

SCHOOL OF MARINE SCIENCES
ALAGAPPA UNIVERSITY, THONDI CAMPUS - 623409

RESEARCH METHODOLOGY

Unit - I

Methods for assessing primary productivity in animals - Histology: Principles of microtechniques -fixing, embedding, sectioning, staining, differential. Histochemistry: Principles and practice. Methods employed in analysis of proximate composition. laboratory culture of diatoms and dinoflagellates - culture systems - fin fishes, shell fishes and seaweeds. Morphometric and meristic character - methods for estimation reproduction and breeding periodicity in animals.

Unit - II

Spectroscopy: Principles of biophysical methods, X-ray diffraction, Spectrofluorometer, flame photometer, UV-visible, atomic absorption and emission spectrophotometers, NMR and Mass spectrometer. Centrifuge: Principles and applications - Ultra centrifuge (velocity, buoyance and density, gradient centrifugation). pH: Buffers - pH meters - ion, selective electrodes. Chromatography: Principles and Application of Chromatography: Paper, Thin layer, column, Ion Exchange, Gel filtration, Gas Liquid, HPLC and affinity. Electrophoresis: Principles and Application of Electrophoresis: Paper, Agarose, PAGE, SDS PAGE and Iso-Electric focusing. Hybridization, sequencing, PCR, DNA finger printing, screening of genome and cDNA libraries.

Unit - III

Biostatistics: Collection and analysis of biological data - mean, median, mode Standard deviation, Standard error, Coefficient of variation, Student 't' test, Skewness, Kurtosis, Chi - square, Correlation, Regression and ANOVA. Bioinformatics: Internet - Worldwide Web - Search Engines - their functions. Boolean searching - file formats. Biological data bases - sequence and structure - date retrieval - searching source data bases - sequence similarity searches - FASTA and BLAST, CLustalW and Phylip.

Unit- IV

Biological literature library research: Abstracting, searching for literature, indexing; manuscript preparation, organization of the paper - the art of writing - presentation of results - tables - graphs - histogram - relevant titles, etc. Internet and e-journals. Computer aided techniques for data analysis, data presentation and slide preparation.

Unit- V

Research fields in Geology-Field instruments, Essentials of topographic and geological maps and mapping-Sampling of geological specimens (Fossils, Rocks, Minerals, Groundwater and Unconsolidated sediments)-Measurements of structural features in rock types- Microscopy: Principles and applications of microscopy, light, phase contrast, fluorescence, scanning and transmission electron microscopes. Polarizing microscopes, Ore microscopes, Scanning electron microscopes, Mirror stereoscope, Heavy mineral separators- Analytical instruments: XRF, XRD, Atomic absorption spectrometer, Electron probe micro analyser and Inductively coupled plasma mass spectrometry.

References:

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3. Comir., & Peter Wood Ford. (1979). *Writing scientific papers in English*. London: Pitman Medical Publishing Co.
4. Day, R.A. (1994). *How to write and publish a scientific paper*. London: Cambridge University Press.
5. Ewing, G.W. (1988). *Instrumental methods of chemical analysis*. McGraw Hill Book Company.
6. Gurumani, N. (2006). *Research Methodology for Biological Sciences*. Chennai: MJP Publishers.
7. Milton, J.S. (1992). *Statistical methods in Biological and Health Sciences*. New York: McGraw Hill Inc.
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9. Wilson and Walker. (2000). *Practical biochemistry - principles and techniques*. Cambridge University Press.
10. Tufte, E.R., 1983. 'The visual display of quantitative information'. Graphics Press, Cheshire.
11. Mishra R.P., *Research Methodology*. Concept Publishing Co, New Delhi.
12. Lahee H., 1959. *Field geology*, McGraw- Hill.
13. Babu S.K and Sinka D.K (1987) *Practical Manual for Sedimentology*, CBS Publishers and Distributors.