

**कृषि के लिए उपयोगी विज्ञान एवं गणित तत्व**  
**(Elements of Science Mathematics Useful for Agriculture) Ag-1 (50 Marks)**

**I. AGRIL PHYSICS:**

**(10 Marks)**

1. Principle of Archimedes, Floating bodies density and relative density, determination of R.D. by Hydrometers.
2. Atmospheric pressure. Fortins barometer and its relation to weather condition manometer.
3. Pumps-Force and Vacuum pumps, syphon suction pumps.
4. Friction-Laws of Friction, angle of friction, coefficient of friction and its determination, advantages and disadvantages of friction.
5. Machines- simple machines such as plane, lever, pulley, Simple wheel, their construction, and working mechanical advantages, Velocity ratio efficiency of machine.
6. Gravitation and gravity: Relation between 'G' and 'g' simple, Harmonic motion Simple pendulum, law of gravitation.
7. Unit of heat, Specific heat, thermal capacity, water equivalent of heat, determination of Specific heat of solid and liquid, latent heat, determination of latent heat of ice and steam.
8. Transmission of Heat-Conduction, Convection and Radiation, Conductivity, good and bad conductor, Newtons law of cooling-simple idea.
9. Light, Rectilinear, propagation of light, Shadow and eclipse, pinhole camera, reflection through Prism, Dispersion of light, dispersive power spectrum, their type, spectrometer.
10. Optical instruments. Human eye, its defects, photographic camera, simple and compound microscope, Telescope.
11. Magnetism Magnetic field, intensity of magnetic field, lines of forces: neutral point, couple acting on magnet placed in a uniform magnetic field. Magnetic movement of magnet. Tangent law and its limitation.
12. Electric charge - Electric potential, electric field and its intensity due to a point, potential inside a conductor.
13. Electrical capacity, its unit, its value for a Spherical conductor, principle of condensers capacity of spherical and parallel plate condenser.
14. Ohms law. Resistance, grouping of resistance, Electromotive force and potential difference, potentiometer its principle, comparison of EMF of two cells by potentiometer.
15. Elementary idea of heating effect of Current, Joule's law, Determination of 'j' by Joule's Calorimeter, elementary idea of the house wiring electric iron, Electric power and energy.

**II AGRIL. CHEMISTRY :**

**(15 Marks)**

1. Atomic Structure : Bohr's atomic model Distribution of Electrons according to Bohr-Bory Rules, Radio activity and atomic disintegration.
2. Chemical Bonds: Characteristic of electrolyte, Covalent and co-ordinate Bonds.
3. Ionic Theory : Uses of ionization, Solubility product, Hydrolysis, neutralization, Ionic product of water, Determination of pH. Buffer Solution. Nutritional Importance of Soil pH.
4. Colloids: Lyophilic and Lyophobic, properties of colloids, colloids, colloidal solutions, protective colloids, Gold number, soil colloids clay and humus.
5. Introduction of important minerals present in soil and their chemical composition.



6. Chemical Fertilizers Manufacture of different Fertilizers of N.P.K. and their utilization. Micronutrients.
7. Volumetric analysis Strength of solution, normality, Molarity, determination of equivalent weight of acid, base and salt.
8. Introduction to Organic Chemistry, Determination of empirical, molecular and structural formula of simple organic compounds.
9. Classification and nomenclature of organic compounds, Isomerism.
10. Saturated and unsaturated Hydrocarbons, Methane, Ethylene, Acetylene, Chemistry of Gobar Gas.
11. Fermentation, Ethyl alcohol. Aliphatic carboxylic acid-Acetic acid, urea.
12. Oil and fats, Extraction, Composition and properties. Manufacture of soap, Vanaspati ghee, use of oil in paints.
13. Elementary Biochemistry, Carbohydrates. Proteins, Lipids, Vitamins and Enzymes.

