

**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 HillBook 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.