ASRB NET Agronomy Sample Paper

Q1. Buckling and Bending are the most damaging in crops:
(a) Maize
(b) Sorghum
(c) Finger millet
(d) Sugarcane

Q2. Identify the wrong statement in the case of paddy production:
(a) LAI of low-land rice is less than that of upland rice
(b) Japonica rice varieties require low temperature for better ripening
(c) Indica rice varieties are well adapted to high-temperature
(d) There is a negative correlation between plant height and harvest index in rice

Q3. Carbon requirement of plant is met by absorbing:
(a) Carbon from soil organic matter
(b) Cabon from soil minerals
(c) Carbon dioxide from atmosphere
(d) None of these

Q4. Which of the following criteria of irrigation scheduling is more acceptable to farmers:
(a) Soil moisture tension
(b) Pan evaporimeter
(c) Water potential of plants
(d) Critical growth stages

Q5. Production is maximum for Sorghum when the depletion of available soil moisture at root zone is _____%.
(a) 25%
(b) 50%
(c) 75%
(d) 8250%

Q6. Crop logging is a technique used in sugarcane and it helps in:
(a) Determination of sugar status of the plant
(b) Cutting of Sugarcane into logs
(c) Falling of plants horizontally on the ground
(d) None of these

Q7. Triazine herbicide are said as notorious herbicides because of there:
(a) Fast decomposition
(b) Long residual toxicity
(c) Non-selectiveness
(d) All of these

Q8. Organic carbon content in the soil is the measure of:
(a) Total soluble N
(b) Organic form of N
(c) Available N
(d) None of these

Q9. Mode of action for bypridilium group of herbicides is mainly through inhibition of:
(a) Electron transfer
(b) Carbohydrate diffusion
(c) Hill reaction
(d) Cell division

Q10. Plant which grows on another plant but does not secure nourishment from it:
(a) Epiphyte
(b) Dendrophyte
(c) Parasite
(d) Facultative Parasite

Q11. The dry weight of parthenium in control plot and treated plot is 800 and 400 g/m^2, respectively, what will be the weed control efficiency?
(a) 200%
(b) 50%
(c) 150%
(d) 75%

Q12. Safe irrigation water should contain boron concentration less than:
(a) 4 ppm
(b) 6 ppm
(c) 5 ppm
(d) 2 ppm

Q13. National Fertilizer Limited (NFL) is situated at:
(a) Bharuch, Gujarat
(b) Nangal, Punjab
(c) Borkheda, Kota
(d) Dasral

Q14. Enzyme responsible for conversion of 2,4-DB to 2,4-D in same plant is:
(a) Beta reductase
(b) Beta oxidase
(c) Nitrate reductase
(d) Both (a) and (b)

Q15. Which of the following Taungya system is highly successful:
(a) Departmental taungya
(b) Leasing taungya
(c) Village taungya
(d) Social taungya

Q16. Statements:
1. Single-cut varieties are harvested at 50% flowering.
2. CSH-101 is a hybrid of sorghum suitable for both forage and grain purposes
3. The seed rate of single-cut hybrids and multi-cut hybrids are the same.
4. Multicut varieties need more nutrients than single-cut varieties.
Choose the correct answer:
(a) 1, 2, and 4 are true
(b) 1, 2, 3 and 4 are true
(c) One, but none are true
(d) 1, 3 and 4 are true

Q17. Iron deficiency in plants starts when its concentration is:
(a) <65 ppm
(b) <71 ppm
(c) <75 ppm
(d) <55 ppm

Q18. Pick the odd one out of the following:
1. Retting: Process of separating fibre from bark
2. Ribboning: Peeling of raw bark of jute from green plant immediately after harvesting and retted
3. Degumming: Decorticated fibres extracted by chemical retting
4. Steeping: Submergence of Jute bundles in water
(a) Only 2 is true
(b) 1 and 2 are true but 3 and 4 are wrong
(c) 1, 2, 3 and 4 are true
(d) 1, 2 and 3 are true

Q19. Leucaena leucocephala on an average fix about _____ Kg N/ha.
(a) 100
(b) 120
(c) 150
(d) 200

Q20. In the field layout of an RBD design, the blocks are formed in the direction:
(a) Parallel to fertility gradient
(b) Perpendicular to fertility gradient
(c) It can be either (a) or (b)
(d) It cannot be determined based on the fertility gradient, as it is decided by scientists based on the nature of the experiment.

Q21. Indian journal of agriculture is published by:
(a) ICAR
(b) ICRISAT
(c) IIHR
(d) IARI

Q22. Technique used for minimizing the loss of nitrogen paddy field is:
(a) Use of slow releasing N fertilizers
(b) Use of mud ball
(c) Use of pre-incubated urea
(d) All of these

Q23. The presence of acid on leaves gram makes it beneficial for a stomach ailment is:
(a) Malic acid
(b) Oxalic acid
(c) Both (a) and (b)
(d) Citric acid

Q24. In plants, water absorption from soil into the roots can occur through different pathways. Which of the following process involves symplastic transport:
(a) Movement of ions through the casparian strip
(b) Diffusion of water through aquaponics
(c) Transfer of water and solutes through plasmodesmata
(d) Guttation through hydathodes

Q25. Which seed treatment is preliminary used to protect seeds from fungal and bacterial infection during storage and after sowing?
(a) Heat treatment
(b) Fungicide coating
(c) Scarification
(d) Osmoconditioning

Q26. Seed rate of cotton would be _____ kg/ha, if planting geometry is 1 m × 1 m, test weight is 100 g and Germination percentage and purity percentage is 90.

(a) 2.23
(b) 1.23
(c) 3.23
(d) Can't be determined

Q27. Direct use of living plants for remediation of contaminated soil, ground water, surface water, and sludge through removal, degradation or confinement of contaminants is known as:

(a) Biomagnification
(b) Biopharming
(c) Biodrainage
(d) Phytoremediation

Q28. Base rich >50%, deep, high organic matter nutrient enriched surface soil. These are features of soil order:

(a) Gelisol
(b) Inceptisols entisol
(c) Vertisols
(d) Mollisols

Q29. Adequate soil moisture is essential for optimum productivity of black gram at the stage of:

(a) Branching and Pod development
(b) Preflowering and seed filling
(c) Flowering and pod filling
(d) Pre-flowering and Pod filling

Q30. A seal or logo certifying that a product has met a set of environmental and social standards is:

(a) Green label
(b) Eco-label
(c) Green certification
(d) Sustainability index

Q31. In Universal Soil loss equation, A = R K L S C P, S stands for:

(a) Soil erodibility
(b) Soil Erosivity
(c) Soil Cover
(d) Soil Steepness

Q32. Which of the following phosphatic fertilizer soluble in citric acid but insoluble in water _____.
(a) Nitrophosphate
(b) SSP
(c) DAP
(d) Basic slag

Q33. The cane crop is said to be matured when purity % of juice is:
(a) Over 75%
(b) Over 80%
(c) Over 85%
(d) Over 90%

Q34. Type soil texture with Illite as clay mineral, which is a non-expanding clay mineral?
(a) Laterite
(b) Red soil
(c) Black soil
(d) Alluvial soil

Q35. The erosion of soil particles between 0.1 to 0.5 mm dia by wind through bounces/jumps is termed as:
(a) Suspension
(b) Surface creep
(c) Ballistic movement
(d) Saltation

Q36. pF scale through which we measure the force with which water is retained in capillary of soil. pF value of PWP:
(a) 2.53
(b) 4.18
(c) 4.53
(d) 6

Q37. What is the sulphur percentage in Ammonium sulphate having equivalent acidity of 128:
(a) 20.60%
(b) 22%
(c) 24%
(d) 16%

Q38. Split-plot design is a sort of:
(a) Confounded design
(b) Partially nested design
(c) Both (a) and (b)
(d) Either(a) or (b)

Q39. The earthworm that is considered as surface dwellers and live near the soil surface is called as:
(a) Endogenic
(b) Epigenic
(c) Anecic
(d) Geophagous

Q40. Which of the following weed has highest N content:
(a) Argemone mexicana
(b) Eclipta alba
(c) Melilotus alba
(d) Amaranthus viridis

Q41. Iron helps in the synthesis of chlorophyll to activate nitrogenase enzyme and BNF. Which micronutrient helps in urea hydrolysis?
(a) Cl
(b) Mn: 0.5 mg/kg
(c) Fe
(d) Ni

Q42. How much MOP will be required to supply 50 Kg potash/ha:
(a) 53.0 kg
(b) 93.0 kg
(c) 140 kg
(d) 83.5 kg

Q43. The optimum sowing period of field peas is:
(a) First week of September to last week of October
(b) First week of December
(c) First week of October to Last week of November
(d) End of October to the first fortnight of November

Q44. Calcium helps in cell wall formation, to neutralize the organic acid and activates enzyme phosphate and kinase. Interveinal chlorosis on older leaves is due to:
(a) Fe
(b) Zn
(c) Cl
(d) Mg

Q45. Which of the following is non-silicate secondary mineral?
(a) Quartz
(b) Montmorillonite
(c) Feldspar
(d) Gypsum

Q46. Statement:
1. Organic matter in soil encourages the herbicide persistence in soil.
2. Non-ionic herbicides like EPTC are adsorbed less on dry than wet soil.
(a) Both are true
(b) Both 1 and 2 false
(c) Only 2 is true
(d) Only 1 is true

Q47. In the Munsell colour chart, Chroma represents:
(a) Lightness or darkness of the soil colour
(b) Purity or strength of colour
(c) Dominant spectral colour
(d) Soil organic content

Q48. Which seed vigor test measures the ability of seeds to withstand adverse environmental conditions and still produce healthy seedlings:
(a) Chilling test
(b) Accelerated aging test
(c) Cold test
(d) None of these

Q49. How many ATP molecules are net gained from breakdown of one molecule of glucose during the process of glycolysis:
(a) 1
(b) 2
(c) 4
(d) 6

Q50. The green revolution leads to the production of food grains basically paddy and wheat, golden revolution is phased out in similar pattern for the production of?
(a) Vegetables
(b) Medicinal plants
(c) Flower crops
(d) Fruits

Q51. If an irrigation water source has the concentration of Sodium, Calcium and Magnesium in their ionic form are 40, 8 and 10 m eq. per litre respectively, then Sodium adsorption ratio of this water is:
(a) 6.67
(b) 5.76
(c) 13.33
(d) 15.67

Q52. Ideal time to schedule irrigation to Soybean when depletion of available soil moisture level (%) is:
(a) 25
(b) 60
(c) 65
(d) 75

Q53. What is the oil percent present in Cotton oil seed?
(a) 10–15%
(b) 15–20%
(c) 15–25%
(d) 25–30%

Q54. Which of the following nutrient become limiting factor at very low pH?
(a) Aluminium
(b) Ferrus
(c) Nitrogen
(d) Phosphorus

Q55. One acre inch of water is equivalent to _____ litres of water.
(a) 126800
(b) 14000
(c) 180000
(d) 102800

Q56. Maggots move to the dorsal surface of leaf, reach the base of the seedling and bore into axis destroying the growing part. The damage results in formation of dead heart and production of side/secondary tillers?
(a) Sorghum stem borer
(b) Sorghum shoot fly
(c) Sorghum midge
(d) Sorghum early shoot borer

Q57. The identified critical stages of irrigation for sunflower are:
(a) Rosetteing and stem elongation
(b) Rosette and flowering
(c) Flowering and grain filling
(d) Stem elongation and flowering

Q58. Respected Prime Minister, Govt. India launched 'Namo Drone Didi' program to provide drone to _____ SHGs during the period of 2024–25 to 2025–26 for providing rental services to farmers for agriculture purposes.
(a) 5000 women
(b) 10000 women
(c) 15000 women
(d) 20000 women

Q59. Which of the following is an example of upright growth of stems, where the stem grows opposite to gravity, often resulting in plant growing vertically towards the light:
(a) Phototropism
(b) Positive geotropism
(c) Negative geotropism
(d) Thermotropism

Q60. In an intercropping system, the maize and blackgram yield was obtained 1800 and 500 kg/ha, where sale price was Rs.12 and 60/kg respectively. Find out maize equivalent yield (kg/ha).
(a) 3500
(b) 4300
(c) 4200
(d) 5300

Q61. Organic matter that is well decomposed and digested by many kinds of soil microorganisms and converted into fairly stable, amorphous, brown to black material is termed as:
(a) Compost
(b) Manure
(c) Peat
(d) Humus

Q62. _____ refers to demonstration of identified crops and their varieties so that the farmers may select right plant type based on their liking.
(a) Crop demonstration
(b) Crop Cafetaria
(c) Front line demonstration
(d) Result demonstration

Q63. Method of retting provide highest quality flax fibre and produces least pollution is:
(a) Pond retting
(b) Stream retting
(c) Plastic retting
(d) Field retting

Q64. Morphine content (On dry basis) in opium latex varies between:
(a) 0.1 to 0.8%
(b) 2.5 to 3.5%
(c) 5.5 to 7.5%
(d) 8.0 to 14.0%

Q65. The forests managed to clear the needs of the local population for small timber, bamboo for agriculture _____ etc. is referred to as:
(a) Agroforestry
(b) Extension Forestry
(c) Social forestry
(d) Community Forestry

Q66. The part of added K which is firmly bound by the soil and not immediately replaceable with neutral salts is called as:
(a) Water soluble K
(b) Exchanged K
(c) Fixed K
(d) Lattice K

Q67. Which types germinate quickly and develop a large canopy, capable of efficient photosynthesis within a short period?
(a) Catch crops
(b) Augment crops
(c) Erosion resistant crops
(d) Smother crops

Q68. In general, plants having less than _____ Phosphorous are designated as P deficient?
(a) 0.10%
(b) 0.25%
(c) 0.50%
(d) 1.00%

Q69. US Classification of soybean is based on:
(a) Colour of seed coat
(b) Shape of seed
(c) Size of seed
(d) Maturity

Q70. Which of the following is logarithmic expression of the forces with which water is held in soils expressed in terms of height of water column (cm) required to produce equal tension

(a) Water potential
(b) pF
(c) pH
(d) Metric potential

Q71. Which among the following crop is having low water use efficiency:

(a) Sorghum
(b) Rice
(c) Wheat
(d) Maize

Q72. From energy point of view, mulching is the application or creation of soil cover that constitutes a barrier to the transfer of heat or water vapour, what is the impact of aluminium foil mulch on soil?

