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Complete Syllabus • Conceptual Flowcharts • Comparative Tables • Solved Practice Questions

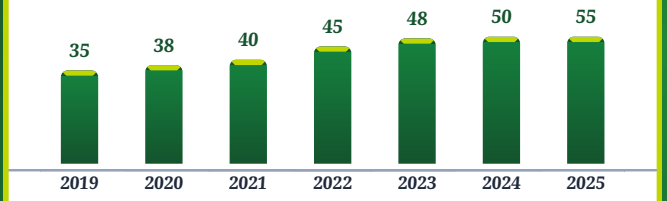
AGRICULTURE SCIENCE, ANIMAL HUSBANDRY, LAND REVENUE & RURAL DEV

Agronomy, Soil Science, Irrigation, Horticulture, Animal Husbandry & Livestock Breeds, Fisheries, Agricultural Economics (MSP/e-NAM), UP Revenue Code 2006, Land Measurement Units (Gunter/Shahjahani/Bigha), Panchayati Raj & Rural Schemes

Topic-Wise Exam Weightage Distribution (%)



Previous Years' Question Trend Analysis



Target Competitive, Entrance & Departmental Examinations

NABARD Grade A & B • IBPS AFO • UP Lekhpal • Gram Vikas Adhikari (VDO) • UPSSSC AGTA • State PCS

Core Syllabus Pillars & Exam Question Weightage (%)

- Agronomy, Cropping Systems, Cereals/Pulses/Oilseeds & Horticulture (24%)
- Soil Science, Plant Nutrients, Fertilizers (N:P:K 4:2:1) & Irrigation (20%)
- Animal Husbandry, Dairy Breeds (Cattle, Buffalo, Goat, Sheep) & Fisheries (18%)
- Agricultural Credit, CACP & MSP, KCC, NABARD, e-NAM & PMFBY (16%)
- UP Revenue Code 2006, Land Survey (Jarib/Bigha/Khasra), PRIs & Rural Schemes (22%)

Complete Theory
NCERT & Official Sources

Visual Flowcharts
Comparative Matrices

Memory Tricks
Exam Trap Alerts

75+ Solved MCQs
One-Liner Capsules

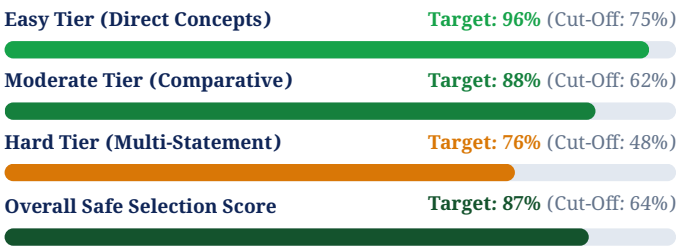
Preface, Exam Weightage Dashboard & Study Strategy — AGRICULTURE SCIENCE, ANIMAL HUSBANDRY, LAND REVENUE & RURAL DEV

IUC Academy (Inclusive Universal Careers Academy | www.iucacademy.com) • Official English Medium Study Notes

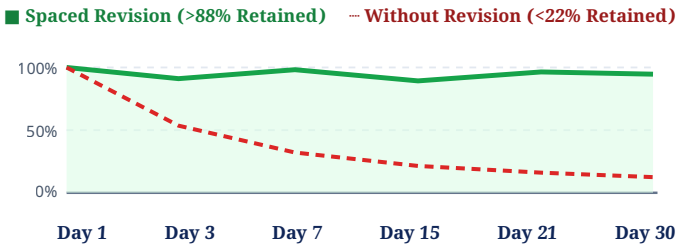
Dear Aspirants,

Modern competitive, entrance, and departmental promotion examinations demand a combination of deep conceptual clarity, statutory precision, and rapid revision tools. Prepared by **Inclusive Universal Careers Academy (IUC Academy — www.iucacademy.com)**, these comprehensive English-medium study notes integrate **structured chapter theory, 4-node conceptual process flowcharts, multi-column comparative tables, inline mathematical/scientific formulas, 'Did You Know?' boxes, 'Exam Trap Alert' callouts, 'Memory Trick' mnemonics, Chapter-End Analytical Synthesis Matrices, 75+ Step-by-Step Solved MCQs, and Rapid-Fire One-Liner Revision Capsules**.

