

RESEARCH METHODOLOGY

UNIT I - Library and Research Documentation – Methods of literature collection, online resources, Technical papers, Reviews, Monographs and Abstract services, Information storage and retrieval, Preparation of index cards, Preparation and presentation of research papers for Journals, Symposia and Conferences-Impact factor-citation index- refereed journals Scope, Identification and Selection of Research Problem – Experimental approach – Designing of Methodology – Planning and Execution of Investigations – Methods of Editing and Abstracting, Preparation of Manuscript and Proof Reading – Thesis Writing.

UNIT II - Principles of Microtechniques – Fixatives and Histological stains – Fixation, Tissue processing and Staining – Freezing Microtomy (Cryostat). Histochemistry – Fixatives, Histochemical stains – Principles involved in identification of Carbohydrates, Proteins, Lipids, Enzymes and DNA. Electron Microscopy – SEM, TEM, STEM – Principles and applications – Histological preparations of tissues for SEM & TEM. Photography – Photomicrography – Image analyzer- Principles and applications.

UNIT III - Chromatography – Principles, Types and Applications – Paper, Column, Ion – exchange, TLC, HPLC, GLC, GC – MS, NMR. Electrophoresis : Principles, Types and Applications – Paper, Agar Gel, PAGE, SDS- PAGE- Gel documentation-2D electrophoresis Immunological Techniques : Antigen - Antibody preparation and Purification – Immunodiffusion – Immuno electrophoresis, ELISA, RIA Blotting Techniques-Western, Southern and Northern - MALDI and N' terminal sequencing. Tracer techniques – Autoradiography and its applications – Radiation measuring devices – Geiger Muller Counter, Scintillation Counter – Principle and applications.

UNIT IV - pH meter – Principles and applications. Centrifuge – Principles, types and applications Spectrophotometry – Principles and applications Uv-Vis, Colorimeter - Atomic Absorption Spectrophotometer – Flame photometer. Calorimetry – Wet combustion Bomb calorimeter. Manometry – Respirometer – Warburg's apparatus – Oxygen analyser.

UNIT V - Statistical methods and application : Experimental designs – Sampling – Probability – Normal curve – Test of Significance – Student's 't' – test – Chi – Square test, 'F' test – Analysis of Variance – one way, two way and multiple way of analysis – Correlation coefficients – Simple, Linear and Multiple Correlations – Simple, Linear and Multiple regressions. Computer Application: Classification – Input and Output devices, Main and auxiliary memories, CPU – Software : System software and applications. Definition of operating systems of computers, interpreters, assemblers, loaders program algorithm, flow charting, coding, debugging and testing. Spread sheets and Statistical analysis using EXCEL.

Text Book:

Ramakrishnan.S., Swamy, R (1995) Text book of clinical (Medical) Biochemistry & Immunology, TR.Publications, Madras.

Reference Books:

Allen, H.Benton., William, E.Verner, Jr.(1974) Field Biology and Ecology, McGraw Hill Book Co., New York.

Anderson, Durston, Polle (1970) Thesis and Assignment Writing, Wiley Easter Limited.

Khan, T.I., Shishodia. (1998) Biodiversity Conservation and Sustainable development Pointer Publishers, Jaipur. KING, B. (1986) Cell Biology. London, Allen and Unwin Boston, London.

Kumar, H.D. (1998) Modern concepts of Biotechnology. Vikas Publishing House Pvt. Ltd., New Delhi.

Kumar, D.Kumar, S. (1998) Modern concepts in Microbiology. Vikas Publishing House Pvt. Ltd., New Delhi.

RECENT TRENDS IN ZOOLOGY AND NANOTECHNOLOGY**UNIT I**

DNA sequencing and Human genome project, DNA finger printing and foot printing, DNA amplification and RT-PCR, Gene and cDNA Library. Detection of genetic diseases using DNA recombinant technology, screening and counseling – Human gene therapy - Animal cell culture Primary and established cell line-Stem cell therapy. DNA methylation, antisense RNA, Transposons, Signalling by receptors. Cloning technique and its application in Biology, knock out genes– Ethical issues. Reproductive technologies related to human in vitro fertilization.

UNIT II

Somatic mutation and oncogenes – Induction of mutation by mutagens, teratogens and carcinogens. Biofertilizers – composting – Biopesticides – SCP – Production and sources. Methods involved in the production of Protein- transgenic plants and animals and their uses. Production of recombinant protein, insulin and growth hormone. Protein Engineering – Enzyme Technology – Terminator genes.

UNIT III

Organization and expression of immunoglobulin gene. Vaccine – Whole organism vaccines, submit vaccines, recombinant vaccines, DNA vaccines, edible vaccines, synthetic peptide vaccine, multivalent submit vaccine, - development of AIDS and malaria vaccines. Applications of RIA, immunofluorescence, ELISA, Western blot and monoclonal antibodies in diagnosis of various diseases. Molecular Diagnostics: Karyotyping - FISH - RFLP HLA, tissue typing and organ transplantation.

UNIT IV

Nanotechnology- Introduction, history, Nanosystems- properties synthesis- purification and application of fullerenes carbon nanotubes, self assembled monolayer protected metal nanoparticles and nanoshells. Nanobiology – Interaction between bio molecules and nanoparticle - Surface synthesis of hybrid nano- Bioassemblies of nano in biology.

UNIT V- Nanomedicines: Approaches to developing nanomedicine. Kinds of nanosystem in use, Nanopores, Nanoshells, Tectodendrimers- Protocols for nanodrug administration- Nanotechnology in diagnostic applications- Nanotriobiology- definition, Current status and future perspectives of nanobiology.