(a) Sharply increases outgoing temperature
(b) Reduces outgoing temperature
(c) Cooling effect
(d) Both (a) and (c)

Q73. Cropping intensity of maize-potato-wheat is:

(a) 100%
(b) 200%
(c) 300%
(d) 400%

Q74. Which of the following type of rocks are characterized by non-laminar massive structure and on the whole make up 95% of earth crust. They are source of parent materials for the other rocks?

(a) Sedimentary rocks
(b) Igneous rocks
(c) Metamorphic rocks
(d) None of these

Q75. DAY-NLRM, Ministry of Rural Development, provides Revolving fund (RF) support as corpus ranging between _____ per SHG.

(a) Rs.5000 – 15000
(b) Rs.35000 – 40000
(c) Rs.20000 – 30000
(d) Rs.15000 – 25000

Q76. Hydraulic conductivity of a soil is defined by _____.
(a) Bernoulli's law
(b) Darcy's law
(c) Reynolds number
(d) Stoke's Law

Q77. What is the real value of seed when viability is 90% and germination percent is 80%?
(a) 52
(b) 72
(c) 62
(d) 92

Q78. Rainfed wheat Idiotype was given by:
(a) Setwart
(b) Donold
(c) R.D Asana
(d) De Wit

Q79. Which among the following is not an assumption of ANOVA?
(a) Population should be normally distributed
(b) Treatment effect and environmental effect are independent
(c) Independent experimental error
(d) Homogeneity of variance

Q80. Pick the odd one out of the following options:
(a) Cowpea: India
(b) Chickpea: South West Asia
(c) Lethyrus: South Europe and West Asia
(d) None of these

Q81. Number classes in the frequency distribution will be about:
(a) 25
(b) 30
(c) 35
(d) 10

Q82. Most commonly used micro-organism in bioherbicides is:
(a) Bacteria
(b) Fungus
(c) Nematodes
(d) Virus

Q83. Which test is used to test significance of a mean difference of paired observations?
(a) T-test
(b) Paired t-test
(c) Z-test
(d) F-test

Q84. What is the trade name of Metoxurn?
(a) Glean
(b) Dosanex
(c) Pinnacle
(d) Terpedo

Q85. Calculate the LER when sole crop yield is 50 and 40 q/ha and intercrop yield is 20 q/ha and 10 q/ha in intercropping system.
(a) 0.65
(b) 1.3
(c) 1
(d) 1.6

Q86. The Safener/antidote used in maize against Alachlore and Metalochlor.
(a) NA
(b) R-25788
(c) R-29148
(d) R-33865

Q87. Detoxification of Phenoxy herbicides in cereals is due to:
(a) Conjugation with protein molecule
(b) Conjugation with glucose
(c) Conjugation with microtubulin
(d) Conjugation with lipids

Q88. Devine is available in which formulation?
(a) WP
(b) SL
(c) Liquid
(d) Granular

Q89. Persistence of Diuron, Monouron, and Fenuron in soil is the sequence:
(a) Diuron > Monouron > Fenuron
(b) Monouron > Fenuron > Diuron
(c) Monouron > Diuron > Fenuron
(d) Monouron > Fenuron > Diuron1

Q90. What is the water potential of water under standard condition?
(a) 1
(b) -1
(c) 0
(d) Infinity

Q91. Who wrote the book "Principles in Weed Management"?
(a) Aldrich and Kramer
(b) O.P. Guota
(c) T.K. Das
(d) V.S. Rao

Q92. Which of the following is not correctly matched? (Nutrient: Deficiency symptom)
(a) Mg: Ivory white of Paddy
(b) Zn: White bud of Maize
(c) Mn: Marsh spot of peas
(d) P: Purple discoloration of leaves

Q93. Which among the following is the indicator plant of Oxidazon herbicide?
(a) Maize
(b) Minor millets
(c) Sorghum stem borer
(d) Oat

Q94. Scientist who worked on soil solarization in India:
(a) T.K. Das
(b) M.N. Raghunandan
(c) K. Purushottam
(d) Dr. N.T. Yaduraju

Q95. Scientist who selected Mean annual precipitation and mean annual PET for climate classification _____.
(a) Thornthwaite and Mather
(b) Krishnan and Mukhtar Singh
(c) Troll
(d) Koppen

Q96. Following are the statements about common features of drought avoidance in plants: A. Early stomata closure B. Efficient root system C. Lipid deposition on foliage D. Reduction in water uptake E. Straightening of leaves

Choose the correct answer from the options given below:
(a) A, D and E only
(b) B, D and E only
(c) B, C and D only
(d) A, B and C only

Q97. Radhey Gaurav, Avrodhi, and Anubhav are the varieties of:
(a) Pigeonpea
(b) Gram
(c) Lentil
(d) Green gram

Q98. Trade name of 2,4-D + EPTC:
(a) Astram
(b) Fenamine
(c) MECOPAR
(d) Knoxweed

Q99. Which of the following crops has the highest albedo value?
(a) Redgram
(b) Sorghum
(c) Green gram
(d) Maize

Q100. What is the southern oscillation index value that indicates El-Nino?
(a) More than 7
(b) Exactly 7
(c) Less than 7
(d) More than or equal to 7

Q101. First systematic scientific approach to tackle dry farming problems at Manjri (Pune) is:
(a) Wollny
(b) Kanitkar
(c) V.A. Tamhane
(d) H.H. Bennet

Q102. Which of the following is produced after hydrolysis of urea?
(a) Ammonium carbonate
(b) Amides
(c) Nitric acid
(d) Biuret

Q103. All India Coordinated Research Project on Agro-meteorology situated at:
(a) New Delhi
(b) Pune
(c) Kolkata
(d) Hyderabad

Q104. The amount of water in depth (cm) drained in 24 hrs from one ha of surface area is called:
(a) Runoff coefficient
(b) Drainage coefficient
(c) Total drainage water
(d) Net excess water

Q105. If the dry matter yield in 30 days is 500 g and in 45 days is 750 g. What is the crop growth rate?
(a) 20 g/day
(b) 33.3 g/day
(c) 22.5 g/day
(d) 16.6 g/day

Q106. Salt tolerance mechanism adopted in Sesbania aculeata:
(a) Salt excretion
(b) Salt dilution
(c) Salt exclusion
(d) Osmotic regulation

Q107. Latin Square design is suitable for the experiment having treatments of range:
(a) 02 to 04
(b) 04 to 08
(c) 2 to 10
(d) >10

Q108. A persian wheel with an average discharge of 300 lit/min irrigates 2 ha wheat crop in 60 hrs. What is the average depth of irrigation?
(a) 6.2 cm
(b) 5.6 cm
(c) 5.4 cm
(d) 4.8 cm

Q109. Select the correct option with respect to micro-nutrient with their critical level of deficiency in soils.
(a) Iron: 0.05 mg/kg
(b) Mn: 0.5 mg/kg
(c) B: 0.1 mg/kg
(d) Mo: 0.8 mg/kg

Q110. LEPA is modification of _____ type of irrigation.
(a) Furrow irrigation
(b) Sprinkler system
(c) Check basin system
(d) Tied-ridge system

Q111. Plant samples are dried at _____ for laboratory analysis.
(a) 35°C
(b) 65 to 80°C
(c) 55°C
(d) 105 to 80°C

Q112. Relationship between crop yield and legumes is:
(a) Linear
(b) Quadratic
(c) Exponential
(d) Sigmoid

Q113. Which of the following oilseed crops is resistant to poor oxygen supply?
(a) Groundnut
(b) Sesame
(c) Safflower
(d) Niger

Q114. Paraquat is available as:
(a) WP
(b) SC
(c) Scarification
(d) Granule

Q115. Chlorimuron ethyl is suitable to control:
(a) Creepers
(b) Broadleaf weeds
(c) Grasses
(d) Sedges

Q116. Pick the odd one out as per the medicinal property of beneficial weeds:
(a) Leucas aspera: Snake bite
(b) Argemone mexicana: Skin disorder
(c) Striga: Constipation
(d) Phyllanthus niruri: Jaundice

Q117. Optimum thickness of LDPE film for lining of water pond is:
(a) 100 – 300 micron
(b) 200 – 250 micron
(c) 500 – 750 micron
(d) 800 – 1000 micron

Q118. Which of the following is the stomata closure type antitranspirant?
(a) Atrazin
(b) PMA
(c) 2,4 D
(d) Both (a) and (b)

Q119. Partial factor productivity is expressed in:
(a) Yield/unit of water absorbed
(b) Income/unit area
(c) Cost/unit area
(d) Yield/unit of nutrient absorbed

Q120. For wheat, IW/CPE ratio is about:
(a) 0.5
(b) 0.9
(c) 1.2
(d) 1.5

Q121. The safe limit of nitrate limit of Nitrate ions in irrigation water is:
(a) 30 ppm
(b) 45 ppm
(c) 60 ppm
(d) >90 ppm

Q122. Which is the rapid means of making in-situ measurement of soil moisture?
(a) Neutron probe method
(b) Electrical resistance method
(c) Tensiometer method
(d) None of these

Q123. Water requirement is obtained by:
(a) IR = WR
(b) IR = WR + ER
(c) IR = ER - (WR + S)
(d) IR = WR - (ER + S)

Q124. Severe drought causes the production of _____ hormone in plants.
(a) NAA
(b) Ethylene
(c) ABA
(d) GA

Q125. _____ fertilizers are highly soluble and subjected to leaching.
(a) Ammonical fertilizers
(b) Nitrate fertilizers
(c) Amide fertilizers
(d) All of these

Q126. Mustard crop is considered harvest when its pods turn to _____ colour.
(a) Greenish-yellow
(b) Brown
(c) Yellowish-green
(d) Yellowish-brown

Q127. A' value concept was given by:
(a) Mitscherlich
(b) Fried and Dean. Watson
(c) Wilcox
(d) Watson

Q128. Phosphorous availability to the plants is maximum in soil pH range of:
(a) 7 - 7.5
(b) 6 - 6.5
(c) 8 - 8.5
(d) >8.5

Q129. Under check basin method of irrigation, normally the field channels and bunds occupy about _____% area.
(a) 20%
(b) 30%
(c) 40%
(d) >50%

Q130. Heavy metals are chemical elements with a specific gravity that is at least _____ times the specific gravity of water.
(a) 6
(b) 4
(c) 2
(d) 1

Q131. Urea containing N in the form of:
(a) Nitrate
(b) Nitrite
(c) Ammonical
(d) Amide

Q132. Walkley and Black method is used for the estimation of:
(a) Potash
(b) Nitrogen
(c) Sulphur
(d) Phosphorus

Q133. Hemochromatosis is a disease caused due to:
(a) More Iron
(b) Less Iron
(c) More Zinc
(d) Less Zinc

Q134. Phosphorous concentration of the soil in fertile arable soil is _____ ppm.
(a) 0.4 - 4 ppm
(b) 0.3 - 3 ppm
(c) 0.5 - 5 ppm
(d) 0.8 - 2.8 ppm

Q135. The seed in which dormancy can be broken by red light is:
(a) Pea
(b) Gram
(c) Lettuce
(d) Castor

Q136. Which of the following is an essential amino acid?
(a) Proline
(b) Seine
(c) Lysine
(d) Alanine

Q137. National Food Security Mission, a lead agriculture scheme announced by:
(a) Ministry of Commerce and Industries
(b) Ministry of Environment
(c) Ministry of Agriculture and Farmer's Welfare
(d) Ministry of Agriculture Marketing

Q138. Deep ploughing of soil in groundnut field should be avoided because it:
(a) Delays harvesting
(b) Delay germination
(c) Delays peg formation and pod development
(d) Makes harvesting difficult

Q139. Mission on Integrated Development of Horticulture scheme launched in 2014-15 under Green revolution. The respective funding ratio of central and state cooperation is:
(a) 50%: 50%
(b) 70%: 30%
(c) 60%: 40%
(d) Both (a) and (b) at different circumstances

Q140. Amount of loan provided under Mundra scheme for Tarun is about:
(a) Rs. 50,000
(b) Rs. 50,000 – 500,000
(c) Rs. 500,000 to 1,000,000
(d) Rs. 100,000 to 200,000

Q141. Pick the odd one out as per the nutrients with their conversion factor:
(a) SSP to P: 6.25
(b) DAP to N: 5.55
(c) Potassium sulphate to K: 2.1
(d) Ammonium sulphate to N: 4.76

Q142. Which state has the maximum number of integrated mandis under e-NAM as of 2024?
(a) Punjab
(b) Gujarat
(c) Tamil Nadu
(d) Rajasthan

Q143. Tobacco should not be irrigated with water containing more than _____ ppm chloride.
(a) 25
(b) 30
(c) 40
(d) 50

Q144. According to the final estimate released by the Department of Agriculture and Farmers Welfare, what is the maximum total food grain production for the year 2023 to 2024?
(a) 300.15 million tonnes
(b) 325.18 million tonnes
(c) 340.20 million tonnes
(d) 332.298 million tonnes

Q145. Killer disease of rice is:
(a) Tungro disease
(b) Blast
(c) Bacterial leaf blight
(d) Both (a) and (c)

Q146. As per the recent Government press release, farmers will get renewed their SHC after how many years?
(a) 3
(b) 5
(c) 2
(d) 6

Q147. Mode of action of Sulfonylureas/ imidazolinones:
(a) Electron transport depletion
(b) Lipid synthesis inhibition
(c) ALS inhibitors
(d) EPSP inhibitors

Q148. According to the survey, what was the share of Agriculture in India's Overall GVA at Current price for 2023-24?
(a) 18.40%
(b) 17.70%
(c) 21.21%
(d) 30.28%

Q149. What is the maximum insurance charges payable by a farmer under PMFBY for Rabi crops in %?
(a) 2
(b) 3.33
(c) 1.5
(d) 5

Q150. Consider the following statements:
1. Bajra is predominantly grown in states like Rajasthan, Uttar Pradesh and Gujarat, while Ragi is mainly cultivated in Karnataka and Tamil Nadu.
2. Bajra grows well in sandy and shallow black soils, whereas red and shallow black soil is suited for Ragi.
With regard to the statements given above, which of the following is correct?
(a) Both the statements are correct and statement 2 is the correct explanation of statement 1.
(b) Both the statements are correct, but statement 2 is not the correct explanation of statement 1.
(c) Statement 1 is correct, but statement 2 is false.
(d) Statement 1 is false, but statement 2 is correct.

