hons.) Biotechnology
Skill Enhancement Course Subjects

SKILL ENHANCEMENT CHOICE PAPERS I: MOLECULAR DIAGNOSTICS

Unit- I

Comparison of enzymes available for enzyme immunoassays, conjugation of enzymes. Solid phases used in enzyme immunoassays. Homogeneous and heterogeneous enzyme immunoassays. Enzyme immunoassays after immuno blotting. Enzyme immuno histochemical techniques. Use of polyclonal or monoclonal antibodies in enzymes immuno assays. Applications of enzyme immunoassays in diagnostic microbiology

Unit- II

Molecular methods in clinical microbiology: Applications of PCR, RFLP, Nuclear hybridization methods, Single nucleotide polymorphism and plasmid finger printing in clinical microbiology Laboratory tests in chemotherapy:

Unit- III

Susceptibility tests: Micro-dilution and macro-dilution broth procedures. Susceptibility tests: Diffusion test procedures. Susceptibility tests: Tests for bactericidal activity. Automated procedures for antimicrobial susceptibility tests.

Unit- IV

Automation in microbial diagnosis, rapid diagnostic approach including technical purification and standardization of antigen and specific antibodies. Concepts and methods in idiotypes.Antiidiotypes and molecular mimicry and receptors. Epitope design and applications. Immunodiagnostic tests. Immuno florescence. Radioimmunoassay.

Unit- V

GLC, HPLC, Electron microscopy, flowcytometry and cell sorting.

SUGGESTED READING

1. Practical Biochemistry, Principles and Techniques, Keith Wilson and John Walker
2. Bioinstrumentation, Webster
3. Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe,Kluwer Academic
4. Ananthanarayan R and Paniker CKJ. (2005). Textbook of Microbiology. 7th edition (edited by Paniker CKJ). University Press Publication.
5. Brooks GF, Carroll KC, Butel JS and Morse SA. (2007). Jawetz, Melnick and Adelberg's Medical Microbiology. 24th edition. McGraw Hill Publication.
6. Goering R, Dockrell H, Zuckerman M and Wakelin D. (2007). Mims' Medical Microbiology.4th edition. Elsevier.
7. Joklik WK, Willett HP and Amos DB (1995). Zinsser Microbiology. 19th edition. Appleton-Centuary-Crofts publication.
8. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein'sMicrobiology. 7th edition. McGraw Hill Higher Education.
9. Microscopic Techniques in Biotechnology, Michael Hoppert

SKILL ENHANCEMENT CHOICE PAPERS II: ENZYMOLOGY

UNIT - I

Isolation, crystallization and purification of enzymes, test of homogeneity of enzyme preparation, methods of enzyme analysis.

Enzyme classification (rationale, overview and specific examples) Zymogens and their activation (Proteases and Prothrombin).

Enzyme substrate complex: concept of E-S complex, binding sites, active site, specificity, Kinetics of enzyme activity, Michaelis-Menten equation and its derivation,

Different plots for the determination of Km and Vmax and their physiological significance, factors affecting initial rate, E, S, temp. &pH. Collision and transition state theories, Significance of activation energy and free energy.

UNIT – II

Two substrate reactions (Random, ordered and ping-pong mechanism) Enzyme inhibition types of inhibition, determination of Ki, suicide inhibitor.

Mechanism of enzyme action: General mechanistic principle, factors associated with catalytic efficiency: proximity, orientation, distortion of strain, acid-base, nucleophilic and covalent catalysis. Techniques for studying mechanisms of action, chemical modification of active site groups, specific examples-: chymotrypsin, lysozyme, GPDH, aldolase, RNase, Carboxypeptidase and alcohol dehydrogenase.

Enzyme regulation: Product inhibition, feed backcontrol, covalent modification.

UNIT – III

Allosteric enzymes with special reference to aspartate transcarbomylase and phosphofructokinase. Qualitative description of concerted and sequential models. Negative co- operativity and half site reactivity. Enzyme - Enzyme interaction, Protein ligand binding, measurements analysis of binding isotherm, cooperativity, Hill and scatchard plots, kinetics of allosteric enzymes. Isoenzymes–multiple forms of enzymes with special reference to lactate dehydrogenase. Multienzyme complexes. Ribozymes. Multifunctional enzyme-eg Fatty Acid synthase.

UNIT – IV

Enzyme Technology: Methods for large scale production of enzymes.

Immobilized enzyme and their comparison with soluble enzymes, Methods for immobilization of enzymes. Immobilized enzyme reactors. Application of Immobilized and soluble enzyme in health and industry. Application to fundamental studies of biochemistry. Enzyme electrodes.

UNIT – V

Thermal stability and catalytic efficiency of enzyme, site directed mutagenesis and enzyme engineering– selected examples, Delivery system for protein pharmaceuticals, structure function relationship in enzymes, structural motifs and enzyme evolution.

Methods for protein sequencing. Methods for analysis of secondary and tertiary structures of enzymes. Protein folding *invitro&invivo.*

SUGGESTED READING

1. Biochemistry, LubertStryer, 6th Edition, WH Freeman, 2006.

2. Harper's illustrated Biochemistry by Robert K. Murray, David A Bender, Kathleen M.Botham, Peter J. Kennelly, Victor W. Rodwell, P. Anthony Weil. 28th Edition, McGrawHill, 2009.
3. Biochemistry, Donald Voet and Judith Voet, 2nd Edition, Publisher: John Wiley andSons, 1995.
4. Biochemistry by Mary K.Campbell& Shawn O.Farrell, 5th Edition, Cenage Learning,2005.
5. Fundamentals of Enzymology Nicholas Price and Lewis Stevens Oxford University Press 1999
6. Fundamentals of Enzyme Kinetics Athel Cornish-Bowden Portland Press 2004
7. Practical Enzymology Hans Bisswanger Wiley-VCH 2004
8. The Organic Chemistry of Enzyme-catalyzed Reactions Richard B. Silverman Academic Press 2002

SKILL ENHANCEMENT CHOICE PAPERS III: INDUSTRIAL FERMENTATIONS

UNIT I

Production of industrial chemicals, biochemicals and chemotherapeutic products. Propionic acid, butyric acid, 2-3 butanediol, gluconic acid, itaconic acid, Biofuels: Biogas, Ethanol, butanol, hydrogen, biodiesel, microbial electricity, starch conversion processes; Microbial polysaccharides; Microbial insecticides; microbial flavours and fragrances, newer antibiotics, anti cancer agents, amino acids.