### III AGRIL. MATHEMATICS :

(10 Marks)

1. Arithmetic progression : Definition, formula to find the nth term. Formula to find, sum off n terms. Definition of arithmetic mean. Insertion of given number of means between two given quantities. Finding of remaining quantity when any three of S, a, d, n are given.
2. Geometric Progression : Definition, Formula to find the nth term, geometric mean insertion of geometric means between two given Quantities-Finding of remaining quantity when any three of k, s, a, n, are given.
3. Logarithms and Common Logarithms : Definition logarithm of product division of number raised to any power, characteristics of the logarithm of any number greater than unity. Characteristics of the Logarithm of decimal fraction.
4. Trigonometrical functions of angles of any size and sign. Trigonometrical ratios of an, angle (90+) (180+)
5. Trigonometrically ratio of the sum and difference of two angles. Geometrical proof for Sin (AB) Cos (AB) product formula for Sin C, Sin D, Cos C, Cos D
6. Statistics : Calculation of mean, mode median and standard deviation, variance and mean deviation for grouped data using various formula

### IV AGRIL. BOTANY ZOOLOGY:

(15 Marks)

1. Plant anatomy, (i) Root-Structure and Functions (ii) Stem-Structure and Functions (iii) Leaf Structure and Functions.
2. Agril Botany Zoology : Classification of plants. (i) Outline of classification of plants, (ii) study of the Following families, (a) Compositeae (b) Leguminosae (c) Cucurbitae (d) Solanaceae. (e) Malvaceae (f) Cruciferae (g) Gramineae.
3. Plant Breeding and genetics, (i) Definition of Genetics and plant breeding and role of Genetics in plant breeding (ii) Cell-its structure and cell division (iii) Principle of inheritance, (iv) Self and cross pollinated crops, (v) Methods of breeding field crops.
4. Plant Physiology - (i) Respiration, types Function, (ii) Photosynthesis (iii) Transpirations (iv) Plant growth and development. Animal Kingdom- (i) Classification- of animal kingdom, (ii) Useful and harmful - insects of agriculture- Silk-worm, Honey bee, LAC insect, Termites, Grass hopper, grass caterpillar Anatomy and physiology Elementary internal anatomy of grass hopper, earthworm and cockroach with reference to digestive, Respiratory and reproductive system.



## CROP PRODUCTION AND HORTICULTURE (Ag. 2) :

(50 Marks)

1. (i) Introduction and activities of agriculture and crop production, (ii) Importance of crop production in National Economy (iii) Different Branches of Farming and their importance.
2. Soil and Soil Fertility : (i) Soil and its constituents (ii) physical properties of Soil-Soil texture and Structure porespace, specific gravity, plasticity, cohesion and soil temperature (iii) Formation of soil-classification of soil in C.G. and their characteristics (iv) Soil corrosion its kinds, their causes and control, measures of soil conservation (v) Soil acidity and alkalinity and their reclamation, soil-pH.
3. Tillage : (i) object of tillage, tillage operations, ploughing, leveling, harrowing, intercultivation (ii) Tillage implements, country plough improved ploughs, harrows and cultivators, threshers, winnowers and seed drills, tractor driven implements.
4. Manures and Fertilizer : (i) Essential elements for plant growth (ii) Description and uses of organic manures F.Y.M. Compost green manures (iii) Different Nitrogenous, phosphate and potash fertilizers, properties and uses.
5. Production of crops : (i) Classification of crops according to seasons and economic classification (ii) Cultivation of Kharif crops-jowar, Maize, Groundnut, Cotton, Paddy, Soyabean, Arhar, Urad, Moong (iii) Rabi crops- Wheat, Linseed, Mustard, Sugarcane, Gram, Barely under following heads 1. Preparation of land 2. Sowing operation 3. Seed rate per hectare 4. Manures and fertilizer 5. Irrigation 6. Intercultural and weeding 7. Improved varieties 8. Yield per Hectare 9. Disease : pests and their control.
6. Irrigation and Drainage : (i) Object of irrigation and drainage (ii) Sources of irrigation and drainage (iii) Method of irrigation and drainage (iv) Water requirements of crops (v) Duty and Discharges of water, (vi) Common water lifts. Diesel and electric pumps.
7. Weed and weed control.
8. Cropping scheme, importance of principles of: (i) Crop rotation (ii) Principle cropping. (iii) Mixed-and inter cropping (iv) Dry farming (v) Cooperative farming.
9. Elementary Surveying-importance of surveying. Elementary survey with the help of chains, instruments used in survey as optical square, cross staff, offset rod, dumpy level, recording of field book.
10. Introduction (i) Importance and scope of Horticulture (ii) Pomology-location and layout, (iii) Planting system Trimming, pruning, inter-Cropping, winds, breaks, protection from frost and sunburn (vi) Care maintenance and rejuvenation of fruit, orchards.
11. Vegetable Gardening (i) Kitchen gardening (ii) Cultivation of Radish, Carrot, cole crops, onion, Brinjal, Chilies, Tomato, potatoes.
12. Fruit cultivation (i) Vegetative propagation-Budding, inarching and Goottee cutting, Grafting and Layering (ii) Cultivation of papaya, Banana, Grapes, Mango, Guava and Citrus fruits.
13. Ornamental Gardening (i) General Cultivation of Winter and Summer season annuals (ii) Ornamental and flowering plants, Trees, Shrubs, Climbers, hedges and Hedge plants, (iii) Common ornamental and flowering plants e.g. Rose, Carina and Chrysanthemum (iv) Preparation and maintenance of Lawns.
14. Fruit and Vegetable preservation- Canning and bottling Technique (i) Simple canning and bottling techniques, use of suitable containers like aluminized plastic and paper (ii) Washing, Blanching and peeling of fruits and Vegetables, trading of fruits for canning.
15. Preservation of Fruits and vegetables (i) General principles and methods of fruit and vegetable preservation (ii) processing by heat, preservation by antiseptic drying, preservation by fermentation. dehydration and packing (iii) preparation of Jelly, lime squash and Tomato sauce.