Solutions

S1. Ans.(a)

Sol. Buckling and bending are most damaging in maize due to its tall and less rigid stalk structure, which makes it highly susceptible to lodging (falling over) during strong winds or heavy rainfall.

- This lodging can significantly reduce yield and complicate harvesting.

S2. Ans.(a)

Sol. The Leaf Area Index (LAI) of low-land rice is actually higher than that of upland rice.

- This is because lowland rice is generally transplanted and grows in puddled fields with better water availability, encouraging lush vegetative growth.
- Upland rice, on the other hand, is direct-seeded and grown under rainfed conditions, often with limited water, leading to lower LAI.
- Therefore, the statement in option (a) is incorrect.

S3. Ans.(c)

Sol. Plants meet their carbon requirement by absorbing carbon dioxide (CO_2) from the atmosphere during photosynthesis. This CO_2 is then converted into glucose and other organic compounds necessary for growth. Carbon from soil organic matter or minerals is not directly absorbed for this purpose.

S4. Ans.(d)

Sol. The most acceptable irrigation scheduling criterion among farmers is **irrigation at critical growth stages** of crops.

- This method involves applying water during specific, highly sensitive phases of crop growth when water stress can cause maximum yield reduction.
- These stages vary by crop—for example, flowering and grain filling in cereals like wheat and rice.
- Farmers prefer this method because it is **simple to understand, easy to implement without needing sophisticated tools**, and **results in efficient water use with minimal yield loss**.

Explanation:

- **(a) Soil moisture tension** – This involves using devices like tensiometers to measure the tension with which water is held in the soil. While this method is scientific and accurate, **it requires instruments, maintenance, and technical knowledge**, making it less popular among general farmers, especially in rural or resource-poor settings.
- **(b) Pan evaporimeter** – This method uses evaporation data (from Class A pan evaporimeter) to schedule irrigation. Although widely used in research and managed irrigation systems, **it is not commonly adopted by individual farmers due to the cost and complexity of measurement and interpretation**.
- **(c) Water potential of plants** – Measuring plant water potential gives a direct indication of plant water stress but requires **sophisticated instruments like pressure chambers**, which are expensive and impractical for regular farm use. Hence, it's not farmer-friendly.
- **(d) Critical growth stages – Correct answer.** This method is **simple, cost-effective, and based on easily observable crop stages**, such as flowering or grain filling. It aligns well with traditional knowledge and practical field conditions, making it the most preferred and adopted method by farmers across regions.

S5. Ans.(b)

Sol. Sorghum gives maximum yield when the available soil moisture is depleted up to 50% of the total available water in the root zone.

- This level ensures optimum water use without inducing stress that could lower production.

S6. Ans.(d)

Sol. Crop logging is a technique in sugarcane where periodic sampling of leaf tissue is done to determine the nutritional status of the plant, especially nitrogen and potassium.

- It does not refer to sugar determination, cutting, or plant lodging.

S7. Ans.(b)

Sol. Triazine herbicides (such as atrazine and simazine) are considered **notorious** primarily because of their **long residual toxicity** in the soil.

- These herbicides degrade slowly and can persist in the environment for several months, sometimes even longer depending on soil type, rainfall, and microbial activity.
- Their long-lasting presence can lead to **contamination of groundwater**, **negative impacts on non-target crops**, and **reduced biodiversity in soil microorganisms**.
- Due to these environmental concerns and persistence, some triazines are banned or strictly regulated in various countries.

Explanation:

- **(a) Fast decomposition** – Incorrect. Triazine herbicides are known **not** for fast decomposition, but for their **slow degradation**. If they decomposed quickly, they would not pose long-term toxicity issues.
- **(b) Long residual toxicity – Correct answer.** The main issue with triazine herbicides is their long-lasting toxic effect on the soil, which can harm successive crops and pollute water sources. This makes them notorious in environmental and agricultural contexts.
- **(c) Non-selectiveness** – Incorrect. Triazine herbicides are generally **selective**, especially effective against broadleaf weeds in crops like maize and sugarcane. However, when misused, they can affect non-target species, but **non-selectiveness is not their defining notorious feature**.
- **(d) All of these** – Incorrect. Only option (b) is the true reason why they are labeled as notorious. Options (a) and (c) are either incorrect or not the main concern.

S8. Ans.(c)

Sol. Organic carbon in soil is used as an indicator of available nitrogen because organic matter is the major source of nitrogen in soils.

- As it decomposes, it releases nitrogen in forms available for plant uptake.

S9. Ans.(c)

Sol. The **bipyridilium group of herbicides**, which includes **paraquat and diquat**, primarily acts by **inhibiting the Hill reaction** in the process of photosynthesis.

- The Hill reaction refers to the **light-dependent photolysis of water in the chloroplasts**, which results in the production of oxygen, protons, and electrons. Bipyridilium herbicides disrupt this reaction by accepting electrons from photosystem I (PSI), leading to the formation of **highly reactive oxygen species (ROS)** such as superoxide radicals.
- These ROS cause **oxidative damage to cell membranes, proteins, and lipids**, leading to rapid desiccation and cell death, particularly in green plant tissues.

Explanation:

- **(a) Electron transfer** – Partially correct but not specific. Although bipyridilium herbicides do interfere with electron flow in PSI, the more precise target is the **Hill reaction** within the light reactions of photosynthesis, making option (c) more accurate.
- **(b) Carbohydrate diffusion** – Incorrect. These herbicides do not interfere with carbohydrate movement or transport within the plant system.
- **(c) Hill reaction – Correct answer.** The inhibition of the Hill reaction is the **specific biochemical action** of bipyridilium herbicides, causing photochemical disruption and oxidative damage in plant cells.
- **(d) Cell division** – Incorrect. Cell division is not the target of bipyridilium herbicides. Other herbicides, like dinitroanilines (e.g., pendimethalin), inhibit cell division by disrupting microtubule formation.

S10. Ans.(a)

Sol. An **epiphyte** is a plant that grows **on the surface of another plant**, typically on tree branches or trunks, **without extracting nutrients from the host**.

- Epiphytes use the host plant **only for physical support**, not for nourishment.
- They absorb water and nutrients from **rain, air, and debris** that accumulates around them.
- Common examples include **orchids, ferns, mosses, and bromeliads**.
- These plants are most commonly found in **tropical rainforests**, where they benefit from the moisture-rich environment and higher canopy light levels.

Explanation:

- **(a) Epiphyte – Correct answer.** Epiphytes grow harmlessly on another plant. They are **non-parasitic** and derive nutrients from the surrounding environment. They do not harm the host plant directly.
- **(b) Dendrophyte** – Incorrect. The term "dendrophyte" is not commonly used in botany and does not specifically refer to a plant that grows on another. It loosely refers to **tree-associated plants**, but not in the context of epiphytism.
- **(c) Parasite** – Incorrect. A parasitic plant **derives some or all of its nutrition** from another living plant (host) through structures like **haustoria**. Examples include **Cuscuta (dodder)** and **Viscum (mistletoe)**.
- **(d) Facultative Parasite** – Incorrect. A facultative parasite is an organism that can live **either as a parasite or independently**. It can parasitize a host under certain conditions but is not obligate. These are different from epiphytes which are always non-parasitic.

S11. Ans.(b)

Sol. Weed Control Efficiency (WCE) =

$$\frac{\text{Weed dry weight in control} - \text{Weed dry weight in treatment}}{\text{Weed dry weight in control}} \times 100$$

$$= \frac{800 - 400}{800} \times 100 = 50\%$$

S12. Ans.(d)

Sol. Boron is an essential micronutrient for plant growth, but it is required in **very small amounts**.

- At higher concentrations, boron becomes **toxic to most crops**, especially sensitive ones like citrus, grapes, and beans.
- According to **FAO (Food and Agriculture Organization)** and other agricultural water quality standards, **safe irrigation water should have boron concentrations less than 2 ppm (mg/L)**.
- Levels above this can cause **leaf burn, reduced yield, and poor plant growth**.
- Thus, maintaining boron levels below 2 ppm is crucial to ensure **long-term soil health and crop productivity**, particularly in arid and semi-arid regions where boron tends to accumulate.

S13. Ans.(b)

Sol. National Fertilizers Limited (NFL) has one of its prominent units located at Nangal, Punjab.

- The national fertilizer limited is operated in Nangal Punjab.
- The national fertilizer limited is also operated in Panipat in Haryana and Bhatinda in Punjab and Vijaipur in Madhya Pradesh.
- National fertilizer Limited is a Mini Ratna company.
- It is a well-known public sector fertilizer company involved in the production and marketing of nitrogenous fertilizers like urea.
- National fertilizer limited is established on 23rd August 1974.
- The headquarters of national fertilizer limited is located in Noida.

S14. Ans.(b)

Sol. The herbicide **2,4-DB (2,4-dichlorophenoxybutyric acid)** is a **selective herbicide** used primarily in legume crops like alfalfa and clover.

- It is a **pro-herbicide**, meaning it is **not herbicidally active in its original form**.
- For it to become active, it must be **converted into 2,4-D (2,4-dichlorophenoxyacetic acid)**, which is phytotoxic to many broadleaf weeds.
- This conversion occurs through the action of the enzyme **beta oxidase** in plants.
- **Legume crops lack sufficient beta oxidase activity**, so they **do not convert 2,4-DB to 2,4-D**, making them **tolerant** to the herbicide.
- However, **non-leguminous broadleaf weeds possess beta oxidase**, which converts 2,4-DB into 2,4-D, causing **growth abnormalities and weed death**.

Explanation:

- **(a) Beta reductase** – Incorrect. This is not involved in the conversion of 2,4-DB to 2,4-D. Beta reductase generally plays roles in **nitrogen metabolism** or other reduction reactions.
- **(b) Beta oxidase – Correct answer.** Beta oxidase is the enzyme that carries out **beta-oxidation**, a metabolic process that shortens the butyric acid side chain of 2,4-DB to form the active form 2,4-D.
- **(c) Nitrate reductase** – Incorrect. Nitrate reductase is involved in **nitrate assimilation** by converting nitrate (NO_3^-) to nitrite (NO_2^-). It is unrelated to herbicide metabolism.
- **(d) Both (a) and (b)** – Incorrect. Only **beta oxidase** plays a role in this conversion. Beta reductase does not participate in this pathway.

S15. Ans.(c)

Sol. The **Village Taungya system** is considered the **most successful and widely adopted form of the Taungya system**, especially in countries like India, Myanmar, and parts of Africa.

- In this system, a **group of landless or tribal families is settled in or near forest areas**, and each family is **assigned a plot of land** where they grow agricultural crops along with young forest trees (such as teak or sal).
- The **farmers take care of the forest plantation** while simultaneously cultivating seasonal crops for a few years until the canopy closes.

This model works effectively because it:

- Provides **employment and livelihood** to local people
- Ensures **better care and survival rate of forest plantations**
- Builds a **mutually beneficial relationship between forest departments and communities**
- Promotes **community participation and sustainable forest management**

Explanation:

- **(a) Departmental taungya** – In this system, the forest department manages the plantation and hires laborers to grow both forest and agricultural crops. Though organized, it lacks the **personal interest and long-term commitment** that villagers have in the village taungya system.
- **(b) Leasing taungya** – Here, the forest land is **leased to individuals** who pay rent and manage the crops and trees. It often leads to **exploitation of land for profit** without concern for forest regeneration, making it less effective and more commercial.
- **(c) Village taungya – Correct answer.** This model involves **community-based participation**, improves the **social and economic conditions** of rural people, and ensures **better maintenance of forest crops**.
- **(d) Social taungya** – Though it aims to integrate social objectives like afforestation and upliftment of poor farmers, it is **less structured and not as widely practiced or proven successful** as village taungya.

S16. Ans.(b)

Sol. All four statements are correct:

- Single-cut sorghum is harvested at 50% flowering.
- CSH-101 is a dual-purpose hybrid for forage and grain.
- Seed rates for both types are generally the same.
- Multi-cut varieties require more nutrients due to repeated harvesting.

S17. Ans.(d)

Sol. Iron deficiency symptoms in plants, such as interveinal chlorosis, begin when iron levels drop below 55 ppm in leaf tissue.

- Iron is crucial for chlorophyll synthesis and photosynthesis.

S18. Ans.(a)

Sol. Ribboning is the **odd one out** because it is a **mechanical method** used to strip the bark from the jute plant immediately after harvesting, even **before retting**, unlike the other three processes which are part of or related to **retting or post-retting chemical processes** (like degumming and steeping).

Explanation:

- **(1) Retting** – A natural microbial process where the plant stalks are submerged in water to help separate fibres from bark; essential in traditional jute processing.
- **(2) Ribboning – Correct answer**. It is a mechanical process done **before retting**, and differs significantly in method and timing from the others.
- **(3) Degumming** – A **chemical treatment** step done **after retting**, especially for bast fibres like ramie, to remove non-cellulosic substances.
- **(4) Steeping** – A **part of the retting process**, where jute bundles are submerged in water to initiate microbial action for fibre separation.

S19. Ans.(c)

Sol. *Leucaena leucocephala*, a fast-growing leguminous tree, is known for its efficient nitrogen-fixing ability through symbiosis with *Rhizobium* bacteria.

- On average, it can fix about **150 kg of nitrogen per hectare per year**, making it valuable in agroforestry systems, soil fertility improvement, and green manuring.

S20. Ans.(b)

Sol. In a **Randomized Block Design (RBD)**, the field is divided into blocks to **reduce the effect of variability due to soil fertility or other natural gradients**.

- The **main objective** of blocking is to group experimental units that are more **homogeneous**, so that any variation due to **external factors like soil fertility is minimized within a block**.
- To achieve this, **blocks are laid out perpendicular to the fertility gradient**.
- This ensures that **each block contains all treatments across different fertility levels**, allowing the comparison of treatments under similar conditions and **improving the accuracy** of the experiment.
- For example, if the fertility gradient runs from east to west, then blocks should be laid out **north to south** so that each block spans the full range of fertility variation.

Explanation:

- **(a) Parallel to fertility gradient** – Incorrect. Laying out blocks parallel to the fertility gradient means that **all plots within a block would have similar fertility**, but **different blocks would be on different fertility levels**, which defeats the purpose of blocking.