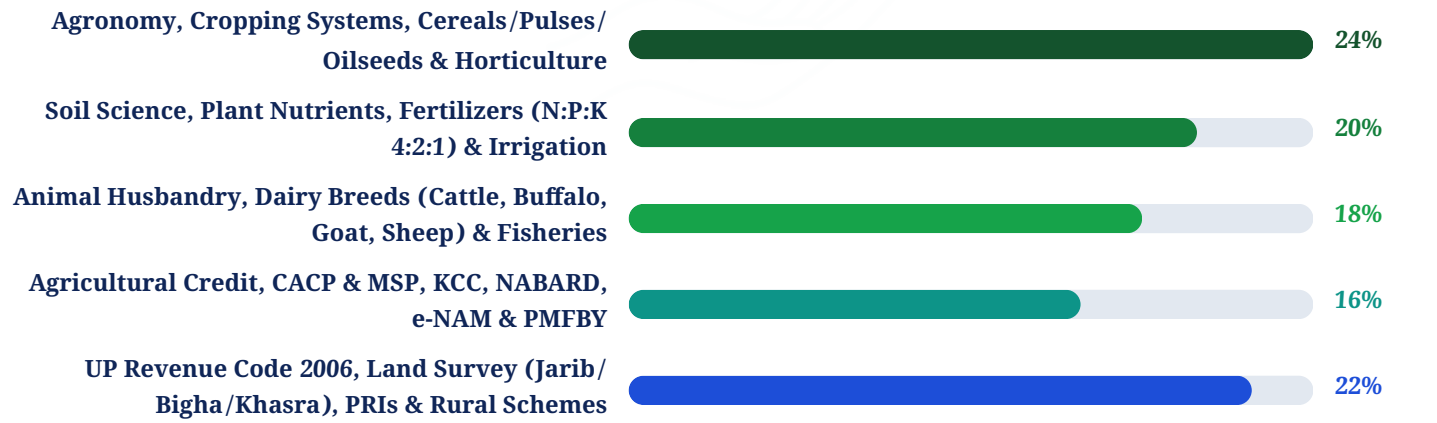
Target Accuracy vs Qualifying Cut-Off Benchmark (%)



Spaced Revision (1-3-7-21 Day Rule) & Retention Curve



Topic-Wise Exam Question Weightage Index (%)



Verified Official Curriculum & Statutory Reference Portals

- **Indian Council of Agricultural Research (ICAR)** (https://icar.org.in/)
- **UP Board of Revenue Official Portal** (https://bor.up.gov.in/)
- **NCERT Official Textbooks** (https://ncert.nic.in/textbook.php)
- **IUC Academy Official Portal** (https://www.iucacademy.com)

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- 1.3 Cropping Systems, Cropping Intensity and Agronomic Indices

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9. Solved Exam Practice Questions (MCQs)
10. Extended Comparative & Analytical Practice Set (Questions 36–75)
11. Rapid-Fire Last-Minute One-Liner Revision Capsule

Published by: Inclusive Universal Careers Academy (IUC Academy)

Authoritative Statutory & Scientific Sources: Indian Council of Agricultural Research (ICAR) and Board of Revenue, Uttar Pradesh

Chapter *1:* Principles of Agronomy, Agro-Climatic Zones & Cropping Systems in India

Chapter Key Study Pillars — Chapter 1: Principles of Agronomy, Agro-Climatic Zones & Cropping Systems in India

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Fundamentals of Agronomy and Classification of Field Crops	**Agro-Climatic and Agro-Ecological Zones of India**	**Cropping Systems, Cropping Intensity and Agronomic Indices**

1.1 Fundamentals of Agronomy and Classification of Field Crops

• **Etymological Foundation and Scope:** Agronomy is derived from the Greek words *Agros* (field) and *Nomos* (to manage), representing the specialized branch of agricultural science recorded by the Indian Council of Agricultural Research (ICAR) that deals with principles and practices of crop production and field management.

• **Seasonal Classification of Indian Crops:** Indian cropping seasons are divided into three major categories based on thermal and photoperiodic requirements: **Kharif** (June–October, warm wet monsoon season requiring short day length for flowering, e.g., Paddy, Maize, Sorghum, Pearl Millet, Cotton, Soybean, Pigeon Pea), **Rabi** (October–March, cool dry winter season requiring long day length for reproductive initiation, e.g., Wheat, Barley, Mustard, Chickpea, Lentil, Linseed, Pea), and **Zaid** (March–June, hot dry summer season between Rabi and Kharif, e.g., Watermelon, Muskmelon, Cucumber, Summer Moong, Forage Maize).

• **Botanical and Economic Classification:** Cereals belong to the family *Poaceae* (Gramineae) and serve as starch-rich staple grains; pulses belong to *Fabaceae* (Leguminosae) and fix atmospheric nitrogen via symbiotic *Rhizobium* bacteria in root nodules; oilseeds belong to *Brassicaceae* (Mustard), *Fabaceae* (Peanut/Soybean), *Pedaliaceae* (Sesame), and *Asteraceae* (Sunflower/Safflower).

• **Photoperiodism and Vernalization:** Discovered by Garner and Allard (1920), photoperiodism governs floral initiation based on day length: **Short-Day Plants (SDP)** require less than 12 hours of daylight (Rice, Soybean, Sorghum, Tobacco), **Long-Day Plants (LDP)** require more than 14 hours of daylight (Wheat, Barley, Oat, Sugarbeet), and **Day-Neutral Plants (DNP)** flower irrespective of photoperiod (Cotton, Sunflower, Tomato, Maize, Buckwheat).