UNIT II

Microbial products of pharmacological interest, steriod fermentations and transformations. Over production of microbial metabolite, Secondary metabolism – its significance and products.
Metabolic engineering of secondary metabolism for highest productivity.
Enzyme and cell immobilization techniques in industrial processing, enzymes in organic synthesis, proteolytic enzymes, hydrolytic enzymes, glucose isomerase, enzymes in food technology/organic synthesis.

UNIT III

Purification & characterization of proteins, Upstream and downstream processing, solids and liquid handling. Distribution of microbial cells, centrifugation, filtration of fermentation broth, ultra centrifugation, liquid extraction, ion-exchange recovery of biological products.
Experimental model for design of fermentation systems, Anaerobic fermentations.

UNIT IV

Rate equations for enzyme kinetics, simple and complex reactions. Inhibition kinetics; effect of pH and temperature on rate of enzyme reactions. Mathematical derivation of growth kinetics, mathematical derivations of batch and continuous culture operations; single stage CSTR;

UNIT V

Mass transfer in aerobic fermentation; resistances encountered; overall mass transfer co-efficient (Ka) determination, factors depending on scale up principle and different methods of scaling up. Metabolic engineering of antibiotic biosynthetic pathways.

SUGGESTED READING

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
2. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.

3. Patel AH. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited.
4. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.
5. Salisbury, Whitaker and Hall. Principles of fermentation Technology,

SKILL ENHANCEMENT CHOICE PAPERS IV: DRUGDESIGNING

UNIT I:

Introduction to The Drug Discovery/Development: Drug Discovery, Drug Development, Source of Drugs, Structural effects on drug action

Approaches to New Drug Discovery : Drugs Derived from Natural Products, Existing Drugs as a Source for New Drug Discovery, Using Disease Models as Screens for New Drug Leads, Physiological Mechanisms: the Modern "Rational Approach" to Drug Design. Approaches to Lead Optimization: 1. Bioisosteric replacement 2. Conformation restriction a. Increase selectivity, b. Increase affinity 3. Pharmacophore 4. Molecular dissection 5. Metabolic stabilization

UNIT II:

Enzymes as Targets of Drug Design: Enzyme kinetics, Enzyme inhibition and activation, Approaches to the Rational Design of Enzyme Inhibitors

UNIT III:

Receptors as Targets of Drug Design: Receptor Theory, Receptor Complexes and Allosteric Modulators, Second and Third Messenger Systems, Molecular Biology of Receptors, Receptor Models and Nomenclature, Receptor Binding Assays, Lead Compound Discovery of Receptor agonists and antagonists

UNIT IV:

Prodrug Design and Applications: Definition, Applications, Prodrug Design Considerations, Prodrug Forms of Various Functional Groups, Ester prodrugs of compounds containing –COOH or –OH, Prodrugs of compounds containing amides, imides, and other acidic NH, Prodrugs of Amines, Prodrugs for compounds containing carbonyl groups Drug release and activation mechanisms: 1. Simple one-step activation 2. Cascade release/activation systems

UNIT V:

Computer-Aided Drug Design: Docking and virtual screening, Molecular Dynamics and binding free energy methods

SKILL ENHANCEMENT CHOICE PAPERS V: BASICS OF FORENSIC SCIENCE

Unit- I

Introduction and principles of forensic science, forensic science laboratory and its organization and service, tools and techniques in forensic science,

Unit- II

branches of forensic science, causes of crime, role of modus operandi in criminal investigation. Classification of injuries and their medico-legal aspects, method of assessing various types of deaths.

Unit- III

Classification of fire arms and explosives, introduction to internal, external and terminal ballistics. Chemical evidence for explosives. General and individual characteristics of handwriting, examination and comparison of handwritings and analysis of ink various samples.

Unit- IV

Role of the toxicologist, significance of toxicological findings, Fundamental principles of fingerprinting, classification of fingerprints, development of finger print as science for personal identification,

Unit- V

Principle of DNA fingerprinting, application of DNA profiling in forensic medicine, Investigation Tools, eDiscovery, Evidence Preservation, Search and Seizure of Computers, Introduction to Cyber security.

SUGGESTED READING

1. Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press,Washington.
2. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty FirstCentury, Select Publishers, New Delhi (2001). _
3. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, Universityof Delhi, Delhi (2002). _
4. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific andInvestigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005). _
5. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G.Eckert (ED.), CRC Press, Boca Raton (1997). _
6. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). _
7. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene_Investigation, CRC Press, Boca Raton (2013).

SKILL ENHANCEMENT CHOICE PAPERS VI: BIOFERTILIZERS AND BIOPESTICIDES

Unit- I

Biofertilizers

General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers. Symbiotic N2 fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants *Frankia* - Isolation, characteristics, Alder, Casurina plants, non-leguminous crop symbiosis. Cyanobacteria, *Azolla*- Isolation, characterization, mass multiplication, Role in rice cultivation, Crop response, field application.

Unit- II

Non - Symbiotic Nitrogen Fixers

Free living *Azospirillum, Azotobacter*- free isolation, characteristics, mass inoculums, production and field application.

Unit- III

Phosphate Solubilizers

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application

Unit -IV

MycorrhizalBiofertilizers

Importance of mycorrizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.

Unit- V

Bioinsecticides

General account of microbes used as bioinsecticides and their advantages over synthetic pesticides, *Bacillus thuringiensis*, production, Field applications, Viruses – cultivation and field applications.

Suggested Readings

1. Kannaiyan, S. (2003). Bioetchnology of Biofertilizers, CHIPS, Texas.
2. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. NewYork.
3. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, ScientificPublishers.
4. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.
5. Saleem F and Shakoori AR (2012) Development of Bioinsecticide, Lap Lambert AcademicPublishing GmbH KG
6. Aggarwal SK (2005) Advanced Environmental Biotechnology, APH publication.

Unit 4 – Project Work - Field Work, Case Studies

1. The Project/field work is meant for students to understand vulnerabilities and to work on reducing disaster risks

Reference Books:

1. Andharia J – Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper No.8, 2008.
2. Govt. of India: Disaster Management Act, Govt. of India, New Delhi,2005.