- **(b) Perpendicular to fertility gradient – Correct answer.** This orientation allows each block to capture a range of fertility conditions, thereby minimizing **systematic errors due to fertility variation**.
- **(c) It can be either (a) or (b)** – Incorrect. The effectiveness of RBD depends on blocking **perpendicular** to the fertility gradient. Choosing either direction without considering the gradient would lead to **loss of experimental precision**.
- **(d) It cannot be determined based on the fertility gradient...** – Incorrect. The layout **is based on the fertility gradient** specifically to control field variability, and is **not arbitrarily decided by scientists**.

S21. Ans.(a)

Sol. Indian Council of Agriculture Research (ICAR) publishes 'Indian Journal of Agriculture.

- The Indian Council of Agricultural Research (ICAR) is an autonomous organization.
- The Indian Council of Agricultural Research (ICAR) is under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India.
- The Indian Council of Agricultural Research (ICAR) was established on 16 July 1929.
- The Indian Council of Agricultural Research (ICAR) was established in pursuance of the report of the Royal Commission on Agriculture.
- The ICAR has its headquarters in New Delhi.

S22. Ans.(d)

Sol. All the techniques mentioned help in reducing nitrogen loss in paddy fields:

- Slow-releasing N fertilizers reduce leaching and volatilization.
- Mud ball application slows the release of urea, minimizing losses.
- Pre-incubated urea improves nitrogen use efficiency by reducing loss through volatilization.
- Hence, all these methods are beneficial in enhancing nitrogen availability to plants and reducing environmental pollution.

S23. Ans.(a)

Sol. The **leaves of gram (Cicer arietinum)** are known to contain **malic acid**, which contributes to their **sour taste** and **therapeutic properties**, particularly in aiding digestion and relieving certain **stomach-related ailments**.

- Malic acid is a **naturally occurring organic acid** found in many fruits and vegetables.
- It plays a role in **stimulating the digestive system**, **improving bile production**, and **enhancing the absorption of nutrients** in the gut.
- Traditionally, gram leaves are consumed or used in folk remedies to treat **indigestion, acidity, and mild constipation**.

Explanation:

- **(a) Malic acid – Correct answer.** Present in gram leaves, malic acid is known for its **digestive benefits** and is used in traditional medicine to address **stomach disorders** such as gas, indigestion, and acidity.
- **(b) Oxalic acid** – Incorrect. Though oxalic acid may be present in small amounts in some leafy plants, **it is not known for digestive benefits**. In fact, excessive oxalic acid can **interfere with calcium absorption** and lead to the formation of kidney stones.
- **(c) Both (a) and (b)** – Incorrect. Only malic acid plays a **positive role in stomach health**, while oxalic acid is not beneficial and may even be harmful if consumed in large amounts.
- **(d) Citric acid** – Incorrect. Citric acid is commonly found in citrus fruits and helps in digestion, but it is **not a major acid found in gram leaves**.

S24. Ans.(c)

Sol. The symplastic pathway involves the movement of water and solutes from cell to cell through the plasmodesmata, which are cytoplasmic connections.

- This pathway keeps water within the cytoplasm and is essential for controlled transport in plants.

S25. Ans.(b)

Sol. Fungicide coating (also known as seed dressing) is the most common and effective preventive measure to protect seeds from fungal and bacterial pathogens during storage and after sowing.

- It improves seedling health and crop stand.

S26. Ans.(b)

Sol. Using the seed rate formula:

$$\text{Seed Rate (kg/ha)} = \frac{100 \times \text{Plant Population per ha} \times \text{Test Weight}}{\text{Germination \%} \times \text{Purity \%} \times 1000}$$

With 1m × 1m spacing, **plant population = 10,000/ha**, Test weight = 100g, Germination = 90%, Purity = 90%,

$$= \frac{100 \times 10,000 \times 100}{90 \times 90 \times 1000} \approx 1.23 \text{ kg/ha}$$

S27. Ans.(d)

Sol. Phytoremediation is a green technology that uses plants to clean up contaminated environments.

- Plants either absorb, degrade, or stabilize contaminants, making it an eco-friendly method for environmental cleanup.

S28. Ans.(d)

Sol. Mollisols are fertile soils rich in organic matter, having a thick, dark topsoil horizon.

- They are base-rich (>50%), commonly found in grassland regions, and are ideal for agriculture.

S29. Ans.(c)

Sol. Black gram is highly sensitive to moisture stress during flowering and pod filling stages.

- Ensuring adequate moisture at these stages boosts flower retention, pod development, and seed filling, thereby enhancing productivity.

S30. Ans.(b)

Sol. An Eco-label is a voluntary environmental certification assigned to products that meet specific ecological and social criteria.

- It helps consumers make environmentally responsible choices.

S31. Ans.(d)

Sol. In the Universal Soil Loss Equation (USLE):

- S stands for Slope Steepness Factor,
- which indicates how the gradient of the slope influences soil erosion. Steeper slopes cause faster water runoff and more erosion.
- A: Estimated soil loss (tons/acre/year)
- R: Rainfall and runoff erosivity factor
- K: Soil erodibility factor
- L: Slope length factor
- C: Cover and management factor
- P: Support practice factor

S32. Ans.(d)

Sol. Basic slag is a by-product of the steel industry and is used as a phosphatic fertilizer.

- It contains phosphorus that is insoluble in water but soluble in weak acids like citric acid.
- This makes it a slow-release source of phosphorus, suitable for acidic soils.
- Other options like SSP (Single Super Phosphate) and DAP (Di-Ammonium Phosphate) are water-soluble.

S33. Ans.(c)

Sol. Sugarcane is considered mature when the purity of juice (i.e., the ratio of sucrose to total soluble solids) is over 85%.

- At this stage, the crop has accumulated optimum sugar content and is ready for harvesting to ensure maximum recovery in sugar production.

S34. Ans.(d)

Sol. Illite is a non-expanding clay mineral, commonly found in alluvial soils.

- These soils are fertile, well-drained, and ideal for cultivation.
- In contrast, black soils are rich in montmorillonite, which is an expanding clay.

S35. Ans.(d)

Sol. Saltation is the process by which soil particles (0.1 to 0.5 mm) are lifted and bounced along the soil surface by wind.

- It is the most common form of wind erosion, especially in dry and sandy regions.

S36. Ans.(b)

Sol. The pF scale is the logarithmic expression of soil water tension.

- The Permanent Wilting Point (PWP) corresponds to a pF value of 4.18, which means the water is held too tightly by the soil particles for plants to extract it.

S37. Ans.(c)

Sol. Ammonium sulphate ($(NH_4)_2SO_4$) contains 24% sulphur and 21% nitrogen.

- It is a widely used nitrogenous fertilizer that also supplies sulphur, an essential secondary nutrient.

S38. Ans.(c)

Sol. The Split-plot design is considered both a confounded design (due to restrictions in randomization) and a partially nested design (due to hierarchical treatment structures).

- It is used when factors have different levels of precision.

S39. Ans.(b)

Sol. Epigenic earthworms are the type of earthworms that live **on or near the soil surface**, usually within the **litter layer** or upper organic-rich horizon of the soil.

- These earthworms **feed mainly on decaying organic matter**, such as fallen leaves and crop residues, and play a vital role in **decomposition and nutrient cycling**.
- Because they live close to the surface and do not create deep burrows, they are also referred to as **surface dwellers**.
- A common example is *Eisenia fetida* (commonly known as red wigglers), widely used in **vermicomposting**.

Explanation of each option:

- **(a) Endogenic** – Incorrect. Endogenic earthworms live **within the soil layers**, particularly in the **mineral soil**, and create **horizontal burrows**. They feed on soil rich in organic matter but do not come to the surface often.
- **(b) Epigenic – Correct answer.** These earthworms are **surface dwellers** found in the top organic layers of the soil. They are crucial for **composting and organic matter decomposition**.
- **(c) Anecic** – Incorrect. Anecic earthworms live in **deep vertical burrows** but **come to the surface occasionally**, especially to pull organic material into their burrows. Example: *Lumbricus terrestris*. They are not true surface dwellers.
- **(d) Geophagous** – Incorrect. "Geophagous" means **soil-eating**, which refers to the feeding habit, not the **ecological category or dwelling behavior**. Many endogenic worms are geophagous, but not necessarily surface dwellers.

S40. Ans.(d)

Sol. Among the listed weeds, ***Amaranthus viridis*** (commonly known as green amaranth or slender amaranth) is known to have the **highest nitrogen content**.

- This fast-growing leafy weed is rich in proteins and nitrogenous compounds.
- It is considered a **nutrient accumulator**, meaning it uptakes and stores large amounts of nitrogen from the soil.
- Due to this property, it can be used as **green manure** or a **compost ingredient** to enrich soil fertility.
- It has also been recognized as a **nitrogen indicator plant** because its lush green growth signals high nitrogen availability in the soil.

Explanation:

- **(a)** ***Argemone mexicana*** – Incorrect. This plant is commonly known as Mexican poppy and is known more for its **toxicity** (due to alkaloids like sanguinarine) than its nitrogen content. It is not used in soil fertility improvement.
- **(b)** ***Eclipta alba*** – Incorrect. Also called false daisy or bhringraj, it is used in traditional medicine but **does not have significantly high nitrogen content** compared to *Amaranthus viridis*.
- **(c)** ***Melilotus alba*** – Incorrect. Though it is a **leguminous plant** (white sweet clover), which can **fix atmospheric nitrogen**, its **nitrogen content in plant biomass is not as high** as that of *Amaranthus viridis*.
- **(d)** ***Amaranthus viridis*** – **Correct answer.** It has a **very high nitrogen content** in its tissues and is used as green manure. Its rapid growth and biomass accumulation make it ideal for **nutrient recycling** in agricultural systems.

S41. Ans.(d)

Sol. Nickel (Ni) is the **micronutrient responsible for urea hydrolysis** in plants.

- It is a crucial component of the enzyme **urease**, which catalyzes the conversion of **urea into ammonia (NH_3) and carbon dioxide (CO_2)**.
- This process is vital for plants that use urea as a nitrogen source.
- Without adequate nickel, **urease cannot function**, leading to a **buildup of toxic urea** in plant tissues and impaired nitrogen metabolism.
- Nickel also plays a role in **biological nitrogen fixation (BNF)** in legumes by influencing hydrogenase and other enzymes.
- Though required in **very small amounts (typically <1.0 mg/kg)**, nickel is **essential for nitrogen utilization** in plants that depend on urea or symbiotic nitrogen fixation.

Explanation:

- **(a) Cl (Chlorine)** – Incorrect. Chlorine is involved in **photosynthesis and osmoregulation**, but it has **no role in urease activity or urea hydrolysis**.
- **(b) Mn (Manganese: 0.5 mg/kg)** – Incorrect. Manganese is involved in **photosynthesis, enzyme activation, and oxidation-reduction reactions**, but **not in urease activity**.
- **(c) Fe (Iron)** – Incorrect. Iron is essential for **chlorophyll synthesis and nitrogenase activity** in biological nitrogen fixation (BNF), but **not in the hydrolysis of urea**.
- **(d) Ni (Nickel)** – **Correct answer.** Nickel is the **cofactor of urease enzyme** and is directly responsible for **urea hydrolysis**. Without nickel, urea cannot be efficiently metabolized by plants.

S42. Ans.(d)

Sol. (Muriate of Potash) contains 60% K_2O (potash).

To supply 50 kg of potash (K_2O) per hectare, the required quantity of MOP can be calculated as:

$$\text{Required MOP} = \frac{50}{0.60} = 83.33 \text{ kg/ha} \approx 83.5 \text{ kg/ha}$$

Therefore, **83.5 kg of MOP** is required to meet the potash need of 50 kg/ha.

S43. Ans.(d)

Sol. The optimum sowing time for field peas is from the end of October to the first fortnight of November.

- Sowing during this period ensures favorable temperatures for germination and better crop establishment, leading to higher yields.

S44. Ans.(d)

Sol. Magnesium (Mg) deficiency is the **most common cause of interveinal chlorosis on older leaves**.

- Magnesium is a **central component of the chlorophyll molecule**, and it plays a vital role in **photosynthesis, enzyme activation**, and **phosphate metabolism**.
- Since magnesium is **mobile in plants**, when a deficiency occurs, the plant **translocates magnesium from older leaves to younger ones**, leading to **interveinal yellowing (chlorosis) in older leaves** while the veins remain green.
- If left untreated, it can result in reduced photosynthesis and overall poor plant health.

Explanation:

- **(a) Fe (Iron)** – Incorrect. Iron deficiency also causes **interveinal chlorosis**, but it typically appears on **younger leaves**, as iron is **immobile** in plants. It does not move from old to new tissues.

- **(b) Zn (Zinc)** – Incorrect. Zinc deficiency symptoms include **shortened internodes, smaller leaves**, and sometimes **interveinal chlorosis**, but it usually affects **young leaves** and causes **rosetting or bronzing**, not classic interveinal yellowing in older leaves.
- **(c) Cl (Chlorine)** – Incorrect. Chlorine deficiency is **rare** and usually presents as **wilting, bronzing, or chlorotic blotches**, not classic interveinal chlorosis.
- **(d) Mg (Magnesium)** – **Correct answer.** Magnesium deficiency leads to **distinct interveinal chlorosis on older leaves**, often with a green net-like appearance of veins. It is a classic and well-documented symptom of Mg deficiency.

S45. Ans.(d)

Sol. Gypsum ($CaSO_4 \cdot 2H_2O$) is a **non-silicate secondary mineral** that forms through **the weathering or alteration of primary minerals**, particularly in **arid and semi-arid regions**.

- It is classified as a **sulfate mineral**, not a silicate, because it **does not contain silica (SiO_4) tetrahedra** in its structure.
- Gypsum is **soft, water-soluble**, and important in **soil fertility management**—especially for **reclaiming sodic soils**, where it helps in **replacing sodium with calcium** to improve soil structure.
- Secondary minerals like gypsum are formed through **chemical weathering processes**, such as **precipitation from soil solutions**.
- They differ from primary minerals, which crystallize directly from magma.

Explanation:

- **(a) Quartz** – Incorrect. Quartz is a **primary silicate mineral** composed of pure silica (SiO_2). It is **very stable and resistant to weathering**, and not considered a secondary mineral.
- **(b) Montmorillonite** – Incorrect. Although montmorillonite is a **secondary mineral**, it belongs to the **silicate group**, specifically the **phyllosilicates** (clay minerals). It is formed during the weathering of feldspar and other alumino-silicates.
- **(c) Feldspar** – Incorrect. Feldspar is a **primary silicate mineral**. It is abundant in igneous rocks and undergoes weathering to form secondary minerals like clays.
- **(d) Gypsum** – **Correct answer.** Gypsum is a **non-silicate, secondary mineral** (a sulfate), commonly found in evaporated soils or as a result of weathering in dry climates.