16. Rural Finance (i) Cultivator's Finance needs for farmers (ii) Sources of credit (iii) Organisation of Rural Cooperative credit and marketing societies.
17. Agriculture Business planning and Management (i) Inventory of farm resources (ii) Identifying family assets and liabilities (iii) Maintenance of farm Records and Accounts.

**पशुपालन एवं कुक्कुट पालन के तत्व**

**Elements of Animal Husbandry and poultry Farming (Ag-3) (50 Marks)**

- (A) 1. Introduction - (i) Importance of Live stock in Indian Economy (ii) Body Parts of cow and buffalo and description of important systems; respiratory digestive, reproductive, secretion of milk.
2. Improved Cattle Breeds - (i) Cow (ii) Buffalo (iii) Goat and (iv) Sheep.
3. Care and management of Cattle - (i) Animal Hygiene (ii) Cattle housing - sheds for bullocks, bull milch cattle etc. (iii) Special attention for rearing of calves, pregnant and milch cattle, working bullocks and bull.
4. Breeding of cattle - (i) Breeding : Line breeding and cross breeding, Mendel's laws of breeding. (ii) Artificial insemination in cattle with examples.
- (B) 5. Dairy Farming - (i) General idea regarding dairy farming as a business in village and town conditions, requirement of land, labour, capital, management techniques (ii) Scope of dairy farming - white revolution in India.
6. Milk production- (i) Different methods of milking, (ii) Principles of clean milk production, (iii) Factors affecting quality of milk.
7. Composition of milk- (i) Definition of Milk (ii) Milk constituents, (iii) composition of Milk Factors affecting composition of milk.
8. Physical properties of milk - (i) Temperature (ii) Boiling Freezing point (iii) pH (iv) Density (v) Sp. Gravity, Use of lactometer (vi) Gerber's method for fat test.
- (C) 9. Feed and Feeding (i) principles of Feeding of dairy cattle, (ii) Different types of feeds and fodders and their nutritive values-kharif and Rabi fodders; Hay and Silage crops (iii) Preservation of , fodders : making of silage, hay silopits. (iv) Computation of balanced ration of cows, buffaloes, bullocks, bulls goats and sheep.
10. Judging of Cattle (i) Importance of Judging, (ii) Judging method Score card method and on the basis of body parts, (iii) Judging the age of cattle by rings on the horn and by the teeth development.
11. Dairy appliances - (i) Construction of appliances and their cleanliness (ii) working of cream separator and its parts. Butter churner, Butter worker.
12. Milk products - (i) Preparations of Cheese, Gream, Ravri, Dahi, flutter, Ghee, Condensed milk, Milk powder and their composition.
13. Common diseases of Cattle- (i) Symptoms of sick Animals (ii) Symptoms of different diseases.Rinderpest. Foot and Mouth disease, Blackquarter, Haemorrhagic Septicaemia, Anthrax and piroplasmosis; (iii) Their prevention and control measures.
14. Poultry Farming- (i) Introductory, (ii) Scope and limitation of Poultry Farming (iii) Important breeds of poultry for eggs, meat, (iv) Hatching of eggs and uses of incubator.
15. Housing and ration for poultry birds- (i) Poultry sheds, layout model sheds, (ii) Ration of poultry bird Chicken, Grower, Layers arid Broilers.
16. Diseases of Poultry - (i) Preventive control measures, (ii) Bacillary. White diarrhoea, Ranikhet, Coccidiosis, Fowl Pox, Fowl, cholera, Ecto and endoparasites.