Course Code :- BSP - 501
Subject :- Āsana, Pränäyäma and meditation level-2
Marks in examination: 70+30=100

Objectives:

1. To introduce the classical hatha yoga advanced practices.
2. Focus on overall development of all sheaths.
3. To bring out the hidden talents through regular practices.

Unit -1 :-

1. Breathing Practices:
2. Revision of all breathing Practices
3. Loosening Exercises (Sithila Karan Vyayama):
4. Previous level practices plus
   - Jumping
   - Sit ups
   - Pushups
   - Rocking and Rolling
   - Jumping and Twisting
   - Side sit ups
   - Alternate leg placing
   - Pavana Muktäsana Kriya
5. Surya Namaskāra – 12 rounds

Unit- 2 :-

1. Yogāsanās:
2. Previous level practices plus

Standing:

- Ekapadarajkapotasana
- Pärshvakonäsana
- Garudāsana
- Uttitha Pärshvakonäsana
- Parivråtta Trikonäsana
- Natarājāsana
- Veerabhadrāsana
- Pärshvotthänäsana

Sitting:

- Baddha Konäsana
- Janu Shirasana
- Baddaha Padmäsana
- Kürmäsana
- Supta Vajräsana
- Vashcikasana
- Kukkutäsana
- Mayurasana

Prone:

- Bhujaìgäsana 1, 2, 3 & 4
- Purna Dhanurasana
- Purna Salabhäsana

Supine:

- Garbhapidasana
- Haläsana
- Padma Sarvängasana
- Matsyäsana

Advance Kriyäs

1. Dhauti: Vastra Dhauti, Vaman Dhauti, Danda Dhauti.
2. Trätaka
3. Laghu Shankhaprakñälana
4. Agnisara, Nauli Kriya

MINE SURVEY

UNIT I	Theodolite: Various types; Principles of construction; Temporary and permanent adjustments; Measurement of horizontal angles; Traversing: traversing; Closing error and its adjustment; Problems in traverse surveying; Areaof closed traverse; Omitted measurements and their calculations.
UNIT II	Curve Ranging: Definition; Elements of curves; Degree of curvature; Type of Curves; Nomenclature of a simple circular curve Different methods of setting out curves.
UNIT III	Stope Surveying -Definition and Introduction, purpose of stope survey Methods of stope surveying for flat, Contouring: Definitions; Characteristics of contours; Tacheometric Contouring - Fieldwork, Interpolation of contours; Plotting and interpretation of contours.
UNIT IV	Definitions; latitudes & departures; Partial latitude and partial departures, Calculation of Partial latitude andpartial departures Total latitude and total departures; Calculation of Total latitude and total departures.

Practicals

1. Constructional details of vernier theodolites & its temporary adjustments.
2. Measurement of horizontal angle with the help of vernier theodolite
3. Traversing of given area with the help of vernier theodolite and its plotting with co-ordinate method.
4. Constructional details of microptic theodolites & its temporary adjustments
5. Measurement of horizontal angle with the help of microptic theodolite
6. Traversing of given area with the help of microptic theodolite and its plotting with co-ordinate method
7. Determination of tacheometric constants.
8. Determine the height of inaccessible points, distance between two inaccessible points with tacheometer.
9. Exercise on tacheometric contouring and plotting of contour map for flat area.
10. Exercise on tacheometric contouring and plotting of contour map for hilly area
11. To prepare topographic map by co-ordinate plotting of given area at a scale of 1:1000, 1:2000 as per mining regulation.
12. G.T. sheet and its application.
13. Elements of a curve and design a curve for underground roadways meeting at an angle of 90, 120,150 degree etc.

M.Sc. Zoology
SEMESTER-II

Skill Enhancement Course-I

Paper V: SEC1 (M2ZOO-SEC01): BIOSTATISTICS

Unit I

Types & Representation of data: Raw data, grouped data; Representation of data using Bar diagram, Pie diagram, Histogram, polygon.

Unit II

Measures of central tendency and dispersion: Mean, Median, Mode, Mean deviation, Variance & Standard deviation; Probability.

Unit III

Probability: Probability (classical & axiomatic definition of probability, theorem on total and compound probability), Addition & Multiplication theorem of Probability, Random variables & Probability Distribution, Simple problems involving Binomial, Poisson & Normal variables.

Unit IV

Hypothesis testing and parametric tests: Hypothesis-definition, types (One tailed, two tailed), Sampling distribution and errors, Types of errors (Type I, II); Testing of hypothesis (two tailed only); Z-test; t-test; Chi square-test; F-test. Non parametric tests: (Rank sum test, Kruskal Wallis test) Analysis of variance (ANOVA), Correlation and Regression.

Unit V

Methods of sampling: Probability Sampling and Non-probability Sampling methods.

Suggested Readings

1. Zar, J.H. Biostatical Analysis. Pearson Edu.
2. Gupta, S.C. and Kapoor, V.K. Fundamentals of applied statistics. S. Chand and Company.
3. Dutta, N.K. Funadamentals of Biostatistics. Kanika Pub. New Delhi.
4. Arora, P.N. and Malhan, P.K. Biostatistics. Himalya Publishers.
5. Daniel, M. 1999. Biostatistics (3rd Edition). Panima Publishing Corporation.
6. Campbell, R.C. Statistics for Biologist. Cambridge University Press.
7. Introduction to Mathematics for Life Scientists. 3rd edition (1979). Edward Batschalet, Springer.
8. Introductory biostatistics. 1st edition. (2003), Chap T. Le. John Wiley, USA
9. Maths from scratch for biologists by Alan J. Cann; Wiley-Blackwell.
10. Easy Mathematics for Biologists by Peter C. Foster; Hardwood Academic Publisher.

14. Use of theodolite in maintaining the gradient of drivage, laying of drainage system.

Text Books/References

1. Dr.B.C.Punmia. Surveying Vol. I & II, Pub: Laxmi Publication New-Delhi
2. T.P. Kanetkar. Surveying & Levelling, Vol I & II, Geeta book store Dhanbad.
3. Mc Adam. "Colliery Surveying"

BACHELOR OF PHYSIOTHERAPY (BPT)
FIRST YEAR
EXERCISE THERAPY-I
Course Code: BPT –102

Course Objectives:

1. To understand the principles of exercise therapy and its application as a treatmentmodality
2. The students will be able to understand the Exercise therapy in depth.
3. The students will be able to understand about the biomechanical principles, movements and range of motion with goniometry.
4. The students will be able to understand the manual muscle testing, special manual therapy techniques and posture
5. The student will be able to understand about human gait & its cycles.
6. The students will be able to understand about the hydrotherapy, relaxation and therapeutic gymnasium.