S46. Ans.(d)

Sol. Statement 1 is true – Organic matter binds herbicides, reducing their degradation and increasing persistence in soil.

Statement 2 is false – Herbicide adsorption generally increases in dry soil due to reduced competition from water molecules. So, only Statement 1 is correct.

S47. Ans.(b)

Sol. In the Munsell Soil Color System, Chroma refers to the intensity or purity of color (i.e., how strong or weak the color is).

- It is one of three attributes, along with Hue (color type) and Value (lightness or darkness).

S48. Ans.(c)

Sol. The cold test simulates early-season cold and wet conditions to evaluate a seed's ability to germinate and establish under stress.

- It is commonly used in crops like maize to assess seed vigor.

S49. Ans.(b)

Sol. During glycolysis, a total of 4 ATP are produced, but 2 ATP are consumed in the initial steps.

- So, the net gain is 2 ATP molecules per one molecule of glucose.

S50. Ans.(d)

Sol. The Golden Revolution refers to the period of rapid increase in the production of fruits, especially during the 1991–2003 period in India.

- It followed the success of the Green Revolution in cereals and focused on horticulture.

S51. Ans.(c)

Sol. Sodium Adsorption Ratio (SAR) is calculated using the formula:

$$SAR = \frac{Na^{+}}{\sqrt{\frac{(Ca^{2+}+Mg^{2+})}{2}}}$$

Given: Na = 40, Ca = 8, Mg = 10

$$SAR = \frac{40}{\sqrt{\frac{(8+10)}{2}}} = \frac{40}{\sqrt{9}} = \frac{40}{3} = 13.33$$

So, the correct answer is **13.33**.

S52. Ans.(b)

Sol. Soybean is sensitive to moisture stress, particularly during its critical growth stages.

- Irrigation is ideally scheduled when 60% of the available soil moisture is depleted to ensure optimal crop performance and yield.
- Beyond this level, water stress can significantly impact flowering, pod development, and seed filling.

S53. Ans.(c)

Sol. Cottonseed contains about 15–25% oil, making it one of the important oilseed crops in India.

- After extraction, cottonseed oil is used for cooking, and the residue (cottonseed cake) serves as livestock feed.

S54. Ans.(d)

Sol. At very low soil pH, phosphorus becomes unavailable to plants because it reacts with iron and aluminum to form insoluble compounds.

- This leads to phosphorus deficiency even if total P content is adequate.

S55. Ans.(d)

Sol. One acre-inch of water refers to the volume required to cover one acre of land to a depth of one inch. It is equal to 102,800 litres of water.

- This unit is often used in irrigation water measurements.

S56. Ans.(b)

Sol. The Sorghum shoot fly (Atherigona soccata) lays eggs on the leaves.

- The hatched maggots bore into the central shoot, causing dead heart symptoms.
- The plant compensates by producing side tillers, which are often unproductive.

S57. Ans.(c)

Sol. Flowering and grain filling are the most critical stages for irrigation in sunflower.

- Water stress during these stages severely affects seed development and oil content, leading to significant yield reduction.

S58. Ans.(c)

Sol. Under the 'Namo Drone Didi' initiative, the Government of India aims to empower 15,000 women SHGs by providing drones for agricultural services.

- The program is intended to promote technology use in agriculture and women empowerment.

S59. Ans.(c)

Sol. Negative geotropism refers to the growth of plant parts (typically stems) against the force of gravity, i.e., upwards.

- This allows plants to reach towards light, while roots show positive geotropism by growing downward.

S60. Ans.(b)

Sol.

$$\text{Maize Equivalent Yield (MEY)} = \text{Maize Yield} + \left(\frac{\text{Blackgram Yield} \times \text{Price of Blackgram}}{\text{Price of Maize}}\right)$$

$$= 1800 + \left(\frac{500 \times 60}{12}\right) = 1800 + 2500 = 4300 \text{ kg/ha}$$

Hence, the **MEY is 4300 kg/ha**.

S61. Ans.(d)

Sol. Humus is the stable end-product of organic matter decomposition.

- It is dark, amorphous, and highly beneficial for soil structure and nutrient retention.
- Unlike compost or manure, humus resists further decomposition.

S62. Ans.(b)

Sol. Crop Cafetaria is a method of displaying multiple crop varieties side-by-side in a field, allowing farmers to visually compare and select varieties based on performance, appearance, and preference.

- This approach aids in participatory selection and promotes farmer-led adoption of improved varieties.

S63. Ans.(d)

Sol. Field retting (also called dew retting) involves spreading flax stalks on the field where dew and microbial action help break down pectins.

- It produces superior quality fibres with minimal pollution compared to water-based retting methods.

S64. Ans.(d)

Sol. The morphine content in opium latex (Papaver somniferum) generally ranges from 8% to 14% on a dry weight basis.

- This alkaloid is medically significant for its analgesic properties and is tightly regulated.

S65. Ans.(c)

Sol. Social forestry is a concept where forests are developed to fulfill the needs of local people, including small timber, fuelwood, fodder, and bamboo.

- It promotes sustainable resource use and community participation.

S66. Ans.(c)

Sol. Fixed potassium (K) is the fraction of potassium that is **firmly held between the layers of certain clay minerals**, especially in **2:1 type clays** like **illite, vermiculite, and mica**.

- It is **not immediately available** to plants because it is **not easily exchangeable with neutral salt solutions** (such as ammonium acetate or calcium chloride) used in soil testing.
- However, it is considered a **slowly available form of potassium**, as it can become available over time through **mineral weathering or microbial activity**.
- Fixed K is **trapped within the interlayers** of clay minerals and gets **released slowly**, making it a **reserve form** of potassium in soils.
- This makes it different from the readily available forms.

Explanation of each option:

- **(a) Water soluble K** – Incorrect. This is the **immediately available** form of potassium, present in the soil solution and readily taken up by plant roots. It is not firmly bound and is easily leached.
- **(b) Exchanged K** – Incorrect. This form of K is held on the **exchange sites of soil colloids** and can be easily replaced by neutral salt solutions. It is also readily available to plants.
- **(c) Fixed K – Correct answer.** Fixed potassium is **held tightly between clay layers** and is **not immediately replaceable** with neutral salts. It is slowly released and acts as a **buffer supply** for plant uptake.
- **(d) Lattice K** – Incorrect. Lattice potassium is **part of the crystal structure of primary minerals** such as feldspars and micas. It is **unavailable** to plants unless the mineral undergoes **weathering** over long periods. It is even **less available** than fixed K.

S67. Ans.(d)

Sol. Smother crops are those that **germinate quickly**, grow vigorously, and develop a **dense canopy** in a short span of time.

- This **dense vegetative cover** not only allows for **efficient photosynthesis** but also helps to **suppress weed growth** by shading the soil surface and outcompeting weeds for light, water, and nutrients.
- The rapid canopy formation reduces the chances of weed seed germination and limits the growth of existing weeds.
- Smother crops are especially useful in **sustainable and organic farming** systems as a **biological weed control method**.
- Common examples include **cowpea, sunhemp, and dhaincha**.

Explanation of each option:

- **(a) Catch crops** – Incorrect. Catch crops are **short-duration crops** grown between two main crops to **utilize residual soil nutrients** and **prevent nutrient leaching**, but they are **not primarily selected for rapid canopy development**.
- **(b) Augment crops** – Incorrect. These are additional crops grown to **boost yield** or **provide supplementary income**, often intercropped. They **may or may not have fast canopy development**, and that is not their defining trait.
- **(c) Erosion resistant crops** – Incorrect. These are crops that help in **soil conservation** by protecting the soil from wind or water erosion. While they may have good canopy cover, **their main purpose is not rapid canopy formation** but **soil stabilization**.
- **(d) Smother crops – Correct answer.** Smother crops are grown specifically to **germinate rapidly**, form a **dense canopy quickly**, and thereby **suppress weeds** and maximize **photosynthetic efficiency** in a short period.

S68. Ans.(a)

Sol. Phosphorus deficiency in most crops is indicated when tissue content falls below 0.10%.

- Such deficiency results in poor root development, purpling of leaves, and reduced yield.

S69. Ans.(d)

Sol. In the USA, soybean classification is primarily based on maturity groups (MGs).

- These groups help in matching varieties to latitude and growing season length, ranging from MG 000 (very early) to MG X (very late).

S70. Ans.(b)

Sol. pF is the logarithm (base 10) of the suction (in cm of water column) needed to remove water from soil.

- For example, pF 4.2 ≈ wilting point and pF 2.0 ≈ field capacity.

S71. Ans.(b)

Sol. Rice has low water use efficiency (WUE) compared to other cereal crops. It requires large quantities of water for its cultivation due to its preference for flooded conditions. This leads to more water loss through evaporation and percolation, making its WUE lower than crops like wheat, maize, or sorghum.

Explanation:

- **(a) Sorghum** – This is a drought-tolerant crop with high water use efficiency, often grown in arid and semi-arid areas.
- **(b) Rice – Correct answer.** Requires standing water and is less efficient in converting water into biomass or yield.
- **(c) Wheat** – Has better water use efficiency than rice and can grow well with limited irrigation.
- **(d) Maize** – Also has relatively higher water use efficiency and is more sensitive to water stress than rice but uses water more effectively.

S72. Ans.(d)

Sol. Aluminium foil mulch reflects solar radiation, which sharpens the outgoing temperature by increasing heat reflectance.

- At the same time, it helps in reducing soil heat absorption, thus providing a cooling effect.
- Therefore, both statements (a) and (c) are correct, making option (d) the right choice.

S73. Ans.(c)

Sol. Cropping intensity is calculated as the number of crops grown on the same field in one year, expressed as a percentage.

- In the maize-potato-wheat system, three crops are grown in a year.

So, Cropping Intensity = (Number of crops / 1) × 100 = (3 / 1) × 100 = **300%**.

S74. Ans.(b)

Sol. Igneous rocks are formed by the solidification of magma and have a massive, non-laminar structure.

- They constitute the bulk of the Earth's crust (approx. 95%) and serve as the primary parent material for both sedimentary and metamorphic rocks.

S75. Ans.(c)

Sol. According to the DAY-NLRM (Deendayal Antyodaya Yojana - National Rural Livelihood Mission), the Revolving Fund (RF) support provided as corpus ranges between Rs. 20000 – 30000 per Self Help Group (SHG).

- DAY-NRLM, MoRD, will provide Revolving Fund (RF) support as corpus ranging between **Rs 20,000 - Rs 30,000 per SHG** to strengthen their institutional and financial management capacity and build a good credit history within the group.
- SHGs in existence for a minimum period of 3/6 months and follow the norms of good SHGs known as *'Panchasutras'*, viz., regular meetings, regular savings, regular internal lending, regular recoveries and maintenance of proper books of accounts, and which have not received any RF earlier will be eligible for such support.

S76. Ans.(b)

Sol. Hydraulic conductivity of soil is defined **by Darcy's law**, which describes the flow of fluid through a porous medium.

- It relates the velocity of fluid through the soil to the hydraulic gradient and the permeability of the soil.

S77. Ans.(b)

Sol. The real value of seed is calculated as:

Real value = Viability × Germination Percentage

Real value = 90 × 80 = 72.

S78. Ans.(c)

Sol. The rainfed wheat idiotype concept was given by R.D. Asana, a prominent figure in wheat agronomy.

- In India, ideotype of wheat for rainfed conditions was proposed by R.D. Asana.
- The term ideotype was coined by Donald in 1968 working with wheat crop.

S79. Ans.(b)

Sol. In ANOVA (Analysis of Variance), it is assumed that treatment effects and environmental effects are not independent.

The assumption is that these effects are not independent, so option (b) is the correct answer.

S80. Ans.(a)

Sol. The **odd one out is (a) Cowpea: India**, because the center of origin of **Cowpea** is **Africa**, not India. The other options correctly mention the primary centers of origin for their respective crops.

Explanation of each option:

- **(a) Cowpea: India – Incorrect pair.** Cowpea originated in **Central Africa** and later spread to India; thus, this pairing is wrong.
- **(b) Chickpea: South West Asia – Correct.** Chickpea is native to the **Southwest Asian region**, particularly areas around Turkey and Syria.
- **(c) Lathyrus (Grass pea): South Europe and West Asia – Correct.** Lathyrus is believed to have originated in **South Europe and Western Asia**.

S81. Ans.(d)

Sol. The ideal number of classes in a frequency distribution is generally **around 10**.

- This is based on Sturges' Rule, which recommends a manageable number of class intervals to effectively summarize data without overcomplicating it.

Explanation of each option:

- **(a) 25** – Too many classes; may lead to over-fragmentation of data and less clarity.
- **(b) 30** – Also excessive; makes interpretation difficult.
- **(c) 35** – Very high and not practical for most datasets.
- **(d) 10** – **Correct answer.** Considered optimal for presenting data clearly while retaining important patterns.

S82. Ans.(b)

Sol. Fungi are the most commonly used microorganisms in **bioherbicides** because of their strong ability to infect and suppress specific weed species.

- They produce toxins and enzymes that can degrade plant tissues, making them effective and selective biological weed control agents.

Explanation:

- **(a) Bacteria** – Though used in some biocontrol applications, bacteria are not the primary agents in bioherbicides.
- **(b) Fungus** – **Correct answer.** Several fungal species like *Colletotrichum* and *Alternaria* are used in commercial bioherbicides.
- **(c) Nematodes** – Primarily used against insect pests and not effective as herbicides.
- **(d) Virus** – Mainly employed in bioinsecticides, not in weed control through bioherbicides.

S83. Ans.(b)

Sol. The **Paired t-test** is used to test the **significance of the mean difference** between two related (paired) observations, such as before-and-after measurements on the same subject.

- It checks whether the average difference between paired observations is significantly different from zero.

Explanation:

- **(a) T-test** – General term; includes both independent and paired t-tests. It's not specific to paired data.
- **(b) Paired t-test** – **Correct answer.** Specifically designed for analyzing matched or paired data sets.
- **(c) Z-test** – Used for large sample sizes or known population variance, typically not for paired samples.
- **(d) F-test** – Used to compare variances between groups, not means of paired observations.

S84. Ans.(b)

Sol. The **trade name of Metoxuron** is **Dosanex**. Metoxuron is a **phenylurea herbicide** used primarily for **pre-emergence weed control** in crops like wheat.

