

| BASICS CONCEPTS AND APPLICATIONS OF AGROCHEMICALS | | | |
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| Course Code | 21AG51 | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P: S) | (2:2:0:0) | SEE Marks | 50 |
| Total Hours of Pedagogy | 40 | Total Marks | 100 |
| Credits | 03 | Exam Hours | 03 |
| Course Objectives: <ul style="list-style-type: none">•To understand the basic concepts of agrochemicals and their applications in agriculture.•To study naturally occurring and synthetic chemical agents used for protecting crops in field as well as in storage.•To understand the role of naturally occurring crop protecting chemical agents in fostering organic farming.•To understand the impact of agrochemicals on environmental, animal, and human health•To understand the regulatory mechanism of agrochemicals at national and international levels•To acquire necessary basic knowledge on agrochemicals so as to evolve engineering strategy for their optimal and judicial applications in field as well as storage conditions, based on integrated learning outcomes from other courses. | | | |
| Pedagogy (General Instructions) <p>These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none">1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.2. Chalk and Talk method for teaching basic concepts.3. Arranging visits to farmers' fields to expose pupils to real time farming situations.4. Adopt collaborative (Group Learning) Learning in the class.5. By giving assignments and presentation tasks to students.6. Exploring information from research publications and regulatory documents | | | |
| Module-1 | | | |
| Naturally Occurring Crop Protection Agents <p>Economic loss of agricultural produce due to pest problems: insects, diseases, rodents and weeds; Sources and utility of naturally occurring insecticides, bactericides, fungicides, nematocides, rodenticides; Role of naturally occurring pesticides in fostering organic farming; Working principles of botanical insecticides such as natural pyrethroids, nicotine, rotenone, neem and karanj; Pest control properties of plant hormones, phytoalexins and essential oils; Advantage and limitations of naturally occurring crop protection agents, chemosterilants, insect antifeedants, insect attractants and repellents; microbial pesticides and biocontrol agents.</p> | | | |
| Pedagogy | <ol style="list-style-type: none">1. PowerPoint Presentation2. Chalk and Talk are used for Problem Solving (In-general)3. Video demonstration or Simulations | | |
| Module-2 | | | |
| Synthetic Crop Protection Agents <p>History, scope and principles of chemical insect control; Synthetic insecticides, bactericides, fungicides, nematocides, rodenticides, weedicides; Classification of major groups of insecticides (organo-chlorine, organo-phosphorus, organo-carbamates, synthetic pyrethroids, neonicotinoids), fungicides (inorganics, dithiocarbamates, OP's, phenols, quinines, carboxamides, azoles, methoxyacrylates); Mode of action of different groups of insecticides, fungicides and nematocides; Chitin synthesis inhibitors, insecticide synergists, and fumigants; Plant growth regulators – auxins, gibberellins, cytokinins, ethylene, abscisic acid; Brassinolides;</p> | | | |
| Pedagogy | <ol style="list-style-type: none">1. PowerPoint Presentation2. Chalk and Talk are used for Problem Solving (In-general)3. Video demonstration or Simulations | | |
| Module-3 | | | |
| Chemicals used for storage and preservation <p>Major storage pests of economic importance causing damage during storage of food grains; Strategies involving storage bags, storage structures, and storage conditions; Pesticides and fumigants used in controlling insects and rodents during storage; Chemicals used for preserving freshness and promoting ripening in vegetables and fruits,</p> | | | |

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| respectively. | |
| Pedagogy | 1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3. Video demonstration or Simulations |
| Module-4 | |
| Agrochemical Formulations Basic concepts of pesticide formulation - classification, solid and liquid formulations; preparation, properties, uses; controlled release formulations; Formulants - carriers/ diluents, surfactants, encapsulants, binders, anti-oxidants, stabilizers; Application - devices and quality of deposits; Types of spray appliances, seed treatment and dressing; nanotechnology in crop protection, Tools to develop and measure nanoparticles. Basic concepts of fertilizer formulations: enhancing fertilizer use efficiency and reducing environmental pollutions | |
| Pedagogy | 1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3. Video demonstration or Simulations |
| Module-5 | |
| Agrochemicals – Regulation and Quality Control Production, consumption and trade statistics of pesticides and fertilizers; banned and restricted pesticides, registration and quality control of insecticides; Laws, Acts and Rules governing registration and regulations of agrochemical production and use; key provisions of the Insecticides Act (1968), Environmental Protection Act (1986). Food Safety and Standards Act, WHO, FAO, CODEX and national/international guidelines. | |
| Pedagogy | 1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3. Video demonstration or Simulations |
| Course outcome (Course Skill Set) At the end of the course the student will be able to : <ul style="list-style-type: none"> • Understand the basic concepts of agrochemicals and their applications in agriculture. • Understand naturally occurring and synthetic chemical agents used for protecting crops in field as well as in storage. • Understand the role of naturally occurring crop protecting chemical agents in fostering organic farming. • Understand the impact of agrochemicals on environmental, animal, and human health • Understand the regulatory mechanism of agrochemicals at national and international levels • Acquire necessary basic knowledge on agrochemicals so as to evolve engineering strategies for their optimal and judicious applications in field as well as storage conditions, based on learning outcomes from other courses | |
| Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together | |
| Continuous Internal Evaluation: Three Unit Tests each of 20 Marks (duration 01 hour) <ol style="list-style-type: none"> 1. First test at the end of 5th week of the semester 2. Second test at the end of the 10th week of the semester 3. Third test at the end of the 15th week of the semester | |

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (duration 01 hours)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. **"Agrochemicals and Pest Management"** by T.V. Sathe. Daya Publishing House (2003)

ISBN: 8170353092, 9788170353096

2. **"Agrochemicals and Sustainable Agriculture"** By N.K. Roy. Associated Publishing Company (2021). ISBN: 9788186580110
3. **"Sittig's Handbook of Pesticides and Agricultural Chemicals"** Edited By Stanley A. Greene and Richard P. Pohanish. Elsevier (2005). ISBN: 978-0-8155-1516-6
4. **"Agrochemicals"** By Singh Ranjit. LAP Lambert Academic Publishing. ISBN: 9786139851997
5. **"The Complete Technology Book on Pesticides, Fungicides, Herbicides (Agrochemicals) with Formulae, manufacturing Process, Machinery and Equipment Details"** By Himadri Panda. 2nd Revised Edition. Published by NIIR Project Consultancy Services (2022), ISBN: 9788195577538
6. **"A textbook of Fertilizers"** By Deepak Ranjan Biswas. New India Publishing Agency, New Delhi.
7. **"Pesticide Regulation Handbook"** By Greene Jan. Taylor and Francis Ltd, ISBN: 9781315896366, 9781315896366

Web links and Video Lectures (e-Resources):

Activity Based Learning (Suggested Activities in Class Based learning)

- Quizzes
- Assignments
- Seminars
- Mini Projects


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