Model Answers

MAHARASTRA AGRICULUTURE UNIVERSITIES EXAMINATION BOARD,PUNE

SEMESTER END THEORY EXAMINATION

B.Sc. (Hons.) Agriculture

Semester :	VI(New)	**Term:** II	**Academic Year:**2023-24
Course No:	ELE-SSAC-364	**Title:** Agrochemicals	
Credits :	3 (2+1)	**Time:**	
Day &Date:		**Total Marks:** 80	

Note: 1. Solve **ANY EIGHT** questions from **SECTION "A".**

2. All questions from **SECTION "B"** are compulsory.

3. All questions carry equal marks.

SECTION "A"

Q.1 a) Explain in detail methods of fertilizer application.

Ans: (Solid form –Broadcasting, localized Placement, Placement) 2 Mark
(Liquid form –Fertigation and Foliar application) 2Mark

b) Define fertilizers. Classify the phosphatic fertilizers with examples. 4 Mark

Classification of Phosphatic fertilizers: Phosphatic fertilizers are classified into three groups, depending on the form in .which orthophosphoric acid/phosphoric acid is combined with calcium.

1. Water soluble/Monocalcium phosphate: $Ca(H_2PO_4)_2$
   i) Single super-phosphate - 16% P_2O_5, ii) Double super-phosphate - 32 % P_2O_5
   iii) Triple super-phosphate - 48 % P_2O_5, iv) Ammonium phosphate - 11 %N + 52% P_2O_5
2. Citric acid soluble/Dicalcium phosphate ($CaHP0_4$)
   i) Basic slag,- 14 to 18 % P_2O_5, ii) Tricalcium phosphate - 34% to 39 % P_2O_5
   iii) Rhenania phosphate- 23 to 26% P_2O_5,.
3. Insoluble/Tricalcium phosphate- $Ca_3(PO_4)_2$Acid soluble
   i) Rock-phosphate- 20 to 40 % P_2O_5 ii) Rawbonemeal- 20 to 25 %10 P_2O_5
   iii) Steamed bone meal - 22 % P_2O_5

Q.2 a) Write advantages and disadvantages of agrochemicals uses in agriculture.

(Fertilizers, pesticide, insecticide, herbicide increase crop production and disadvantages its effect on soil, plant animal and humans).

b) Classify micronutrient fertilizers with suitable examples.

Iron (Fe)	Ferrous sulphate	20 % Fe
Zinc (Zn)	Zinc, sulphate	22 to 35 %
Copper (Cu)	Copper sulphate	25 to 35 %
Mangnese (Mn)	Mangnese sulphate	23 %
Boron (B)	Borax (Sodium	10.6 % B
Molybdenum(Mo)	Ammonium	52 % Mo

Q.3 a) Define bio-fertilizers and explain role of bio-fertilizers in agriculture.

a. Define bio-fertilizers 1 Mark

Different bio-fertilizers with role 3 Mark

(N fixing- Symbiotic & Non symbiotic) P Solublising, BGA, Azola, VAM)

b) Comments on the residual effect of herbicide..

Residual effect of herbicides 4 Marks

Points related to environmental toxicity, On Birds and Mammals, Human toxicology, Toxic Effects

Q.4 a) Write short note on handling and storage of fertilizers.

Fertilizers differ in their ability to become moist or hygroscopic, as such they have to be handled during rainy season. Main features from storage point of view are as below i. Ammonium chloride. Excellent, no difficulty in storage and handling ii. Ammonium nitrate. Storage properties satisfactory but fertilizer is hygroscopic. So bags are firmly tied. As it is fire hazardous handle carefully. It is bagged in polythene lined jute bags as it is hygroscopic iii. Urea Easy storage and handling Storage properties satisfactory. Hygroscopic, store in polythene lined jute bags in dry place. iv. Ammonium sulphate and sodium nitrate. Storage properties good, no difficulties in handling & storage.4 Mark

b) Define insecticide. Write plant originated insecticide nicotine and pyrethrum.

Definition of insecticide 1 Mark

Nicotine (Any three points) 1.5 Mark

Pyrethrum (Any three points) 1.5 Mark

Q.5 a) Give classification of fungicides with suitable examples.

Based of chemical nature:

I). Inorganic e.g. lime sulphur, elemental sulphur.

i) Copper: Cuprous chloride, Copper carbamel copper oxychloride, Bordeaux mix.

ii) Mercury: Mercuric chloride, mercurouschlo.