Course Contents: All sections carry equal weight age

Section – A

UNIT 1. Passive movements:

Definition

Relaxed, forced and stretching type.

Indications, contraindications, advantages and Techniques of various passivemovements.

UNIT 2. Active movements:

Free, assisted and resisted

Indication, contraindications, advantages and techniques of various types ofactive exercises.

Special emphasis on: Shoulder abductors & flexors, Triceps brachii, Hipabductors & flexors, quadricep femoris, Abdominal and back extensors.

Clinical methods of strengthening of various muscle groups.

UNIT 3. Muscle Stretching:

Stretching – definition, effects and uses of stretching, indications,contraindication general techniques & group stretching techniques

Special emphasis on stretching of: Pectoral major, biceps brachii, triceps brachii, and long flexors of fingers. Rectus femoris, Ilio-tibial band, gastrocnemius-soleus, hamstrings, hip abductors, ilio-psoas. Sternocleidomsto

Section – B

UNIT 4. Relaxation, Massage:

Description of fatigue and spasm & factors.

General causes, signs and symptoms of fatigue

Techniques of Relaxation- local and General with indication

Rationale of relaxation Techniques.

UNIT 5. Joint Mobility:

Joint range, stiffness, range and limitations

Accessory movements- glides, traction and approximation

Mobilization of peripheral, spinal joints, techniques and grading in detail.

UNIT 6. Crutch Walking:

Description of crutch - components, classification

Good crutch, measurements

Crutch use- Preparation, Training, counseling.

Crutch gaits- types, & significance.

Crutch complications- Palsy, dependency etc.

DRAFTING, PLEADING AND CONVEYANCING

L T P C
4 1 0 4

Objective: **(48 Hours)**

- Translation of thoughts into words- spoken and written is an essential ingredient of an effective lawyer.
- The objective of this course is to make students trained in drafting of pleadings and conveyances and other essential documents.
- The course aims at equipping the students with drafting skills.
- The objective is to teach through class room instructions and simulation exercises.

Expected Outcome:

- Learn legal drafting and legal writing.
- Get acquainted with the use and application of legal language.

UNIT - I **(12 Hours)**

- General principles of drafting/pleading.
- Pleadings- Civil: plaint, written statement, interlocutory application, original petition, affidavit, execution petition, memorandum of appeal and revision, petition under Art. 226 and Art. 32 of the Constitution of India.

UNIT - II **(12 Hours)**

- Pleadings- Criminal: complaint, criminal miscellaneous petition,
- Bail application, Memorandum of appeal and revision.

UNIT - III **(12 Hours)**

- Deed its meaning & essentials.
- Conveyance: sale deed, mortgage deed, lease deed, gift deed, promissory note, power of attorney, will, trust deed.

UNIT - IV **(12 Hours)**

- Drafting of writ petition
- Public Interest Litigation petition

TEXT BOOKS

T1 Dr. G.P. Tripathi, Law of Pleading, Allahabad Law Agency
T2 Dr. A.N.Chaturvedi, Pleading, Conveyancing& Legal Ethics, Allahabad Law Agency

REFRENCE BOOKS

R1Majumdar, Law of Pleading, Conveyancing& Drafting, Allahabad Law Agency
R2 J.P. singhal, Pleading, Judgments and Cheques, Allahabad Law Agency

M.Sc. Microbiology
SEMESTER-II

Skill Enhancement Course-I

Paper V: SEC1 (M2MB-SEC01): TECHNIQUES OF MICROBIOLOGY

Short term skill based programs goal to train all the interested individuals to function as Independent researchers/experts in a multidisciplinary environment of Biotechnology, Forensic Science, and clinical Research.

UNIT I
Sterilization techniques

UNIT II
Preparation of media, Isolation of microorganisms from clinical samples and pure culture techniques

UNIT III
Staining techniques (Grams staining, Negative staining etc.), Determination of total viable count & preparation of growth curves

UNIT IV
Bacterial identification – biochemical tests, Confirmatory tests on selective media.

UNIT V
Enumeration of coliforms in water for human consumption, Antibiotic susceptibility testing, Mutational studies by Replica Plating Technique

Paper V: SEC1 (M2MB-SEC01): BIOSTATISTICS

Unit I
Types & Representation of data: Raw data, grouped data; Representation of data using Bar diagram, Pie diagram, Histogram, polygon.

Unit II
Measures of central tendency and dispersion: Mean, Median, Mode, Mean deviation, Variance & Standard deviation; Probability.

Unit III
Probability: Probability (classical & axiomatic definition of probability, theorem on total and compound probability), Addition & Multiplication theorem of Probability, Random variables & Probability Distribution, Simple problems involving Binomial, Poisson & Normal variables.

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Unit V

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3. Dutta, N.K. Funadamentals of Biostatistics. Kanika Pub. New Delhi.
4. Arora, P.N. and Malhan, P.K. Biostatistics. Himalya Publishers.
5. Daniel, M. 1999. Biostatistics (3rd Edition). Panima Publishing Corporation.
6. Campbell, R.C. Statistics for Biologist. Cambridge University Press.
7. Introduction to Mathematics for Life Scientists. 3rd edition (1979). Edward Batschalet, Springer.
8. Introductory biostatistics. 1st edition. (2003), Chap T. Le. John Wiley, USA
9. Maths from scratch for biologists by Alan J. Cann; Wiley-Blackwell.
10. Easy Mathematics for Biologists by Peter C. Foster; Hardwood Academic Publisher.

B.Com (H) Syllabus – 1st Year
B.CH -07 Business Communication

Course Objective: The objective of this paper is to familiarize the participants with the concepts, goals & techniques of Business Communication and their application in business.