REFERENCES

1. Abbas, A.K., Lichtman, A.K., Pober, J.S. (1998) Cellular and Molecular Immunology. III Edition W.B. Saunders Company, U.S.A.
2. Benjamin Lewin. (1999) Genes VII. Oxford University Press, New York.

3. Branden, C., Tooze, J. (1999) Introduction to protein structure. II Edition, Garland Publishing , Inc., New York.
4. Desmond, S.T., Nicholl. (1994) An introduction to genetic engineering Cambridge University Press, New York.
5. Jonathan Graves, Dungan Reavey (1996) Global Environmental Change. Plant, Animal and Communities. Long man.
6. Hawkins, J.D. (1996) Gene structure and expression. III Edition. Cambridge University Press, New York.

ENVIRONMENTAL POLLUTION AND MANAGEMENT**UNIT-I**

Water pollution – Types, sources and consequences of water pollution. Physico – chemical and Bacteriological sampling and analysis of water quality. Drinking water quality standards – Sewage and waste water treatment and recycling – Water pollution prevention & control act – 1974. Marine pollution - sources of marine pollution and control – criteria employed for the disposal of pollutants in marine system – Coastal management.

UNIT-II

Air pollution: Structure and composition of atmosphere – classification, sources and effects of air pollution – Acid rain –green house effect – global warming – Ozone depletion. Prevention and control of air pollution - particulate control – settling chamber, scrubber, bag filter, cyclones electrostatic precipitators. Gaseous emission control methods. Air pollution prevention and control Act 1981. Noise Pollution – sources, measurement of noise and indices, effect of meteorological parameters on noise propagation. Noise exposure levels and standards - Noise control and abatement measures - Impact of noise on human health.

UNIT-III

Soil Pollution – soil pollutants – types – sources, effects and control – Industrial waste effluents and heavy metals, their interactions with soil components - Soil micro-organisms and their functions - Degradation of different insecticides, fungicides and weedicides in soil – Different kinds of synthetic fertilizers (NPK) and their interactions with different components of soil – Radioactive and thermal pollution

UNIT – IV

Sources and generation of solid wastes – their characteristics, chemical composition and classification – Different methods of disposal and management of solid wastes (Hospital wastes and Hazardous wastes) - recycling of waste materials – Waste minimization technologies – Hazardous Waste Management and handling Rule, 1989 – Resource Management, Disaster Management and Risk analysis - Environmental protection - issues and problems, International and national efforts for environmental protection. Provision for constitution of India regarding Environment (Article 48A and 58A).

UNIT – V

Environmental Education and awareness: Environmental ethics and global imperatives – Current environmental issues in India. Context: Narmada dam, Tehri dam, Almetti dam, soil erosion, Formation and reclamation of alkaline and saline soil – Wastelands and their reclamation – Desertification and their control – Waste disposal, recycling and power generation – Epidemiological issues (e.g., Goitre, Fluorosis, Arsenic) - Government

Agencies & Programs – The Tiwari committee – creation of NCEPC, Department of Environment & Forest – Function of State Pollution Control Board

REFERENCES

1. Rao, M. N and H.V.N. Rao (1993) Air Pollution, Tata McGraw – Hill Publishing Company Limited. New Delhi.
2. Kudesia, V.P and Ritu Kudesia (1992) Water Pollution, Pragati Prakashan Publication, Meerut.
3. Sawyer, C. N., P.L McCarty and G.F. Perkin (1994) Chemistry for Environmental Engineers, II Edition. McGraw-Hill.
4. Sharma, B.K and H.Kaur (1994) Soil and Noise Pollution. Goel Publishing House, Meerut.
5. Kumarasawmy, K., A. Alagappa Moses and M. Vasanthi (2004) Environmental Studies (A Text Book for All Under Graduate Students) Bharathidasan University Publications.

TEACHING AND LEARNING SKILLS (Elective)

Unit I – Computer Application Skills Computer system: Characteristics, Parts and their functions – Different generations of Computer – Operation of Computer: switching on / off / restart, Mouse control, Use of key board and some functions of key – Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations

Unit II – Communication Skills Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and written; Non-verbal communication – Intrapersonal, Interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and writing – Methods of developing fluency in oral and written communication – style, Diction and Vocabulary – Classroom communication and dynamics

Unit III – Communication Technology Communication Technology: Bases, Trends and Developments – Skills of using Communication Technology – Computer Mediated Teaching: Multimedia, E-content – Satellite-based communication: EDUSAT and ETV channels, Communication through web: Audio and Video applications on the Internet, interpersonal communication through the web.

Unit IV – Pedagogy Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation – Versatility of lecture technique – Demonstration, Characteristics, Principles, Planning Implementation and Evaluation – Teaching – Learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion – Models of teaching: CAI, CMI and WBI

Unit V – Teaching Skills Teaching skill: Definition, Meaning and Nature – Types of Teaching skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills

References:

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh

3. Information and Communication Technology in Education: A Curriculum for Schools and programme of Teacher development, Jonathan Anderson and Tom Van Weert, UNESCO, 2002
4. Kumar K.I (2008) Educational Technology, New Age International Publishers, New Delhi
5. Mangal, S.K. (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana
6. Michael D. and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York
7. Pandey S.K. (2005) Teaching Communication, Commonwealth Publishers, New Delhi
8. Ram Babu A. and Dandapani S (2006) Microteaching (Vol.1&2) Neelakamal Publications, Hyderabad
9. Singh V.K. and Sudarshan K.N. (1996) Computer Education, Discovery Publishing Company, New York
10. Sharma R. A. (2006) Fundamentals of Educational Technology, Surya Publications, Meerut
11. Vanaja. M. and Rajasekar S. (2006) Computer Education, Neelkamal Publications, Hyderabad.