Shivaji University, Kolhapur
M.Phil/Pre. Ph.D A.G.P.M. Syllabus 2011

1. STRUCTURE OF THE COURSE WORK FOR M.Phil/PhD.

(NO.OF PAPERS THREE)

Sr.No	Subjects/Papers	Marks
1	Research Methodology	100
2	Recent Trends in the Subject concerned	100
3	Optional Paper (Base on Specialization)	80+20
	Total	**300**

Paper-I

Research Methodology in Agrochemicals and Pest Management

Unit-IA]Research Methodology (15)

Research, its aim, nature and method, Types of /research, pure and applied, criteria of good research, criteria of selection of problem, Research programme, needs, preparation of synopsis, collection of data, primary and secondary source of data, analysis of data.

B]Report Writing

Format of report, drafting and chapterization, plan of presentation, foot notes, citation, bibliography annexure, writing of research papers and dissertation.

Unit-II A] Tracer techniques in Agrochemistry (15)

Radioactivity, detection& measurement of radioactivity, proportional G.M. and Scintillation counters. Use of fluorescent materials and synthetic pigments in Agrochemical analysis.

B] Food processing and food preservation

a) House Hold and Industrial

b) Value addition of processed and preserved food.

Unit-III:Advances in Humus Chemistry and Fertilizer Chemistry: (15)

a) Humus and fertilizers and their physical, chemical and biological properties.

b) Composting methodology.

c) Microorganisms used for compost produced commercially.

d) Traditional and advanced methods for composting at farm.

e) Effect of fertilizers on soil chemistry.

f) Fate of fertilizers and their effects in the Environment.

Unit-IV:A] Computer Applications **(15)**

Introduction to Computational chemistry and molecular modeling, modeling, molecular dynamics, simu8lation, energy minimization and search methods, use of molecular dynamics for normal mode analysis, free energy calculation and conformational analysis,

B] Force Fields

Various types of interactions required for defining the force fields

C] Soft wares

Commercially open sourced packages such as gromax, amber, NAMD, VMD, Chemoffice Ultra.

References:

1) Research Methodology: Methods and techniques by C.R.Kothari, 1987.

2) Writing Scientific paper, reports by W.P.Jones, 1971.

3) Report Writing by C.G.Gaum and P.F.graves (Prentice hall, 1954.)

4) Methods of Research. Appleton Century Crofts Inc. By C.V.Good and D.G.Skates 1954.

5) Scientific Methods (John Wiley) 1962, by R.L.Ackoff.

6) The Research Report:A Guide for the beginner, Ranold PressbyJohnson.

7) Insecticides in agriculture and environment by A.S.Perry, I Yammamoto, I.Ishaya and R.Perry. (Narosa publication House)

8) Insect Sex Pheromones by Jacobson.

9) How to write assignment research papers, dissertation by Bedekar V.H. Kanak publication, New Delhi. 1982.

10) Science and its methodology by Gupta S.P.Ajanta Publication 1978.

11) Preparation and presentation of scientific publication by Salunkhe D.K.MPAU, Rahuri 1981.

12) Molecular Dynamics simulations elementary methods by J.M.Haile

13) The art of Molecular Dynamics simulation by D.C.Rapaport.

14) Introduction to Computational Chemistry by F.Jensen.

15) Molecular Modeling Principles and Applications by A,R, leach.

16) Essentials of Computational Chemistry by C.J.Cramer.

Paper-II

Recent Trends in Agrochemicals and Pest Management (100 Marks)

Unit-I: Advances in Humus and Fertilizer Chemistry (15 hrs)

a) Humus and fertilizers & their physical, chemical & biological properties.
b) Composting Methodology:
   i) Microorganisms used for composting.
   ii) Traditional and advanced methods of composting.
c) Effect of fertilizers on the Soil Chemistry.
d) Fate of fertilizers and their effects on the environment.

Unit-II: Assessment and evaluation of damages caused by biotic and abiotic factors (15 hrs)

a) Assessment and evaluation of damages caused by biotic (Pathogens and Weeds) and abiotic factors (Environmental Factors) to crop plants & methods of their study.
b) Protection of food grains, fruits, vegetables, flowers during transport and storage.

Unit-III: Application of Agrochemicals (15 hrs)

a) Herbicides:Naturally occurring Herbicides: Juglone, Terpenoids, Alkaloids, Photodynamic compounds, from microbes, Synthetic herbicides their mode of action.
b) Plant growth regulators:
c) Insect Growth regulators (IGRS): Pheromones and their mimics.