Unit 1	**Introduction:** Concept, Objectives, Importance of Business Communication, Principle of Effective Communication, Types of Communication, 7 Steps to Effective Communication, Barriers to Communication.
Unit 2	**Communication Skills:** Listening Skills-Cognitive Process of listening, Barriers to Listening, Reading Skills, Speaking Skills, Public Speaking, Voice Modulation & Body Language.
Unit 3	**Written Communication:** Departmental Communication, Meaning, Need & Types i.e. Layout of Business Letters, Presentative Letters-Sales letter, Claim Letter, Employment Letter, Writing Memo, Notice & Circular, Promotion Letter, News Letter, Resignation Letter, Agenda, Office Memorandum, Office Orders, Press Release
Unit 4	**Modes of Communication:** Verbal & Non-Verbal, Verbal - Oral & Written Communication, Face to Face Communication, Visual, Audio-visual, Modern Media Telex, Fax, Tele conferencing, E-mail Non Verbal- Facial Expression, Gestures, sign, Symbols, Signals, Sketches, Graphs, Maps, Charts, Posters
Unit 5	**Business Etiquettes & Public Speaking:** Business Manner, E-mail & Net etiquettes, etiquettes of Written Words, Etiquettes on Telephone, Handing Business Meeting, Models Speeches

Recommended Text

- Rajendra Pal & J S Korlhalli, Essentials of Business Communication
- S V Kadvekar, Business Communication

MEWAR UNIVERSITY (Raj.) Chittorgarh-312901

एम. ए. (ज्योतिष शास्त्र) पाठ्यक्रम (M.A. Astrology Syllabus Scheme) प्रथम वर्ष, प्रथम सत्र (1st Year, 1st Semester)			
Paper – II			Paper Code
Subject	Fundamentals of Astrology (प्रारम्भिक ज्योतिष शास्त्र)		AST-MA-102
ईकाई	Topics	Credits = 6	Marks = 60 + 40 = 100
ईकाई – 1	कर्म सिद्धांत, कर्म के प्रकार, ऋणानुबंधन, ज्योतिष शास्त्र के मूलभूत तत्त्व, राशियों के नाम, राशियों के स्वामी, राशियों का स्वरूप, राशियों का अंग विभाग, राशियों की शीर्षोदयादि संज्ञा, राशियों की क्रूरत्वादि संज्ञा, राशियों के वर्ण, राशियों की दिशाएं, राशियों का घातचक्र विचार, दिवा-रात्रि बली, राशियों की चरादि संज्ञा, गण्डान्त राशियां, वर्गोत्तम नवांश, राशियों की नर आदि संज्ञा एवं भाव बल आदि।		
ईकाई –2	नवग्रह परिचय, ग्रहों का विभाजन, बिम्बीय ग्रह (सूर्य एवं चन्द्र), तारा ग्रह (मंगल-बुध-गुरु-शुक्र-शनि), छाया ग्रह (राहु एवं केतु), ग्रहों का स्वरूप-गुण-धर्म परिचय, सूर्यादि ग्रहों से विचारणीय विषय, ग्रहों का उच्च-नीच एवं मूलत्रिकोण विचार, ग्रहों की दृष्टि, ग्रह मैत्री, ग्रह मैत्री का आधार, नैसर्गिक एवं तात्कालिक मैत्री के आधार पर पंचधा मैत्री, ग्रहों के बल का सामान्य परिचय, ग्रहों की दिशाएं, बली भाव का निर्धारण, ग्रहों के वर्ण-लिंग-तत्त्व- धातु-वस्त्रादि विचार, नक्षत्र परिचय - 27 नक्षत्र परिचय और स्वामी (मुहूर्त स्वामी एवं दशा स्वामी)।		
ईकाई –3	द्वादश भाव परिचय - भचक्र, द्वादश भावों में नाम, केन्द्रादि संज्ञाएं, द्वादश भावों के मुख्य कारकत्व, शुभाशुभ विचार, भाव सिद्धि- भाव, भावेश और कारक विचार, भावेश फल विचार – भावेश की विभिन्न भावों में स्थिति के फल, ग्रहों की भाव-स्थिति के फल, भावफल निर्णय - द्वादशभाव के फल का निर्णय।		
ईकाई –4	योग एवं ग्रह-सम्बन्ध – चन्द्र योग, सूर्य योग,शुभ-पाप कर्तरी, राजयोग, विपरीत राजयोग, नीचभंग राजयोग, धन योग, पंचमहापुरुष योग, अरिष्ट योग। सुदर्शन कुण्डली परिचय, उपयोगिता एवं विचारणीय विषय		
ईकाई – 5	उपरोक्त विषयों का प्रायोगिक विश्लेषण		
सन्दर्भ ग्रन्थ	1. सरल ज्योतिष, डॉ. अरुण कुमार बंसल, अखिल भारतीय ज्योतिष संस्था संघ, नई दिल्ली। 2. प्रारंभिक फलित ज्योतिष, डॉ. मनोज कुमार एवं डॉ. सुशील अग्रवाल, अल्फा पब्लिकेशन्स, नई दिल्ली। 3. बृहज्जातकम् – केदार दत्त जोशी – मोतीलाल बनारसीदास, वाराणसी 4. ज्योतिष पीयूष – पं. कल्याणदत्त शर्मा – शान्तिकुंज हरिद्वार		

SKILL COURSE – I

UNIT I : Communication and Presentation Skill

Basic Language Skills, Comprehension of an unseen passage, Phonology and Stress Marking , Social and Official Correspondence, Interpretation of Short Unseen Literary Prose Pieces (fiction and nonAfiction), Making presentations, public speaking. .

UNIT II Scientific Writing Skill

Introduction; principles of effective writing (cutting unnecessary clutter), Principles of effective writing (verbs),Crafting better sentences and paragraphs, Organization; and streamlining the writing process,,The format of an original manuscript, Reviews, commentaries, and opinion pieces; and the publication process, Issues in scientific writing (plagiarism, authorship, ghostwriting, reproducible research), How to do a peer review; and how to communicate with the lay public

UNIT III Information and Communication Skills

Introduction to Important current Information technologies, Basics of Computer Hardware, Input Output devices, Specifications, System Software, Application software: Word processing, Desktop publishing, Spread Sheets, presentation, web authoring graphing software. Creation of Presentation, Preparation of Slides

UNIT IV

Basic of Computer Networks Internet and Web, Internet Access, search tools, web utilities, Web Browsing Software