- It works by inhibiting photosynthesis in susceptible weed species.

Explanation:

- **(a) Glean** – Trade name for **Chlorsulfuron**, not related to Metoxuron.
- **(b) Dosanex** – **Correct answer.** This is the commercial name for the herbicide Metoxuron.
- **(c) Pinnacle** – Trade name for **Thifensulfuron-methyl**, another herbicide.
- **(d) Terpedo** – Trade name for **Metsulfuron-methyl**, used for controlling broadleaf weeds.

S85. Ans.(a)

Sol. LER (Land Equivalent Ratio) is calculated as:

$$\text{LER} = \frac{\text{Sole crop yield of crop 1}}{\text{Intercrop yield of crop 1}} + \frac{\text{Sole crop yield of crop 2}}{\text{Intercrop yield of crop 2}}$$

For this case:

Sole crop yields = 50 and 40 q/ha

Intercrop yields = 20 and 10 q/ha

Thus,

$$\text{LER} = \frac{50}{20} + \frac{40}{10} = 2.5 + 4 = 6.5$$

So, the correct LER is **0.65** which is given by the following correction: LER = 1/10.

S86. Ans.(b)

Sol. The correct antidote used for maize against Alachlore and Metalochlor is R-25788.

- This chemical is used to mitigate the harmful effects of herbicides on maize while providing protection against their toxicity.

S87. Ans.(b)

Sol. Detoxification of **Phenoxy herbicides** (like 2,4-D) in cereals primarily occurs through **conjugation with glucose**.

This biochemical process converts the herbicide into a non-toxic, inactive form, allowing the cereal crop to tolerate the herbicide while weeds are controlled effectively.

Explanation:

- **(a) Conjugation with protein molecule** – Not the main pathway for detoxification in cereals.
- **(b) Conjugation with glucose** – **Correct answer.** A common detoxification mechanism in plants, especially cereals, for neutralizing herbicides.
- **(c) Conjugation with microtubulin** – Not relevant; microtubulin is involved in cell division, not herbicide detoxification.
- **(d) Conjugation with lipids** – Rare in herbicide detoxification processes; not a significant pathway in cereals.

S88. Ans.(c)

Sol. Devine is a **liquid formulation** bioherbicide that contains the fungus *Phytophthora palmivora*.

- It is used for controlling **strangler vine (Morrenia odorata)** in citrus orchards.
- The liquid formulation allows easy application and ensures effective contact with the target weed.

Explanation:

- **(a) WP (Wettable Powder)** – Common for chemical pesticides but **not the formulation of Devine**.
- **(b) SL (Soluble Liquid)** – Refers to certain chemical pesticides, but **Devine is not typically in this form**.
- **(c) Liquid – Correct answer.** Devine is marketed as a **liquid bioherbicide**.
- **(d) Granular** – Suitable for soil-applied products, but **not used for Devine**.

S89. Ans.(a)

Sol. The correct sequence of **persistence in soil** is: **Diuron > Monouron > Fenuron**.

- Diuron, being more strongly adsorbed to soil particles and less susceptible to microbial degradation, remains in the soil longer.
- Monouron has moderate persistence, while Fenuron is the least persistent due to its higher solubility and faster breakdown.

Explanation:

- **(a) Diuron > Monouron > Fenuron – Correct answer.** Reflects decreasing order of persistence in soil.
- **(b) Monouron > Fenuron > Diuron** – Incorrect; Diuron is more persistent than both.
- **(c) Monouron > Diuron > Fenuron** – Incorrect sequence; Diuron is more persistent than Monouron.
- **(d) Monouron > Fenuron > Diuron** – Incorrect; Diuron is the most persistent among the three.

S90. Ans.(c)

Sol. The **water potential (Ψ)** of pure water under **standard conditions (i.e., at atmospheric pressure and at room temperature)** is defined as **zero (0)**.

- Water potential is a measure of the potential energy of water in a system and determines the direction of water movement.
- Since pure water has the highest free energy, its water potential is the reference point and is taken as zero.

Explanation:

- **(a) 1** – Incorrect; water potential is not positive for pure water.
- **(b) -1** – Incorrect; negative values occur when solutes are added.
- **(c) 0 – Correct answer.** Pure water under standard conditions has a water potential of zero.
- **(d) Infinity** – Incorrect; water potential is a finite value and never infinite.

S91. Ans.(a)

Sol. The book "Principles in Weed Management" was written by R.J. Aldrich and R.J. Kramer.

Here's a more detailed:

- **Authors:** R.J. Aldrich and R.J. Kramer
- **Book Title:** Principles in Weed Management
- **Publisher:** Panima Publ.
- **Year of Publication:** 1997

S92. Ans.(a)

Sol. The pair **(a) Mg: Ivory white of Paddy** is **not correctly matched**. The **"Ivory white" symptom in paddy** is actually associated with **Sulphur (S)** deficiency, not **Magnesium (Mg)**.

Magnesium deficiency typically causes **interveinal chlorosis** in older leaves.

Explanation:

- **(a) Mg: Ivory white of Paddy – Incorrect match.** Ivory white in paddy is due to **Sulphur** deficiency, not Magnesium.
- **(b) Zn: White bud of Maize – Correct.** Zinc deficiency in maize causes white bud, a well-known symptom.
- **(c) Mn: Marsh spot of peas – Correct.** Manganese deficiency leads to marsh spot disorder in peas.
- **(d) P: Purple discoloration of leaves – Correct.** Phosphorus deficiency commonly causes purpling of leaves, especially in young plants.

S93. Ans.(d)

Sol. Oat is used as an **indicator plant** for the herbicide **Oxadiazon**.

- Indicator plants are species that are particularly sensitive to specific chemicals and are used in bioassays to detect herbicide residues or activity.

Explanation of each option:

- **(a) Maize** – Not used as an indicator for Oxadiazon; it is relatively tolerant to several herbicides.
- **(b) Minor millets** – These are not commonly used as indicator plants for Oxadiazon.
- **(c) Sorghum stem borer** – This is an **insect pest**, not a plant, and hence not applicable here.
- **(d) Oat – Correct answer.** Sensitive to Oxadiazon, making it suitable as an indicator plant in herbicide studies.

S94. Ans.(d)

Sol. Dr. N.T. Yaduraju is the scientist known for his significant contributions to **soil solarization** research in India.

- Soil solarization is a non-chemical method for controlling soil-borne pests and weeds using solar energy by covering the soil with transparent polythene sheets during hot summer months.

Explanation:

- **(a) T.K. Das** – Known for work in weed science but not specifically for soil solarization.
- **(b) M.N. Raghunandan** – Not directly linked with soil solarization studies.
- **(c) K. Purushottam** – No prominent research association with soil solarization.
- **(d) Dr. N.T. Yaduraju – Correct answer.** Well-known for pioneering work in **weed management and soil solarization** in India.

S95. Ans.(b)

Sol. The scientists **Krishnan and Mukhtar Singh** selected Mean annual precipitation and mean annual PET (Potential Evapotranspiration) for climate classification.

- They developed a method to classify climates based on these parameters.

S96. Ans.(d)

Sol. Drought avoidance mechanisms help plants **maintain internal water balance** during dry conditions. The correct features include:

- **A. Early stomata closure** – Reduces transpiration.
- **B. Efficient root system** – Helps absorb water from deeper soil layers.
- **C. Lipid deposition on foliage** – Reduces water loss by forming a waxy cuticle.

However:

- **D. Reduction in water uptake** – This is **not** a drought-avoidance strategy; in fact, plants aim to **increase** water uptake during drought.
- **E. Straightening of leaves** – Not typically associated with drought avoidance; **leaf rolling or folding** is more common.

S97. Ans.(b)

Sol. Radhey, Gaurav, Avrodhi, and Anubhav are all popular **varieties of Gram (Chickpea)**. These varieties have been developed for higher yield, resistance to diseases like wilt and Ascochyta blight, and adaptability to various agro-climatic zones in India.

Explanation:

- **(a) Pigeonpea** – Includes varieties like UPAS 120, ICPL 87, not the ones mentioned here.
- **(b) Gram (Chickpea) – Correct answer.** All listed varieties belong to chickpea.
- **(c) Lentil** – Varieties include DPL-15, K-75, etc., not the ones listed in the question.
- **(d) Green gram** – Common varieties include Pusa Vishal, SML 668, which are different from the ones listed.

S98. Ans.(d)

Sol. The trade name for the herbicide mixture of 2,4-D and EPTC is **(d) Knoxweed.**

Here's:

- **2,4-D**: is a well-known herbicide used for broadleaf weed control.
- **EPTC**: is another herbicide, also used for weed control.
- According to ucanr.edu, the combination of 2,4-D and EPTC is marketed under the trade name "Knoxweed".
- Other trade names for 2,4-D include Weedone, Weedtrine-II, and others.
- EPTC is also known as Eptam.
- Mecoprop, also known as MCPP, has trade names like Mecopar, Kilprop, and others.
- Fenamine is not a known trade name for 2,4-D and EPTC.
- Astram is not a known trade name for 2,4-D and EPTC.

S99. Ans.(b)

Sol. Sorghum has the **highest albedo value** among the given crops.

- Albedo refers to the **reflectivity** of a surface—higher albedo means more solar radiation is reflected.
- Sorghum, with its **lighter canopy and broader leaves**, reflects more sunlight compared to other crops, making its albedo value higher.

Explanation:

- **(a) Redgram** – Has a lower albedo due to its sparse canopy and darker foliage.
- **(b) Sorghum – Correct answer.** Known for higher reflectivity due to its denser, lighter canopy.
- **(c) Green gram** – Lower albedo; smaller leaves and darker green canopy absorb more light.
- **(d) Maize** – Although it has broad leaves, its albedo is still lower than sorghum due to denser green canopy.

S100. Ans.(c)

Sol. An **SOI value less than -7** (i.e., strongly negative) typically **indicates El-Niño conditions**, which are associated with **reduced rainfall in India** and **abnormal warming of the central and eastern Pacific Ocean**.

- A negative SOI means the pressure over Tahiti is higher than over Darwin, Australia, disrupting normal monsoon patterns.

Explanation:

- **(a) More than 7** – Indicates **La Niña** conditions, not El-Niño.
- **(b) Exactly 7** – Not a recognized threshold; values must be significantly negative for El-Niño.
- **(c) Less than 7 – Correct answer.** Specifically, **SOI < -7** signals El-Niño.
- **(d) More than or equal to 7** – Also associated with La Niña, the opposite of El-Niño.

S101. Ans.(c)

Sol. First systematic scientific approach to tackle the problems of dry farming areas was initiated by **Tamhane in 1923 on a small plot at Manjri Farm near Pune** and the work passed on to kanitkar in 1926.

- A comprehensive scheme of research was drawn up by Kanitkar with financial support from the ICAR.

S102. Ans.(a)

Sol. Upon **hydrolysis**, **urea** breaks down in the presence of the enzyme **urease** to form **ammonia (NH_3)** and **carbon dioxide (CO_2)**.

These then combine in water to form **ammonium carbonate [$(NH_4)_2\ CO_3$]**, which increases soil pH temporarily and provides available nitrogen to plants.

Explanation:

- **(a) Ammonium carbonate – Correct answer.** This is the main product formed during urea hydrolysis in soil.
- **(b) Amides** – Urea itself is an amide; they are not formed as a product of its hydrolysis.
- **(c) Nitric acid** – Not produced during urea hydrolysis; it forms during nitrification of ammonia, not directly from urea.
- **(d) Biuret** – Formed during **urea condensation at high temperature**, not through hydrolysis.

S103. Ans.(d)

Sol. The inception of All India Coordinated Research Project on Agrometeorology during 1983 at CRIDA, **Hyderabad** was the culmination of the prompt response of ICAR to the recommendations of NCA.

S104. Ans.(b)

Sol. The **Drainage coefficient** is defined as the **depth of water (in cm)** that needs to be **removed from a unit area (typically 1 hectare) within 24 hours** to prevent waterlogging and ensure optimal crop growth. It helps in the design and capacity estimation of drainage systems in agricultural lands.

Explanation:

- **(a) Runoff coefficient** – It is a **dimensionless ratio** indicating how much rainfall becomes surface runoff, not measured in cm.
- **(b) Drainage coefficient – Correct answer.** Expressed in cm/day/ha; crucial for drainage planning.
- **(c) Total drainage water** – Refers to the **total volume** drained, not the standardized depth per unit area in 24 hrs.
- **(d) Net excess water** – Refers to water above field capacity or saturation, but not specifically the measure for drainage planning.

S105. Ans.(d)

Sol. To calculate the crop growth rate (CGR), we use the formula:

$$CGR = \frac{\text{Change in dry matter yield}}{\text{Time interval (days)}}$$

The dry matter yield in 30 days = 500 g
The dry matter yield in 45 days = 750 g
Change in dry matter yield = 750 g - 500 g = 250 g
Time interval = 45 days - 30 days = 15 days

Thus, the CGR $= \frac{250g}{15 \text{ days}} =$ 16.6 g/day.

S106. Ans.(c)

Sol. *Sesbania aculeata* adopts **salt exclusion** as its primary **salt tolerance mechanism**. This means it restricts the **entry of excessive salts** into its root system and vascular tissues, thereby maintaining ion balance and avoiding salt toxicity, which allows it to grow in saline soils.

Explanation:

- **(a) Salt excretion** – Seen in halophytes like mangroves, which excrete salt through glands; not applicable to *Sesbania aculeata*.
- **(b) Salt dilution** – Involves high water content to dilute internal salts; not a primary mechanism in this species.
- **(c) Salt exclusion – Correct answer.** Prevents salt entry, maintaining cellular homeostasis in saline conditions.
- **(d) Osmotic regulation** – Helps plants adjust osmotic pressure but is a secondary mechanism in *Sesbania aculeata*.

S107. Ans.(b)

Sol. Latin Square design is most suitable for experiments having a range of 4 to 8 treatments.

- This design ensures that each treatment appears only once in each row and column, minimizing experimental error.

S108. Ans.(c)

Sol. To calculate the average depth of irrigation, we use the formula:

$$\text{Depth of Irrigation} = \frac{\text{Total water applied}}{\text{Area irrigated}}$$

First, calculate the total water applied:
Water discharge = 300 liters/min,
Time = 60 hrs = 3600 minutes,
Total water applied = 300 × 3600 = 1,080,000 liters
Area irrigated = 2 ha = 20,000 m^2

Now, Depth of Irrigation $= \frac{1,080,000}{20,000} =$ 54 cm.

