

**RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER**  
**SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST**  
**OF ASSISTANT PROFESSOR IN AGRICULTURE (ENTOMOLOGY)**  
**FOR COLLEGE EDUCATION DEPARTMENT**

**PAPER – II**

**Unit 1: Pests of Field Crops-**

Distribution, host range, biology and bionomics, nature of damage and management of arthropod pests of cereals, millets, oilseed, pulses, forage, fibre crops, sugarcane and tobacco. Polyphagous pests: locusts, termites, hairy caterpillars, cut worms, fall armyworm and white grubs.

**Unit 2: Pests of Horticultural Crops-**

Distribution, host range, biology and bionomics, nature of damage and management of arthropod pests of vegetables, fruits and plantation crops, spices, condiments, medicinal plants and ornamentals.

**Unit 3: Pests of Stored Products -**

Fundamentals of storage of grains and grain products. Storage losses, sources of infestation/infection, factors influencing losses. Microflora in storage environment and their control. Storage structures, bulk storage and bag storage, their relative efficacy and demerits. Grain drying methods and aeration. Non-insect pests (rodents, birds, mites) of stored products and their control. Stored grain pests and Integrated approach for their management.

**Unit 4: Biological Control-**

Importance and scope of biological control, history of biological control: Important biocontrol agents- Parasites, predators and insect pathogens. Important entomophagous insect orders and families. Ecological, biological, taxonomic, legal and economic aspects of biological control, phenomena of parasitism, its types and their applied importance. Principles and procedures of using exotic biocontrol agents. Utilization of natural biocontrol agents: conservation, habitat management and augmentation. Mass multiplication techniques of important bioagents. Effective evaluation techniques, Biocontrol organizations in world and India. Successful cases of biological control of pests. Entomophilic pathogens: bacterial, fungi, viruses, protozoan and nematodes, modes of transmission, methods of uses, symptoms of infection. Microbial insecticides and their formulation. Merits and demerits of microbial control. Role of biocontrol agents and microbial insecticides in Integrated Pest Management.

### **Unit 5: Chemical Control and Toxicology-**

History, scope and principles of chemical control. Insecticides and their classification. Formulations of insecticides, physical, chemical and toxicological properties of different groups of insecticides: chlorinated hydrocarbons, organophosphates, carbamates, synthetic pyrethroids, chlordimeform, chitin synthesis inhibitors, avermectins, nitroguanidines, phenylpyrazoles, botanicals (natural pyrethroids, rotenone, neem products, nicotine, pongamia etc). Combination insecticides. Problems of pesticide hazards and environmental pollution. Pesticide risk analysis, safe use of pesticides, precautions and first aid treatments. Insecticides Act 1968, registration and quality control of insecticides. Evaluation of toxicity, methods of toxicity testing, determination of LD 50, LT 50, RL 50 etc. Pesticides residues in the environment and their dynamics of movements, methods of residue. Pharmacology of insect poisons. Mode of action of different groups of insecticides; neuroactive (axonal and synaptic) poisons, respiratory poisons, chitin synthesis inhibitors. Metabolism of insecticides; activative and degradative metabolism, detoxification enzymes and their role in metabolism. Selectivity of insecticidal actions; insecticide resistance; mechanism, genetics and management of insecticide resistance.

### **Unit 6: Host Plant Resistance-**

Chemical ecology: mechano and chemo receptors. Host plant selection by phytophagous insects. Secondary plant substances and their defenses against phytophagous insect. Basis of resistance (Antixenosis, Antibiosis, Tolerance). Biotypes development and its remedial measures. Tritrophic interactions, induced resistance. Breeding for insect resistant plant varieties. Resistance development and evaluation techniques. Genetics of Resistance: vertical resistance, horizontal resistance, oligogenic resistance, polygenic resistance. Role of biotechnology in development of transgenic insect resistant plants, its advantages and limitations. Case histories. Insect resistance to transgenic plants and its management.

### **Unit 7: Innovative Approaches in Pest Management-**

Behavioral control: pheromones- types and uses, advantages and limitations. Hormonal control: types and functions of insect hormones, insect hormone mimics, advantages and limitations. Chemosterilants, antifeedants, attractants, repellents; their types, method of applications, advantages and limitations. Genetic control: concepts and methods, advantages and limitations. Potentialities in IPM.

### **Unit 8: Integrated Pest Management-**

History, concept and principles of IPM. Components of IPM: Cultural, mechanical and physical methods, chemical methods, biocontrol agents utilization, genetic and behavioral control strategy etc. IPM strategies for field and horticultural crops. IPM case histories. Concept of damage levels- Economic Threshold Levels (ETL), Economic Injury Levels (EIL) and their determination. System approach, Agro ecosystem and cropping system vs. IPM. Constraints and Strategies of IPM implementation.

### **Unit 9: Pesticide Application Equipments-**

Types of appliances: sprayers, dusters, fog generators, smoke generators, soil injecting guns, seed treating drums and flame throwers, etc. Power operated sprayers and dusters. Types of nozzles and their uses. Maintenance of appliances. Aerial application of pesticides, principles of aerial application, factors affecting the effectiveness of aerial application. Equipments for aerial applications. Advantages and disadvantages of aerial application.

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### **Note :- Pattern of Question Paper**

- 1. Objective type paper**
- 2. Maximum Marks : 75**
- 3. Number of Questions : 150**
- 4. Duration of Paper : Three Hours**
- 5. All questions carry equal marks.**
- 6. Medium of Competitive Exam : Bilingual in English & Hindi**
- 7. There will be Negative Marking.**