एम. ए. वास्तु शास्त्र पाठ्यक्रम M.A. Vastu Shastra Syllabus Scheme प्रथम वर्ष, प्रथम सत्र (1st Year, 1st Semester)			
Paper – II			Paper Code
Subject	Fundamentals of Vastu Shastra (प्रारम्भिक वास्तु शास्त्र)		VST-MA-102
ईकाई	Topics	Credits = 5	Marks = 60 + 40 = 100
ईकाई – 1	वास्तु शास्त्र परिचय, वास्तु शास्त्र का उद्भव एवं विकास, वास्तु के अंग, वास्तु शास्त्र के प्रवर्तक एवं आचार्य, वास्तु विद् देवगण, वास्तु शास्त्रीय ग्रन्थ, वास्तु शास्त्र का प्रयोजन, वास्तु शास्त्र का पौराणिक स्वरूप		
ईकाई –2	वास्तु शास्त्र में पंच महाभूत परिचय वास्तु शास्त्र एवं प्राकृतिक शक्तियां वास्तु में दिक् साधन एवं स्वरूप देश एवं काल विवेचन वर्तमान में वास्तु शास्त्र का स्वरूप		
ईकाई –3	वास्तु शास्त्र में भूमि एवं भूखण्ड विचार भूमि एवं भूखण्ड चयन भूमि के प्रकार, भूखण्ड का विस्तार एवं कटाव		
ईकाई –4	भूमि के आकार एवं ढलान विचार वीथि विचार, प्रशस्त एवं निषिद्ध भूमि लक्षण भूशयन विचार		
ईकाई – 5	काकिणी विचार, भूशोधन प्रकार भूपरीक्षण विधि, अहिबल चक्र		
सन्दर्भ ग्रन्थ	• भारतीय वास्तु शास्त्र – प्रो. शुकदेव चतुर्वेदी – श्रीलाल बहादुर शास्त्री राष्ट्रीय संस्कृत विश्वविद्यालय, नई दिल्ली • भारतीय वास्तुविद्या – डा. बिहारी लाल शर्मा, मान्यता प्रकाशन, दिल्ली • वास्तुसार – डॉ. देवीप्रसाद त्रिपाठी – परिक्रमा प्रकाशन, दिल्ली		

B TECH (5th SEMESTER) CHEMICAL ENGINEERING

CHE-309 CHEMICAL ENGINEERING DESIGN-I

L	T	P	Cr
3	1	-	4

Internal Evaluation: 50 Marks
External Examination: 50 Marks
Duration of Examination: 03 Hours

Course Objective:

The aim of this course to give up-to-date knowledge for designing the process equipments generally used in the chemical industries. It emphasizes to provide knowledge about design principles of heat and mass transfer equipment used in chemical plants. It also aims to impart knowledge about IS Codes used in the mechanical design of chemical engineering equipments. After undergoing this course the students will have the knowledge to analyze a problem and finding a design method and mechanical specifications to accomplish a particular process objective.

UNIT-I	Design Preliminaries, Introduction, General design procedure, Equipment classification, Design codes, Design considerations, Design pressure, Design temperature, Design stress, Factor of safety, Design wall thickness, Corrosion allowance, Weld joint efficiency factor, Design loadings, Stress concentration, Thermal stress and Criteria of failure.
UNIT-II	Design of process vessels under internal pressure, Thin wall vessels, Cylindrical vessels, Tubes, Pipes, Spherical vessels, Design of heads and closures such as different heads, Nozzle, Flange joints, Gaskets, Types & design of non- standard flanges and Bolts. Design of process vessels under external pressures, Introduction, Determination of safe pressure against elastic failure, Circumferential stiffeners, Spherical shells, Pipes and tubes under external pressure
UNIT-III	Design of tall vessels, Introduction, Equivalent stress under combined loadings and Longitudinal stresses. Design of support for process vessels, Introduction, Different types of supports, Design of supports. Design of thick walled higher pressure vessels, Introduction, Stresses and theories of elastic failure.
UNIT-IV	Equipment fabrication and testing, Welding joints, Inspection and Non-destructive testing of equipment. Design of some special parts, Introduction, Expansion joints and its design, Expansion loop in piping system, Design equations for expansive forces in pipe lines, Shafts and Keys. Storage tanks, Introduction, Classification of storage tanks, Filling & breathing looses, Design of liquid and gas storage tanks.

Recommended Books:

- Bhattacharyya B C, Introduction to Chemical Equipment Design, Mechanical Aspects, CBS Publishers and Distributors.
- Joshi M V and Mahajani V V, Process Equipment Design, Macmillan India Limited.
- Brownell L E and Young E H, Process Equipment Design, Wiley Eastern India Limited.

M.Sc. Environmental Science
SEMESTER-II

Skill Enhancement Course-I

GREEN PRODUCTS

Industrial Ecology and Waste Minimization Waste Management for Resource Recovery, Recycling, Waste Oil Utilization and Recovery, Recovery of solutes from Wastewater, Recovery of Water from Wastewater, Solvent Recovery

Industrial Ecology and Waste Treatment Physical methods of waste Treatment, Chemical Treatment of Wastes, Acid/Base Neutralization, Chemical Precipitation, Chemical Flocculation, Oxidation/Reduction, Electrolysis, Chemical Extraction, Chemical, Thermal Treatment

Industrial Ecology of Waste Disposal Immobilization, Chemical Fixation, Physical Fixation

Future of Industrial Ecology Industrial Ecology in the Midst of Change, The Industrial Ecology Hardware Store – Tools for Product and Process, Service Provider, Systematist and Policy Maker, Industrial Ecology as an Emerging Science, An Industrial Ecology Research Roadmap

Recommended Books:

1. Industrial Ecology: Environmental Chemistry and Hazardous Wastes, Stanley E Manahan, (1999). Lewis, New York, USA.
2. Industrial Ecology. T. E. Graedel and B. R. Allenby, (2003). Printice Hall, New Jersey, USA.