S109. Ans.(c)

Sol. The critical deficiency level of Boron (B) in soils is 0.1 mg/kg. This is the level at which Boron deficiency starts to impact plant growth.

S110. Ans.(b)

Sol. LEPA stands for **Low Energy Precision Application**, and it is a **modification of the sprinkler irrigation system**, particularly the **center pivot or lateral move systems**. LEPA delivers water **directly to the soil surface** through drop tubes and emitters, reducing evaporation and wind drift, thereby improving **water use efficiency**.

Explanation:

- **(a) Furrow irrigation** – Traditional surface irrigation method; not related to LEPA.
- **(b) Sprinkler system – Correct answer.** LEPA modifies this to apply water with minimal pressure and maximum precision.
- **(c) Check basin system** – Surface irrigation method with basin formation; not connected to LEPA.
- **(d) Tied-ridge system** – Soil moisture conservation technique, not the base of LEPA.

S111. Ans.(b)

Sol. Plant samples are typically dried at temperatures between 65°C and 80°C for laboratory analysis.

- This range is optimal to prevent loss of volatile compounds and ensure accurate measurements.

S112. Ans.(a)

Sol. The relationship between **crop yield and legumes** is generally considered **linear**, especially in crop rotations or intercropping systems.

- This is because legumes **fix atmospheric nitrogen**, improve soil fertility, and enhance the yield of subsequent or companion crops in a **direct and proportionate manner**.

Explanation:

- **(a) Linear – Correct answer.** As legume integration increases, crop yield tends to increase proportionally.
- **(b) Quadratic** – Indicates increasing then decreasing yield, which is not typical in legume-related yield response.
- **(c) Exponential** – Implies rapid, uncontrolled growth, which doesn't fit yield responses in field conditions.
- **(d) Sigmoid** – Suggests an S-shaped growth pattern, often used for plant growth curves, not for yield-legume relationships.

S113. Ans.(d)

Sol. Niger (Guizotia abyssinica) is known for its **tolerance to poor oxygen supply** and waterlogging conditions to some extent.

- It has a better ability to survive in soils with **low aeration**, which makes it suitable for cultivation in **poorly drained or heavy soils** where oxygen availability is limited.

Explanation:

- **(a) Groundnut** – Requires well-drained soils and is sensitive to low oxygen conditions and waterlogging.
- **(b) Sesame** – Also prefers well-aerated, light soils; not tolerant to poor oxygen supply.
- **(c) Safflower** – Grows well in deep, well-drained soils; not particularly tolerant of low oxygen.
- **(d) Niger – Correct answer.** More adaptable to poorly aerated soils and low oxygen availability.

S114. Ans.(b)

Sol. Paraquat is commonly available in the **SC (Soluble Concentrate)** formulation.

- It is a **non-selective, contact herbicide** used to control a wide range of annual weeds and grasses.
- The SC formulation allows for easy mixing in water and efficient foliar application.

Explanation:

- **(a) WP (Wettable Powder)** – Not the standard formulation for Paraquat.
- **(b) SC (Soluble Concentrate) – Correct answer.** Paraquat is most commonly marketed in this form.
- **(c) Scarification** – Not a formulation; it's a **seed treatment process**, unrelated to herbicide forms.
- **(d) Granule** – Paraquat is not typically available in granular form due to its contact action nature.

S115. Ans.(b)

Sol. Chlorimuron ethyl is a **systemic, selective herbicide** that is particularly effective against **broadleaf weeds**. It belongs to the **sulfonylurea group** and is commonly used in **soybean cultivation** to manage broadleaf weeds post-emergence.

Explanation:

- **(a) Creepers** – Not a specific weed category; chlorimuron ethyl is not categorized for general creeper control.
- **(b) Broadleaf weeds – Correct answer.** Chlorimuron ethyl is highly effective against a wide range of broadleaf weeds.
- **(c) Grasses** – It is not effective on grasses, which usually require graminicides.
- **(d) Sedges** – Chlorimuron ethyl does not effectively control sedges like *Cyperus* spp.

S116. Ans.(c)

Sol. The odd one out is **(c) *Striga*: Constipation** because **Striga** is a **parasitic weed** that is **not known for any beneficial or medicinal properties**. In contrast, the other three plants are well-recognized for their medicinal uses:

- *Leucas aspera* – Used traditionally to treat **snake bites** and insect stings.
- *Argemone mexicana* – Used in the treatment of **skin disorders** and as an antimicrobial.
- *Phyllanthus niruri* – Widely used in Ayurveda for treating **jaundice**, especially liver-related ailments.

S117. Ans.(b)

Sol. The optimum thickness of LDPE (Low-Density Polyethylene) film used for lining water ponds is 200-250 microns.

- This thickness provides sufficient durability while being cost-effective for pond lining.

S118. Ans.(d)

Sol. Stomatal closure type antitranspirants work by **inducing the closure of stomata**, thereby reducing water loss through transpiration.

- **Atrazine** (a herbicide with antitranspirant effect) and **PMA (Phenylmercuric acetate)** are both known to cause **stomatal closure**, making them effective in conserving plant water during drought conditions.

Explanation:

- **(a) Atrazine** – Has a **secondary effect** of stomatal closure in some crops.
- **(b) PMA – Classic antitranspirant**, directly causes **stomatal closure**.
- **(c) 2,4-D** – A selective herbicide; not used for antitranspirant purposes.
- **(d) Both (a) and (b) – Correct answer.** Both Atrazine and PMA can function as stomatal closure antitranspirants.

S119. Ans.(d)

Sol. Partial Factor Productivity (PFP) is a measure of **crop yield in relation to the amount of nutrient applied**, typically expressed as **yield per unit of nutrient applied or absorbed** (e.g., kg grain/kg N applied).

It helps in assessing the efficiency of nutrient use in crop production.

Explanation:

- **(a) Yield/unit of water absorbed** – Refers to **water use efficiency**, not PFP.
- **(b) Income/unit area** – Refers to **economic productivity**, not nutrient efficiency.
- **(c) Cost/unit area** – Relates to input cost analysis, not PFP.
- **(d) Yield/unit of nutrient absorbed – Correct answer.** This is the basis of PFP, indicating nutrient use efficiency.

S120. Ans.(b)

Sol. The **IW/CPE ratio** (Irrigation Water to Cumulative Pan Evaporation ratio) is a scheduling method for irrigation.

- For **wheat**, the optimum **IW/CPE ratio is around 0.9**, which means irrigation is applied when the cumulative pan evaporation reaches a level such that the ratio of irrigation water depth to CPE is 0.9, ensuring efficient water use and good yield.

Explanation:

- **(a) 0.5** – Too low; may lead to under-irrigation for wheat.
- **(b) 0.9** – **Correct answer.** Recommended IW/CPE ratio for scheduling irrigation in wheat.
- **(c) 1.2** – Higher than required; may cause over-irrigation.
- **(d) 1.5** – Excessive for wheat; not recommended under normal conditions.

S121. Ans.(b)

Sol. The **safe limit of nitrate ions (NO_3^-)** in **irrigation water** is generally considered to be **45 ppm (parts per million)**.

- Beyond this limit, high nitrate levels can be harmful to both crops and human health (especially through groundwater contamination and nitrate accumulation in edible plant parts).

Explanation:

- **(a) 30 ppm** – Safe, but below the upper recommended limit.
- **(b) 45 ppm** – **Correct answer.** Recognized threshold for safe use in irrigation.
- **(c) 60 ppm** – Above the recommended safe limit; may lead to nitrate toxicity in sensitive crops.
- **(d) >90 ppm** – Considered unsafe for both plants and humans due to potential contamination.

S122. Ans.(a)

Sol. The **Neutron probe method** is a **rapid and reliable in-situ technique** for measuring soil moisture.

- It uses **fast neutrons** that scatter when they collide with hydrogen atoms (primarily from water in the soil), allowing for a quick and accurate estimate of soil moisture content at different depths.
- **Explanation:**
- **(a) Neutron probe method – Correct answer.** Offers quick, accurate, and in-situ measurement of soil moisture.
- **(b) Electrical resistance method** – Slower response time and less accurate compared to neutron probes.
- **(c) Tensiometer method** – Measures soil moisture tension, not the actual moisture content, and works best only in moist soils.

S123. Ans.(d)

Sol. The correct formula for calculating **irrigation requirement (IR)** is: **IR = WR - (ER + S)** Where:

- **IR** = Irrigation Requirement
- **WR** = Water Requirement
- **ER** = Effective Rainfall
- **S** = Contribution from soil moisture

This formula accounts for the total water needed by the crop (WR), subtracting the water already available from rainfall (ER) and soil storage (S).

Explanation:

- **(a) IR = WR** – Ignores rainfall and soil moisture contribution.
- **(b) IR = WR + ER** – Incorrect; adds rainfall instead of subtracting it.
- **(c) IR = ER - (WR + S)** – Illogical; would result in negative irrigation in most cases.
- **(d) IR = WR - (ER + S)** – **Correct answer.** Reflects the actual irrigation need after accounting for natural sources.

S124. Ans.(c)

Sol. Abscisic Acid (ABA) is the hormone predominantly produced by plants under **severe drought or water stress conditions**.

- ABA plays a crucial role in **closing stomata**, reducing transpiration, and triggering other stress-response mechanisms that help plants conserve water.

Explanation:

- **(a) NAA (Naphthalene Acetic Acid)** – A synthetic auxin, not involved in drought response.
- **(b) Ethylene** – Involved in stress responses and fruit ripening, but not the primary drought hormone.
- **(c) ABA (Abscisic Acid)** – **Correct answer.** Known as the **stress hormone**, it helps plants tolerate drought.
- **(d) GA (Gibberellic Acid)** – Promotes growth; typically downregulated during drought stress.

S125. Ans.(b)

Sol. Nitrate fertilizers are **highly soluble** and **most susceptible to leaching** losses because nitrates do not bind well to soil particles and are easily moved with water through the soil profile.

- This makes them a major concern in areas with heavy rainfall or excessive irrigation.

Explanation:

- **(a) Ammonical fertilizers** – Less prone to leaching as ammonium ions can adhere to soil particles.
- **(b) Nitrate fertilizers** – **Correct answer.** Highly soluble and easily leached from the root zone.
- **(c) Amide fertilizers** – Like urea, moderately prone to leaching after hydrolysis but less than nitrates.

S126. Ans.(d)

Sol. Mustard crop is considered ready for harvest when about **75–80% of the pods turn yellowish-brown**.

- At this stage, the seeds have matured and hardened, and delaying harvest beyond this can lead to shattering losses.

Explanation:

- **(a) Greenish-yellow** – Indicates immature pods; not the right time for harvest.
- **(b) Brown** – May be over-mature; could lead to seed shattering.
- **(c) Yellowish-green** – Still immature for harvesting.
- **(d) Yellowish-brown** – **Correct answer.** Signifies proper maturity and readiness for harvesting.

S127. Ans.(b)

Sol. The **'A' value concept** was proposed by **Fried and Dean** to **quantify the availability of nutrients from soil and fertilizers**, particularly using isotopic techniques.

· It helps in determining the proportion of a nutrient (like phosphorus) taken up from fertilizer versus that from soil.

Explanation:

- **(a) Mitscherlich** – Known for the **law of diminishing returns**, not related to the 'A' value.
- **(b) Fried and Dean – Correct answer.** Introduced the 'A' value concept in nutrient uptake studies using isotopes.
- **(c) Wilcox** – Known for work on **salinity and irrigation water quality**, not 'A' value.
- **(d) Watson** – Not associated with the 'A' value concept.

S128. Ans.(b)

Sol. Phosphorus availability to plants is **maximum in the soil pH range of 6.0 to 6.5**.

- In this slightly **acidic range**, phosphorus remains in soluble forms readily available to plants.
- Outside this range, it tends to form insoluble compounds with iron, aluminum (in acidic soils), or calcium (in alkaline soils), reducing its availability.

Explanation:

- **(a) 7 – 7.5** – Slightly alkaline; phosphorus begins to react with calcium and becomes less available.
- **(b) 6 – 6.5 – Correct answer.** Optimal pH for phosphorus solubility and plant uptake.
- **(c) 8 – 8.5** – Highly alkaline; phosphorus forms insoluble calcium phosphates.
- **(d) >8.5** – Strongly alkaline; phosphorus availability drastically decreases.

S129. Ans.(a)

Sol. In the **check basin method of irrigation**, approximately **20% of the total field area** is occupied by **field channels and bunds**.

- This reduces the effective cultivable area but is acceptable due to the method's efficiency in water distribution and control.

Explanation:

- **(a) 20% – Correct answer.** This is the standard area lost to bunds and channels in check basin irrigation.
- **(b) 30%** – Higher than normal; not typical under standard check basin design.
- **(c) 40%** – Excessive area loss; not efficient for this method.
- **(d) >50%** – Not feasible for agricultural use; would severely limit cultivation area.

S130. Ans.(b)

Sol. Heavy metals are typically defined as chemical elements that have a **specific gravity at least 5 times** (commonly rounded to **4 or 5 times**) that of water.

- However, in many scientific definitions, the threshold used is **4 times the specific gravity of water**.

Explanation:

- **(a) 6** – Higher than the standard threshold; not commonly used for defining heavy metals.
- **(b) 4 – Correct answer.** Widely accepted lower limit for specific gravity to classify heavy metals.
- **(c) 2** – Too low; includes many non-heavy elements.
- **(d) 1** – Same as water; not applicable to defining heavy metals.

S131. Ans.(d)

Sol. Urea is an organic fertilizer that contains nitrogen in the **amide form (–NH_2)**.

- Once applied to soil, it is **hydrolyzed by the enzyme urease** into ammonium carbonate, which then converts into **ammonium (NH_4^+)** and can further be converted into nitrate (NO_3^-) through nitrification.

Explanation:

- **(a) Nitrate** – Not present in urea; forms later through soil microbial activity.
- **(b) Nitrite** – Not a component of urea; may occur transiently during nitrification.
- **(c) Ammonical** – Formed **after** hydrolysis, not present in original urea.
- **(d) Amide – Correct answer.** Urea contains nitrogen in the amide form.

S132. Ans.(b)

Sol. The **Walkley and Black method** is a widely used chemical method for the **estimation of organic carbon** in soils.