II) Organic fungicide:

a) Organo metallic: Organotins e.g. brestan and duter

i) Organomercurials – Phenyl mercury acetate

b) Thiocarbamates – I) Metallic dithiocarbamate;s e.g. Zibam, II)

Bisidithiocarbamate – e.g. maneb, zineb III) disulphide – e.g. thiram

c) Organophosphate – e.g. Hinosan, Kitazin – P, Aliette

d) Quinone – Chloranil, Dichlone.

e) Thiopenate – e.g. Thiophenatemethyl

f) Aeyl Alanine – e.g. Metalacyl, turalaxyl

g) Carboximide – Vitavax, folpet

h) Heterocyclic N compounds – Captain, Difolantan , bensat

b) Define agrochemicals. Write in short types of agrochemicals.

Definition - Agrochemicals.The science of chemical compositions and changes involved in the production, protection and use of crops and livestock. 1 Mark

Types of Agrochemicals. 3 Mark

1. Fertilizers, (Straight, Complex, Mixed)
2. Pesticides (Insecticide/fungicide/herbicide)
3. Plant growth regulator, (Phytohormons, Chemosterieants and Defoliants)

Q.6 a) Write down management of nitrogenous fertilizers for crop production.

ANS;-1. For paddy ammonical and ammonia forming fertilizers should be used.

2. For all other field crops, all nitrogenous fertilizers are equally effective,

3. On acid soils or soils low in lime/calcium continued use of ammonium sulphate, urea, ammonium chloride and amm. sul. nitrate should be avoided.

4. A nitrate fertilizers like $NaNo_3$- is not suited for top dressing and side dressing when growing crops need nitrogen immediately.

5. Since No_3- fertilizers can easily leached, they should not applied in large quantities in light sandy soils or during rainy season the entire recommended dose of N should applied in split doses.

6. In winter of rabi season, the N fertilizer should be selected on the basis of cheapness per unit kg of N as all N fertilizers are equally effective and loss of N due to leaching does not usually

b) Write classification of pesticides with suitable examples.

Classify pesticides with suitable examples.(any four) 4 Mark

Acaricides	-	Ticks and mites ex. Sulphur and lime sulphur
Algaecides	-	Algae and other aquatic vegetation Ex. Copper sulphate
Antiseptics	-	Non metals from microorganisms
Arboricides	-	Undesirablevegetative part and bushy vegetation Ex. Sulphuracid, Copper sulphate
Bactericides	-	Bacteria and bacterial diseases Ex Bordeaux mixture
Herbicides	-	Control of weeds Ex. 2-4-D, 2-4 5-T, Diurea
Molluscides	-	Climacides – soft bodied insects like snails and slug ex. Mataladehyde
Nematicides-		Control of nematode Ex. Methyl bromide and other fumigants
Zoocides	-	Control of rodents
(Rodenticide)	-	Ex. Zinc phosphate, vartrin
Pesticides	-	To kill the fish Ex. Rotenone

Q.7 a) Give classification of herbicide based on mode of action with suitable examples.

1. Respiration and mitochondrial activities. 2. Photosynthesis 3. Nucleic acid metabolism
4. Synthesis of hydrolytic anzyme with example of each 4 marks

b) How symbiotic nitrogen fixations take place in soil?

(N fixing in soil –The process by which gaeous elemental N is chemically combined with H to farm NH_4 symbiotic and Non symbiotic nitrogen fixation takes place in soil by soil micro organisms. Clay minerals like montmorilonite, elite and vermiculite fixes NH_4 N on soil. 2 Mark

Symbiotic N fixation – The bacteria which leaves in symbiotic association with the host plant (legumes) and fixes N in rood nodules belonging to genius *rhizobium* N fixed by legume bacteria how by legume plant or may pass into soil secondly for example soybean, groundnut 2 Mark

N can be fixed in soil by contain free bacteria i.e. blue green algae and same fungi the *Azothobacter* and *Clostridium* these two types of species play and prominent role in this process. The grater part of the N gain by soil is acquired through may residues organic manures and N fertilizers.

Q.8 a) Comments on insect growth regulator (IGR) and biopesticide. 4 marks

Insect growth regulators (IGRs) are pesticides that don't usually kill insects outright but instead affect the ability of insects to grow and mature normally. IGRs either block the insect's ability to turn into an adult or cause it to change into an adult before it is physically able to reproduce.

A biorational pesticide is a term used to define any pesticide material that relatively causes no harm to humans or animals, and does lit tle or no damage to the environment. An example of a biorational pesticide is citronella products.

Biopesticide: It is define according to the US environmental protection Agency(USEPA) are pesticide derived from natural matrials such as animals ,.plants, bacteria and minerals and also include living organisms that destroy agricultural pests.

These are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides.

Attend to be highly targeted to specific pests. Because they are so targeted, they are generally considered to be more environmentally friendly than synthetic agrochemicals.

b) Discuss insecticide resistance and its management 4 Mark

Resistance – A genetic change in an organism in response to selection by insecticide ,pesticides, which may impair control in the field.