M.Sc. Environmental Science
SEMESTER-II

Skill Enhancement Course-II

COMPOSTING AND VERMICOMPOSTING

- Knowledge of General Safety, health and hygiene Concept of Vermitechnology: What & Why. Definition and justification Vermitechnology
- Importance of Vermicompost in Agricultural practices.
- Vermicomposting for Organic Farming- an Eco-Friendly Approach
- Earthworms: Type, identification & usefulness
- Anaerobic (Pit) & Aerobic (Heap) composting: techniques & their comparison
- Vermicomposting techniques, standard composition of vermicompost
- Collection of wastes & their segregation & processing
- Bed preparation for Anaerobic & Aerobic composting
- Bed preparation for Vermicomposting.
- Earthworm collection & application on beds
- Inspection of beds & watering
- Vermicompost collection
- Earthworms separation
- Air drying of vermicompost, sieving & storing

Recommended Books:

The Complete Book on Organic Farming and Production of Organic Compost by NPCS Board of Consultants & Engineers, Asia Pacific Business Press Inc

M.Sc. Biochemistry
SEMESTER-II

Skill Enhancement Course-I

Paper I: SEC1 (M2BC-SEC01): BIOSTATISTICS

Unit I
Types & Representation of data: Raw data, grouped data; Representation of data using Bar diagram, Pie diagram, Histogram, polygon.

Unit II
Measures of central tendency and dispersion: Mean, Median, Mode, Mean deviation, Variance & Standard deviation; Probability.

Unit III
Probability: Probability (classical & axiomatic definition of probability, theorem on total and compound probability), Addition & Multiplication theorem of Probability, Random variables & Probability Distribution, Simple problems involving Binomial, Poisson & Normal variables.

Unit IV
Hypothesis testing and parametric tests: Hypothesis-definition, types (One tailed, two tailed), Sampling distribution and errors, Types of errors (Type I, II); Testing of hypothesis (two tailed only); Z-test; t-test; Chi square-test; F-test. Non parametric tests: (Rank sum test, Kruskal Wallis test) Analysis of variance (ANOVA), Correlation and Regression.

Unit V
Methods of sampling: Probability Sampling and Non-probability Sampling methods.

Suggested Readings

1. Zar, J.H. Biostatical Analysis. Pearson Edu.
2. Gupta, S.C. and Kapoor, V.K. Fundamentals of applied statistics. S. Chand and Company.
3. Dutta, N.K. Funadamentals of Biostatistics. Kanika Pub. New Delhi.
4. Arora, P.N. and Malhan, P.K. Biostatistics. Himalya Publishers.
5. Daniel, M. 1999. Biostatistics (3rd Edition). Panima Publishing Corporation.
6. Campbell, R.C. Statistics for Biologist. Cambridge University Press.
7. Introduction to Mathematics for Life Scientists. 3rd edition (1979). Edward Batschalet, Springer.
8. Introductory biostatistics. 1st edition. (2003), Chap T. Le. John Wiley, USA
9. Maths from scratch for biologists by Alan J. Cann; Wiley-Blackwell.
10. Easy Mathematics for Biologists by Peter C. Foster; Hardwood Academic Publisher.

B.Sc. (Hons.) Microbiology
Skill Enhancement Course Subjects

SKILL ENHANCEMENT CHOICE PAPERS I: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

Unit 1 Microbiological Laboratory and Safe Practices

Good laboratory practices - Good laboratory practices, Good microbiological practices
Biosafety cabinets – Working of biosafety cabinets, using protective clothing, specification for BSL- 1, BSL-2, BSL-3. Discarding biohazardous waste – Methodology of Disinfection, Autoclaving & Incineration

Unit 2 Determining Microbes in Food / Pharmaceutical Samples

Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, Biochemical and immunological methods: Limulus lysate test for endotoxin, gel diffusion, sterility testing for pharmaceutical products
Molecular methods - Nucleic acid probes, PCR based detection, biosensors.

Unit 3 Pathogenic Microorganisms of Importance in Food & Water

Enrichment culture technique, Detection of specific microorganisms - on XLD agar, Salmonella Shigella Agar, Manitol salt agar, EMB agar, McConkey Agar, Saboraud Agar
Ascertaining microbial quality of milk by MBRT, Rapid detection methods of microbiological quality of milk at milk collection centres (COB, 10 min Resazurin assay)

Unit 4 HACCP for Food Safety and Microbial Standards

Hazard analysis of critical control point (HACCP) - Principles, flow diagrams, limitations
Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water

SUGGESTED READING

1. Harrigan WF (1998) Laboratory Methods in Food Microbiology, 3rd ed. Academic Press
2. Garg N, Garg KL and Mukerji KG (2010) Laboratory Manual of Food Microbiology I K International Publishing House Pvt. Ltd.
3. Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer
4. Baird RM, Hodges NA and Denyer SP (2005) Handbook of Microbiological Quality control in Pharmaceutical and Medical Devices, Taylor and Francis Inc.

SKILL ENHANCEMENT CHOICE PAPERS II: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

Unit 1 Importance of Diagnosis of Diseases

Bacterial, Viral, Fungal and Protozoan Diseases of various human body systems, Disease associated clinical samples for diagnosis.

Unit 2 Collection of Clinical Samples

How to collect clinical samples (oral cavity, throat, skin, Blood, CSF, urine and faeces) and precautions required. Method of transport of clinical samples to laboratory and storage.

Unit 3 Direct Microscopic Examination and Culture.

Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa-stained thin blood film for malaria

Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar, Distinct colony properties of various bacterial pathogens.

Unit 4: Serological and Molecular Methods

Serological Methods - Agglutination, ELISA, immunofluorescence, Nucleic acid based methods - PCR, Nucleic acid probes

Unit 5: Kits for Rapid Detection of Pathogens

Typhoid, Dengue and HIV, Swine flu

Testing for Antibiotic Sensitivity in Bacteria

Importance, Determination of resistance/sensitivity of bacteria using disc diffusion method, Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method

SUGGESTED READING

1. Ananthanarayan R and Paniker CKJ (2009)Textbook of Microbiology, 8th edition, Universities Press Private Ltd.
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
3. Randhawa, VS, Mehta G and Sharma KB (2009) Practicals and Viva in Medical Microbiology 2nd edition, Elsevier India Pvt Ltd
4. Tille P (2013) Bailey's and Scott's Diagnostic Microbiology, 13th edition, Mosby
5. Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and Mccartney Practical Medical Microbiology, 14th edition, Elsevier.

SKILL ENHANCEMENT CHOICE PAPERS III: BIOFERTILIZERS AND BIOPESTICIDES

Unit- 1

Biofertilizers

General account of the microbes used as biofertilizers for various crop plants and their advantages

over chemical fertilizers. Symbiotic N2 fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants *Frankia* - Isolation, characteristics, Alder, Casurina plants, non-leguminous crop symbiosis. Cyanobacteria, *Azolla*- Isolation, characterization, mass multiplication, Role in rice cultivation, Crop response, field application.