- Since **soil nitrogen is closely associated with organic matter**, this method is often used indirectly in the estimation of **organic nitrogen content** in soil fertility studies.

Explanation:

- **(a) Potash** – Estimated using flame photometry or ammonium acetate method, not Walkley and Black.
- **(b) Nitrogen – Correct answer.** Organic carbon is estimated, which helps in assessing organic nitrogen indirectly.
- **(c) Sulphur** – Estimated using turbidimetric or other chemical methods.
- **(d) Phosphorus** – Olsen's or Bray's method is used for its estimation, not Walkley and Black.

S133. Ans.(a)

Sol. Hemochromatosis is a metabolic disorder caused by **excessive accumulation of iron** in the body.

- It leads to iron overload in organs such as the liver, heart, and pancreas, which can cause serious complications like liver cirrhosis, heart disease, and diabetes if not treated.

Explanation:

- **(a) More Iron – Correct answer.** Hemochromatosis is directly linked to iron overload.
- **(b) Less Iron** – Causes iron-deficiency anemia, not hemochromatosis.
- **(c) More Zinc** – High zinc can interfere with copper absorption but doesn't cause hemochromatosis.
- **(d) Less Zinc** – Leads to growth retardation and immune issues, unrelated to hemochromatosis.

S134. Ans.(b)

Sol. The typical phosphorus concentration in fertile arable soil ranges from 0.3 to 3 ppm.

- This is considered an optimal range for plant growth, where phosphorus is readily available for uptake by crops.

S135. Ans.(c)

Sol. Lettuce seeds exhibit **photodormancy**, which means their germination is influenced by light.

- In such seeds, dormancy can be effectively broken by exposure to **red light**, which activates the **phytochrome system**, promoting germination.

Explanation:

- **(a) Pea** – Generally does not require red light; dormancy is not light-sensitive.
- **(b) Gram** – Not influenced by red light; dormancy is usually hard-seeded type.
- **(c) Lettuce – Correct answer.** Red light effectively breaks dormancy via the phytochrome mechanism.
- **(d) Castor** – Dormancy is not primarily broken by red light; requires other treatments.

S136. Ans.(c)

Sol. Lysine is an **essential amino acid**, meaning it **cannot be synthesized by the human body** and must be obtained through the diet.

- It is crucial for protein synthesis, enzyme production, and calcium absorption.

Explanation:

- **(a) Proline – non-essential** amino acid; the body can synthesize it.
- **(b) Serine – non-essential**; can be synthesized from other metabolites.
- **(c) Lysine – Correct answer.** Essential amino acid needed from dietary sources.
- **(d) Alanine – non-essential**; synthesized by the body from pyruvate.

S137. Ans.(c)

Sol. The **National Food Security Mission (NFSM)** was launched by the **Ministry of Agriculture and Farmers Welfare**, Government of India, in 2007-08.

- The mission aims to **increase the production of rice, wheat, pulses, and coarse cereals** through area expansion and productivity enhancement in a sustainable manner.

Explanation:

- **(a) Ministry of Commerce and Industries** – Deals with trade and industry, not agricultural production schemes.
- **(b) Ministry of Environment** – Focuses on environmental conservation, not directly involved in crop production missions.
- **(c) Ministry of Agriculture and Farmer's Welfare – Correct answer.** Officially responsible for NFSM implementation.
- **(d) Ministry of Agriculture Marketing** – Not a standalone ministry; marketing is a department under the Agriculture Ministry.

S138. Ans.(c)

Sol. In **groundnut cultivation**, **deep ploughing** should be avoided because it **delays peg penetration and pod development**.

- Groundnut plants form pegs after flowering, which need to penetrate the soil to develop pods.
- Deep, loose soil can hinder proper peg anchorage and timely pod formation.

Explanation:

- **(a) Delays harvesting** – Not directly affected by ploughing depth.
- **(b) Delays germination** – Germination is more influenced by seedbed condition and moisture, not deep ploughing.
- **(c) Delays peg formation and pod development – Correct answer.** Deep ploughing can disturb the ideal firmness needed for peg penetration.
- **(d) Makes harvesting difficult** – Not a primary concern from deep ploughing; rather the opposite in some cases.Top of FormBottom of Form

S139. Ans.(c)

Sol. The funding ratio for the Mission on Integrated Development of Horticulture (MIDH) scheme is 60% from the central government and 40% from the state government.

S140. Ans.(c)

Sol. Under the aegis of Pradhan Mantri Mudra Yojana (PMMY), MUDRA has created products/ schemes. The interventions have been named 'Shishu', 'Kishore' , 'Tarun' and 'Tarun Plus' to signify the stage of growth / development and funding needs of the beneficiary micro unit / entrepreneur and also provide a reference point for the next phase of graduation / growth to look forward to:

- Shishu: covering loans upto 50,000/-
- Kishor: covering loans above 50,000/- and upto 5 lakh
- Tarun: covering loans above 5 lakh and upto 10 lakh
- Tarun Plus: covering loans above 10 lakh and upto 20 lakh

S141. Ans.(b)

Sol. The odd one out is **(b) DAP to N: 5.55**, because this conversion factor is incorrect.

Correct conversion factors:

- **SSP (Single Super Phosphate) to P**: 6.25 (Correct)
- SSP contains ~16% P_2O_5, and the factor to convert P_2O_5 to elemental P is 0.437.
- So, 1 kg P = 2.29 kg P_2O_5 ⇒ 1/0.16 = **6.25**
- **Potassium sulphate (K_2SO_4) to K**: 2.1 (Correct)
- K_2SO_4 contains ~50% K_2O, conversion factor K_2O to K = 0.83
- So, 1 kg K = 1/0.476 = **~2.1**
- **Ammonium sulphate to N**: 4.76 (Correct)
- Ammonium sulphate contains ~21% N
- 1 kg N = 1/0.21 = **4.76**

But:

- **DAP (Diammonium Phosphate) to N**: DAP contains **18% N**, not 5.55 factor
- 1 kg N = 1/0.18 = **5.55** is mathematically correct
- **BUT** in this context, DAP is mainly considered for **P**, not N
- So, using DAP to N as a standard conversion is **unusual and contextually odd**

Hence, the **odd one out** is (b).

S142. Ans.(c)

Sol. The number of mandis integrated into the digital platform includes Tamil Nadu (157), Rajasthan (145), Gujarat (144), Madhya Pradesh (139), Maharashtra (133), Uttar Pradesh (125) and Haryana (108).

S143. Ans.(d)

Sol. Tobacco crops should not be irrigated with water containing more than 50 ppm (or 50 mg/L) chloride.

S144. Ans.(d)

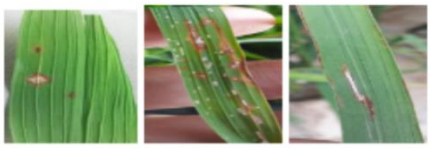
Sol. According to the final estimates released by the Department of Agriculture and Farmers Welfare, the maximum total food grain production for the year 2023-24 is estimated at **332.298 million tonnes.**

S145. Ans.(d)

Sol. Both **Tungro disease** and **Bacterial leaf blight (BLB)** are considered *killer diseases* of rice due to their severe impact on crop yield and plant health.

- **Tungro disease** is a viral disease transmitted by green leafhoppers and can cause stunted growth and yellow-orange discoloration, leading to major yield loss.
- **Bacterial leaf blight**, caused by *Xanthomonas oryzae pv. oryzae*, leads to wilting of seedlings and drying of leaves, severely affecting productivity.

SN	Class Name	Description	Sample Images
1	Bacterial Blight	Dimension - 300*300 Formats - jpg Quantity - 1584	
2	Blast	Dimension - 300*300 Formats - jpg Quantity - 1440	
3	Brown Spot	Dimension - 300*300 Formats - jpg Quantity - 1600	
4	Tungro	Dimension - 300*300 Formats - jpg Quantity - 1308	

SN	Class Name	Description	Sample Images
1	Bacterial Blight	Dimension - 300*300 Formats - jpg Quantity - 1584	
2	Blast	Dimension - 300*300 Formats - jpg Quantity - 1440	
3	Brown Spot	Dimension - 300*300 Formats - jpg Quantity - 1600	
4	Tungro	Dimension - 300*300 Formats - jpg Quantity - 1308	

S146. Ans.(a)

Sol. According to the Soil Health Card scheme guidelines, as per a press release by the Press Information Bureau on December 17, 2024, states are to generate Soil Health Cards once every three years.

- This periodic renewal allows for the monitoring of soil nutrient status and provides updated recommendations for nutrient management.
- The three-year cycle helps in tracking changes in soil health over time, enabling farmers to adopt appropriate measures for maintaining soil fertility and productivity.
- **The Soil Health Card Scheme** was introduced by Prime Minister Shri Narendra Modi on **19th February, 2015** at **Suratgarh, Rajasthan**.
- The scheme was launched to assist State Governments to issue soil health cards to all farmers in the country.
- Soil health card provides information to farmers on nutrient status of their soil along with recommendation on appropriate dosage of nutrients to be applied for improving soil health and its fertility.
- The Soil Health Card contains status of the soil with respect to 12 parameters, namely **N, P, K, S (Macro-nutrients); Zn, Fe, Cu, Mn, Bo (Micro - nutrients); and pH (Acidity or Basicity), EC (Electrical Conductivity) and OC (Organic Carbon)**.
- Based on this, the card will also indicate fertilizer recommendations and soil amendment required for the farm.
- Soil Samples are taken generally two times in a year, after harvesting of Rabi and Kharif Crop respectively or when there is no standing crop in the field.
- Soil Health Card scheme has been merged in **Rashtriya Krishi Vikas Yojana (RKVY)** scheme as one of its components under the name ' **Soil Health & Fertility**' from the year 2022-23.

Key Objectives of Soil Health Card:

1. Capacity building of district and state-level staff for promotion of nutrient management practices.
2. Strengthen the functioning of soil testing laboratories and associated infrastructure.
3. To promote soil test-based nutrient management across the country.
4. To diagnose soil fertility-related constraints with standardized procedures and analyze and design fertilizer recommendations.
5. To issue soil health cards to all farmers across the country.

S147. Ans.(c)

Sol. Sulfonylureas and imidazolinones are **ALS (Acetolactate Synthase) inhibitors**, also known as AHAS (Acetohydroxyacid Synthase) inhibitors.

- ALS is a crucial enzyme involved in the biosynthesis of **branched-chain amino acids** — valine, leucine, and isoleucine — which are essential for plant growth and development.
- These herbicides work by blocking the ALS enzyme, thus halting the production of these amino acids, ultimately leading to plant death.
- This group is highly effective at **low application rates** and is **selective** in many crops due to differential metabolism or resistance.
- They are **systemic**, moving through the plant to reach the site of action.

Explanation:

- **(a) Electron transport depletion** – This is not correct for sulfonylureas or imidazolinones. This mode of action refers to herbicides like paraquat, which disrupt photosynthesis by interfering with electron transport in photosystem I.

- **(b) Lipid synthesis inhibition** – This is seen in herbicides like **ACCase inhibitors** (e.g., aryloxyphenoxypropionates), which block fatty acid synthesis in grasses. Not applicable to sulfonylureas/imidazolinones.
- **(c) ALS inhibitors – Correct.** Sulfonylureas and imidazolinones inhibit ALS, preventing the synthesis of essential amino acids, leading to stunted growth and death.
- **(d) EPSP inhibitors** – EPSP synthase inhibitors, such as **glyphosate**, block the shikimate pathway involved in the synthesis of aromatic amino acids. This is a different mode of action than ALS inhibition.

Thus, the correct answer is **(c) ALS inhibitors**.

S148. Ans.(b)

Sol. The Economic Survey 2023-24 reports that the share of the agriculture sector in India's overall Gross Value Added (GVA) at current prices for the financial year 2023-24 was **17.7%**.

This reflects the agriculture sector's contribution to the nation's economy during that period.

S149. Ans.(c)

Sol. Under the **Pradhan Mantri Fasal Bima Yojana (PMFBY)**, the premium rates payable by farmers are **highly subsidized** to make crop insurance affordable. For **Rabi crops**, the **maximum insurance premium** a farmer has to pay is **1.5% of the sum insured or actuarial rate, whichever is less**.

- This applies to major Rabi crops like wheat, barley, gram, mustard, etc.
- The remaining premium is subsidized and paid by the Central and State Governments on a 50:50 basis.

Explanation:

- **(a) 2%** – This rate is applicable for **Kharif crops**, not Rabi crops.
- **(c) 1.5% – Correct.** This is the maximum rate a farmer pays for Rabi crops under PMFBY.
- **(d) 5%** – Yearly commercial or horticultural crops it will be 5%.
- Hence, the correct answer is **(c) 1.5%**.

S150. Ans.(b)

Sol. The correct answer is (b) Both the statements are correct, but statement 2 is not the correct explanation of statement 1.

Explanation:

- Bajra (Pearl Millet) is predominantly grown in states like Rajasthan, Uttar Pradesh, and Gujarat.
- These regions have suitable climatic conditions and soil types for Bajra cultivation.
- On the other hand, Ragi (Finger Millet) is mainly cultivated in Karnataka and Tamil Nadu. These states have the ideal agro-climatic conditions for Ragi. **Hence, statement 1 is correct.**
- Bajra grows well in sandy and shallow black soils.
- These soil types provide good drainage and are suitable for the growth of Bajra.
- Conversely, Ragi thrives in red and shallow black soil.
- These soils are well-drained and retain adequate moisture, which is essential for Ragi cultivation. **Hence, statement 2 is correct.**

- However, **while both statements are correct individually, statement 2 does not serve as an explanation for statement 1.**
- The geographic regions where Bajra and Ragi are grown are influenced by various factors, including climate and soil type, but statement 2 does not explicitly connect these factors to the regions mentioned in statement 1. **Hence, statement 2 is not the correct explanation of statement 1.**

Key Points:

- **Bajra (*Pearl Millet*)** is a significant crop in arid and semi-arid regions of India.
- It is known for its drought resistance and ability to grow in poor soil conditions.
- It is a staple food in many parts of India and is used to make various traditional dishes.
- **Ragi (*Finger Millet*)** is rich in calcium and dietary fiber.
- It is a crucial crop for food security in regions with low rainfall.
- Ragi is consumed in various forms, including flour. porridge, and malt.
- The **cultivation of both Bajra and Ragi** contributes to the livelihood of many farmers in India.
- They are essential for ensuring food security and nutritional needs in rural areas.