Unit-IV: Study of Soil, Manures and Fertilizer (15 hrs)

a) Advances in soil Chemistry:
b) In relation with microorganisms.
c) In relation with changes in the minerals and salts in the soil.
d) Advances in field application of manures and fertilizers to field.

References:

1. Principles of plant protection. By Chattopadhyaya S.B. (1980)
2. Integrated Pest Management (plenum press N.Y.) by Apple J.A.& R.R.Smith (1976)
3. Parasitic Insects, (American Elsevier New York) by Ashew R.R. (1971)
4. Herbicides Vol. I & II (A.P.New York) by Audus L.J. (1976)
5. Mechanism of biological control of soil – borne pathogens: Ann. Rev. Phytopath – 6, 263- 294, by Baker T.W. (1968)
6. The protection of stored products, in crop protection. (G. J. Hosed Leoard – hill London.
7. Resistance of plants to Insects. Ann. Rev. Entomo. 10: 207 – 232 by Beek S.D.(1965)
8. Martin H. & Woodcole, David, 1983, The Scientific principles of plant

protection. (7^{TH} edition) (Edward Arnold Publ. 486 pp)
9. Boye F. 1978, Insecticides from vegetable kingdom plant Res. & Dev. 7: 13-31
10. Weidner H.1987, A Survey of Research in to stored products Protection in the countries of the third world ibid. 25: 22 – 49
11. Bosch R.V.etal. 1973, "Biological Control" (Intext educational N.Y.)
12. Brian P.W. 1972, The metabolic background of disease resistance. Proc. 6^{Th} European Conf. Cambridge.
13. Burgeos H.D. & N.W.Hussey 1971, Microbial control of Insects & Pestes. (A.P.New York)
14. Butter C.G. 1967, Insect pheromones. Biol. Rev. 42 : 42-87
15. Byass J.S. 1963, Modern spraying Techniques, Its principles & practices. (Woeed crops 15 : 276 – 282)

PAPER – III – A
Recent advances in Agro chemistry.

Unit-I: Hyphenated Technique of Analysis (15 hrs)

Application of IR, 1H-NMR, ^{13}C-NMR, MS, GCMS and LCMS in Agrochemical analysis.

Unit-II: Designing of Agrochemicals & Plant Products (15 hrs)

Designing of synthesis of Agrochemicals such as Pesticides, Plant Growth regulators, Perfumery chemicals, Pheromones, natural products using retrosynthetic analysis approach.

Unit-III: Sampling and Analysis of Soil, Fertilizer, and Agrochemicals (15 hrs)

a) Analysis of Soils
b) Analysis of Fertilizers
c) Pesticide residues: Methods of analysis (Organophlorine, Organophosphours, Aryloxyacetic acids, Carbamates, Synthetic pyrethroids) monitoring, of Pesticides in water, soil and air.
d) Isolation, identification of Natural pesticides.

Unit-IV: Study of the following pesticides: W.R.T. synthesis, mode of action and applications (15 hrs)

Organophosphorus pesticides	: Schradan, Abate, Demeton, Temephos, Metasystox.
Carbomate pesticides	: Eptam, Prooxur, Carbendazin.
Herbicides	: Atrazine, Simazine.
Rodenticide	: Warfarin.
Neonicotinoids	: Thiamethoxam, Imidacloprid, Acetamiprid, Thiacloprid

Reference books :

1. Analysis of pesticides residue by H.A.Moye. (J.W.)

2. Evaluation of pesticides in ground water by W.Y.Garnett, R.C.Honeyceatt & H.N.Nigg. (AES)

3. Pesticides in aquatic Environments by M.A.G. Khan.

4. Pesticides analysis by K.G.Das. (Dekker)

5. Analytical methods for pesticides, plant growth regulators and food additives (Academic press) by Gunter, Weig and J.Sharma (J.W.)

6. Instrumental methods of chemical analysis by Willard, Merrit & Dean. (EWAP)

7. Chemical Instrumentation by Strobel. (Addison weslay)

8. Applications of absorption spectroscopy by J.R.Dyer.

9. Soil and plant analysis by C.S.Piper. (Hons publisher)

10. Applications of spectroscopic techniques in Organic Chemistry by P.S.Kalasi.

11. Spectroscopic methods in Organic Chemistry by D.H.Willan and I. Fleming.

PART – III – B
Recent Advances in Pest Management

Unit I: Integrated Pest Management and Consequences (15 hrs)

Integrated pest management: concepts and basis, preventive practices, therapeutic Practices, development of an IPM programmes, case history of IPM, biointensive IPM. Consequences of pest management: resistance, resurgence, microbial Degradation, upset in community balance.