Use an integrated approach, Protect beneficial organisms, Use recommended application rates, Rotate unrelated compounds, Use mixtures with caution, Use synergists with caution, Use non-specific products, Apply products with care, Monitor problematic pests

Q.9 a) Write in short about mode of action of organophosphate insecticide takes place.

Organophosphate insecticides affect the enzyme choline esterase (ChE) which is responsible for removal of acetyl choline (Ach) present in synapse (gap between nerve cell). This results in to continuous transmission of nerve impulses and loss of coordination of nerves and other organs giving rise to rapid twitching of voluntary muscles and finally paralysis of vital organs including langs. Thus failure of respiration due to paralysis of lungs is the main cause of death. The reaction of inhibition of choline – esterase is irresersible so OPS are more total compared to carbomates. 4 Mark

b) Write about fertilizer control order and insecticide act.

ANS: Fertilizer control order: An order issued by the Government of India under powers conferred by Section 3 of the Essential Commodities Act 1955, under the powers, the Government controls the production, marketing, price and quality of fertilizers. There are 39 Clauses of this order covering definitions, prices, registration of dealers and fertilizer mixtures, regulation on manufacture cell packing requirement, disposal of non-slandered fertilizers, enforcement authority, analysis of samples, etc. The schedule I of the order includes detailed specifications of fertilizers covered by it. In schedule II detailed procedure regarding sampling technique and methods of analysis is given. 2 Mark

Insecticide Act: The main objective of the Insecticide Act is to regulate the import, manufacture, safe transport, distribution and use of insecticides with a view to prevent risk to human beings, animals and for matter connected herewith. All the praisions of the Insecticide Act were brought into force with effect from 1st August, 1971, which was passed in 1968. Due to legal reasons, the act was called Insecticide Act and not pesticide Act under Section 93 (C) the word insecticide means. (1) Any substance specified in the schedule. (2) Any other such substances including fungicide and weedicides may be included after consolation with the board and central Government. (3) Any preparation containing one or more of such substances. Salient features of the Insecticide Act Functions of Central Institute Board Registration Committee, Registration Procedure, Provisional Registration under Section 9(3B), Regular Registration under Section 9(3) of the Act Date requirement for repeat registration under section 9(4).2 Mark

Q.10 a) Define Benzimidazole fungicide. Write their chemical nature and their use.

ANS. Define Benzimidazole fungicide. Benzimidazole fungicide are a class of fungicides including benomyl, carbendazim (MBC), thiophanate-methyl, thiabendazole and fuberidazole. 1 mark
Write their chemical nature .

Chemical nature: The solubility of benzimidazole fungicides is low at physiological pH and becomes high at low pH. In plants, carbendazim, thiabendazole and fuberidazole are mobile, i.e. systemic, and benomyl and thiophanate-methyl are converted to carbendazim. This conversion also occurs in soils and animals. In soil and water, carbendazim is mainly degraded by microbes. They are metabolized through hydrolysis and photolysis in plants. These fungicides kill cells during mitosis by distorting the mitotic spindle; β-tubulin, a protein important in forming the cytoskeleton, is targeted. They mostly inhibit polymerization of β-tubulin by interacting with it directly, but other interactions also exist. 2 Mark

Use : They can control many ascomycetes and basidiomycetes, but not oomycetes. They are applied to cereals, fruits, vegetables and vines, and are also used in postharvest handling of crops. 1 mark

b) What is complex fertilizers? Give its advantages.

Complex fertilizers: The commercial fertilizers containing at least two or more of the primary essential plant nutrients (N, P, K) are called complex fertilizers. 1 mark

Advantages:

They supplement naturally available nutrients in the soil and also provide additional nutrients that are required for specific types of crops.
A distinct advantage of compounded NPK fertilizers is that they can be formulated based on the type of crop and soil.

SECTION "B"

Q.11 Match the pairs

Ans: 1) f 2) e 3) g 4) a 5) h 6) b 7) c 8) d

Q.12 Do as directed.

1. Give the example Secondary nutrients. . **Ans**; Ca,Mg and S
2. Name fungicide used in agriculture. **Ans**: Sulpher, lime ,copper or any one
3. State two examples of herbicides. **Ans**: :2-4-D, 2-4-5-T
4. $NaNO_3$ is not suited for top dressing and side dressing when growing crop need N immediately. **Ans: True**
5. **Ans** Carbamate insecticides are esters of **Carbamic** acid.(Fill in the blank.)
6. Insecticide act was passed in 1968 brought into force in India in the year **1971** (Choose the correct answer)
7. Write the examples of Potassic fertilizers? **Ans**: KCl and K_2SO_4
8. In which year toxicity of pesticide to humans was occurred at Bhopal, India?Ans:**1984**

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