Unit- 2

Non - Symbiotic Nitrogen Fixers

Free living *Azospirillum*, *Azotobacter*- free isolation, characteristics, mass inoculums, production and field application.

Unit- 3

Phosphate Solubilizers

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application

Unit -4

MycorrhizalBiofertilizers

Importance of mycorrizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.

Unit- 5

Bioinsecticides

General account of microbes used as bioinsecticides and their advantages over synthetic pesticides, *Bacillus thuringiensis*, production, Field applications, Viruses – cultivation and field applications.

SUGGESTED READINGS

1. Kannaiyan, S. (2003). Bioetchnology of Biofertilizers, CHIPS, Texas.
2. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. NewYork.
3. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, ScientificPublishers.
4. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt.Ltd. NewDelhi.
5. Saleem F and Shakoori AR (2012) Development of Bioinsecticide, Lap Lambert AcademicPublishing GmbH KG
6. Aggarwal SK (2005) Advanced Environmental Biotechnology, APH publication.

SKILL ENHANCEMENT CHOICE PAPERS IV: FOOD FERMENTATION TECHNIQUES

Unit 1 Fermented Foods

Definition, types, advantages and health benefits

Unit 2 Milk Based Fermented Foods

Dahi, Yogurt, Buttermilk (Chach) and cheese: Preparation of inoculums, types of microorganisms and production process

Unit 3 Grain Based Fermented Foods

Soy sauce, Bread, Idli and Dosa: Microorganisms and production process

Unit 4 Vegetable Based Fermented Foods

Pickels, Saeurkraut: Microorganisms and production process

Unit 5 Fermented Meat and Fish

Types, microorganisms involved, fermentation process

Probiotic Foods

Definition, types, microorganisms and health benefits

SUGGESTED READINGS

1. Hui YH, Meunier-Goddik L, Josephsen J, Nip WK, Stanfield PS (2004) Handbook of food and fermentation technology, CRC Press
2. Holzapfel W (2014) Advances in Fermented Foods and Beverages, Woodhead Publishing.
3. Yadav JS, Grover, S and Batish VK (1993) A comprehensive dairy microbiology, Metropolitan
4. Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer

SKILL ENHANCEMENT CHOICE PAPERS V: MANAGEMENT OF HUMAN MICROBIAL DISEASES

Unit 1 Human Diseases

Infectious and non infectious diseases, microbial and non microbial diseases, Deficiency diseases, occupational diseases, Incubation period, mortality rate, nosocomial infections

Unit 2 Microbial diseases

Respiratory microbial diseases, gastrointestinal microbial diseases, Nervous system diseases, skin diseases, eye diseases, urinary tract diseases, Sexually transmitted diseases: Types, route of infection, clinical systems and general prevention methods, study of recent outbreaks of human diseases (SARS/ Swine flu/Ebola) – causes, spread and control, Mosquito borne disease – Types and prevention.

Unit 3 Therapeutics of Microbial diseases

Treatment using antibiotics: beta lactam antibiotics (penicillin, cephalosporins), quinolones, polypeptides and aminoglycosides.

Judicious use of antibiotics, importance of completing antibiotic regimen, Concept of DOTS, emergence of antibiotic resistance, current issues of MDR/XDR microbial strains.

Treatment using antiviral agents: Amantadine, Acyclovir, Azidothymidine. Concept of HAART.

Unit 4 Prevention of Microbial Diseases

General preventive measures, Importance of personal hygiene, environmental sanitation and methods to prevent the spread of infectious agents transmitted by direct contact, food, water and insect vectors.

Unit 5Vaccines

Importance, types, vaccines available against microbial diseases, vaccination schedule (compulsory and preventive) in the Indian context.

SUGGESTED READINGS

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
3. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
4. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education

5. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition

SKILL ENHANCEMENT CHOICE PAPERS VI: MICROBIOLOGICAL ANALYSIS OF AIR AND WATER

Unit 1 Aeromicrobiology

Bioaerosols, Air borne microorganisms (bacteria, Viruses, fungi) and their impact on human health and environment, significance in food and pharma industries and operation theatres, allergens

Unit 2 Air Sample Collection and Analysis

Bioaerosol sampling, air samplers, methods of analysis, CFU, culture media for bacteria and fungi, Identification characteristics

Unit 3 Control Measures

Fate of bioaerosols, inactivation mechanisms – UV light, HEPA filters, desiccation, Incineration

Unit 4 Water Microbiology

Water borne pathogens, water borne diseases

Unit 5 Microbiological Analysis of Water

Sample Collection, Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive/MPN tests, confirmed and completed. tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests

Control Measures

Precipitation, chemical disinfection, filtration, high temperature, UV light

SUGGESTED READING

1. da Silva N, Taniwaki MH, Junqueira VC, Silveira N, Nascimento MS, Gomes RAR (2012) Microbiological Examination Methods of Food and WaterA Laboratory Manual, CRC Press
2. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals & Applications. 4th edition. Benjamin/Cummings Science Publishing, USA
3. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press
4. Hurst CJ, Crawford RL, Garland JL, Lipson DA (2007) Manual of Environmental Microbiology, 3rd edition, ASM press

Semester – IV

Theory Courses

CC-401 MEASUREMENT AND EVALUATION IN PHYSICAL EDUCATION

Unit- IIntroduction to Test & Measurement & Evaluation

- Meaning of Test & Measurement & Evaluation in Physical Education
- Need & Importance of Test & Measurement & Evaluation in Physical Education
- Principles of Evaluation

Unit- IICriteria; ClassificationandAdministration of test

- Criteria of good Test
- Criteria of tests, scientific authenticity (reliability, objectivity, validity and availability of norms)
- Type and classification of Test
- Administration of test, advance preparation – Duties during testing – Duties after testing.

Unit- III Physical Fitness Tests

- AAHPER youth fitness test
- National physical Fitness Test
- Indiana Motor Fitness Test
- JCR test
- U.S Army Physical Fitness Test

Unit- IV Sports Skill Tests

- Lockhart and McPherson badminton test
- Johnson basketball test
- McDonald soccer test
- S.A.I volleyball test
- S.A.I Hockey test

References:

Bangsbo, J. (1994). *Fitness training in football: A scientific approach*. Bagsvaerd, Denmark: Ho+Storm.

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