Unit II: Study of the following Strategies of Pest Control: (15 hrs)

a. Biological control and management of bioagents for Pest control.
b. Recent advances in microbial control of insect pests.
c. Insect Plant resistance and its applications in pest control.

Unit III: Biotechnological aspects of Insect pest management (15 hrs)

a. Biotechnology and its role in Insect pest management.
b. Use of fungi & viruses in Insect pest management.
c. Application of genetic Engineering in insect pest Management.

d. Genetic Control.

Unit IV: Integrated pest management: (15 hrs)

a. Integrated pest management: A springboard for sustainable agriculture & its scope in future.
b. Pesticide management: Issues and strategies.
c. Hazards associated with pesticides.
d. Behavior and development modifiers and their applications in pest Management

Reference books:

1. A text book of applied Entomology Vol. I & II K.P. Srivastava.

2. Introduction to insect pest Management Ed. R.L.Metcalf & W.H.Luckman.

3. Introduction to biological control R.Bopsch, D.S.Messenger and A.D.Gutierrez.

4. Principals of insect pest management. G.S.Dhaliwal & R.Arora.

5. Entomology and pest management. Larry P. Pedigo.

6. Elements of Economic Entomology. B.V.David & T.Kumarswami.

7. Critical issues in insect Pest Management. G.S. Dhalliwal & E.A.Heinroichs.

8. Biological Pest suppression. H.C.Coppel and J.W.Martins.

PAPER – III –C
Recent Advances in plant protection.

Unit-I: Molecular Plant Pathology (15 hrs)

a) Molecular Genetic Research in disease control, plant disease resistance genes, technique of production of transgenic, transgenic and disease resistance plants.
b) Application of biotechnology for improving biological control.

Unit-II: Principles of plant disease control (15 hrs)

a) Assessment and evaluation of damages caused by biotic (Pathogens and weeds) and biotic (Environmental Factors) Factors to crop plants & methods of their study
b) Principles of plant disease and their control.
c) Protection of grains, fruits, vegetables, flowers during transport and storage
d) Biocontrol agents of plant – pathogen origin and cross protection of crop plants from Infections

Unit-III: Defense Mechanism (15 hrs)

Chemical manipulation of plants for disease resistance, acquired resistance, systemic acquired resistance (SAR) induced resistance to pest and pathogens, induction of resistance by synthetic immunizers such as salicylic acid, methyl 2, 6-dichloroisonicotinic acid, metabolic blockers etc., Gene response to immunizers and inducers.

Unit-IV: Plant Secondary Metabolites (15 hrs)

a) Non specific mechanism for the induction of defense transcripts and phytoalexins by Pathogens, modern methods of inducing disease resistance in plants, proteinase Inhibitors and hydrobiotic enzyme inhibitors as phytoalexins.

Reference books:

1. Principals of procedure of plant protection. By Chattopadhyaya S.B.(1980)

2. Integrated pest management (plenum press N.Y.) by Apple J.A. & R.R.Smith (1976)

3. Parasitic Insects, (American Elsivier New York) by Ashew R.R. (1971)

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5. Mechanism of biological control of soil – borne pathogens: Ann. Rev. Phytopath – 6 263- 294, by Baker T.W. (1968)

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7. Resistance of plants to Insects. Ann. Rev. Entomo. 10: 207 – 232 by Beek S.D.(1965)

8. Martin H. & Woodcole, David, 1983 (7^{TH} edition) The Scientific principles of plant protection. (Edward Arnold Pub. 486 pp)

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11. Bosch R.V.et al. 1973 "Biological Control" (In text educational N.Y.)

12. Brian P.W. 1972 The metabolic background of disease resistace. Proc. 6^{Th} European Conf. Cambridge.

13. Burgeos H.D. & N.W.Hussey 1971 Microbial control of Insects & Pests. (A.P.New York)

14. Butter C.G. 1967 Insect pheromones. Biol. Rev. 42 : 42-87

15. Byass J.S. 1963 Modern spraying Techniques, Its principles & Practices. (Woeed crops 15 : 276 – 282)

16. Cassida J.E.1973 Pyrethrum, The Natural insecticide, (A.P.New York)

17. Chester K.S. 1947 Nature & prevention of plant diseases (Blaleiston, Philadelphia)

18. Chester K.S. 1950 Plant disease losses, their appraisal & Interpretation

19. Chester K.S. 1955 Scientific & economic aspects of plant disease losses appraisal. Ann. App. Biol. 42 : 335 -343

20. Ilan Chet (ed) Biotechnology in plant disease control. Join Wiley & sons.