• **Tillage Concepts and Conservation Agriculture:** Father of Tillage **Jethro Tull** authored *Horse Hoeing Husbandry* (1731) and introduced the terms "weed" and "zero tillage." Primary tillage opens compact soil using implements like Mouldboard Plough, Disc Plough, and Sub-soiler, whereas secondary tillage prepares a fine seedbed (tilth) using Cultivators, Disc Harrows, and Plankers. Zero tillage (No-Till) uses the Happy Seeder or Zero-Till Seed-cum-Fertilizer Drill in the Rice–Wheat system of the Indo-Gangetic Plains to conserve soil moisture, reduce *Phalaris minor* infestation, and prevent crop residue burning.

1.2 Agro-Climatic and Agro-Ecological Zones of India

• **Planning Commission vs. NBSS&LUP Classification:** The Planning Commission of India (1989, Seventh Five-Year Plan) delineated **15 Agro-Climatic Zones** based on physiography, rainfall, temperature, and soil characteristics, whereas the National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) under the Indian Council of Agricultural Research (ICAR) classified India into **20 Agro-Ecological Regions (AERs)** based on physiography, bioclimate, and Length of Growing Period (LGP).

• **NARP Sub-Zonal Framework:** Under the National Agricultural Research Project (NARP) launched by the Indian Council of Agricultural Research (ICAR), the country is further divided into **127 Agro-Climatic Sub-Zones** (subsequently expanded to *131* with state reorganizations) to tailor location-specific varieties and agronomic packages.

• **Agro-Climatic Zones of Uttar Pradesh:** Uttar Pradesh falls primarily across three Planning Commission zones (Zone *4*: Middle Gangetic Plains, Zone *5*: Upper Gangetic Plains, and Zone *8*: Central Plateau and Hills) and is subdivided by the State Agriculture Department into **9 Agro-Climatic Zones**: Bhabhar and Tarai Zone, Western Plains Zone, Mid-Western Plains Zone, South-Western Semi-Arid Zone, Central Plains Zone, Bundelkhand Zone, North-Eastern Plains Zone, Eastern Plains Zone, and Vindhyan Zone.

• **Dryland Farming Categories:** Based on annual precipitation documented by the Indian Council of Agricultural Research (ICAR), dryland agriculture is categorized into three distinct regimes: **Dry Farming** (annual rainfall **< 750 mm**, LGP **< 75 days**, frequent crop failures, arid regions), **Dryland Farming** (annual rainfall **750–1150 mm**, LGP **75–120 days**, semi-arid regions, moisture conservation critical), and **Rainfed Farming** (annual rainfall **> 1150 mm**, LGP **> 120 days**, humid and sub-humid regions, drainage management required).

1.3 Cropping Systems, Cropping Intensity and Agronomic Indices

• **Cropping Pattern vs. Cropping System:** Cropping pattern refers to the yearly sequence and spatial arrangement of crops and fallow on a given area, whereas cropping system encompasses the cropping pattern plus its interaction with farm resources, technology, and environment.

• **Multiple Cropping Variations: Intercropping** grows two or more crops simultaneously in definite row ratios (e.g., Wheat + Mustard in **9:1** ratio; Chickpea + Linseed in **4:2** ratio; Pigeon Pea + Sorghum in **1:2** ratio); **Mixed Cropping** mixes seeds without distinct row arrangement as insurance against weather aberration; **Relay Cropping** (Paira/Utera cropping) sows the second crop after the first crop has reached its reproductive stage but before harvest (e.g., sowing Lathyrus or Lentil in standing Paddy fields); **Alley Cropping** grows arable crops between hedgerows of leguminous shrubs like *Leucaena leucocephala* (Subabul).

• **Quantitative Agronomic Indices:**

• **Cropping Intensity (CI):** CI = ((Gross Cropped Area (GCA) / Net Sown Area (NSA))) × 100. India's national average Cropping Intensity exceeds **151%**, while Uttar Pradesh exceeds **162%**.

• **Land Equivalent Ratio (LER):** LER = Σ \frac{Y_{ij}}{Y_{ii}}, where Y_{ij} is intercrop yield and Y_{ii} is sole crop yield. An LER > 1.0 indicates that intercropping is biologically advantageous over monocropping.

• **Harvest Index (HI):** HI = ((Economic Yield (Grain) / Biological Yield (Grain + Straw))) × 100, introduced by Donald (1962).

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1
Agro-Climatic Assessment & Soil Tilth Preparation

STEP 2
Certified Seed Treatment (FIR: Fungicide-Insecticide-Rhizobium)

STEP 3
Critical Stage Irrigation & Integrated Nutrient Application

STEP 4
Physiological Maturity Harvesting & Post-Harvest Storage

Crop Name (Botanical Name)	Family & Chromosome (2n)	Optimum Seed Rate & Spacing	Critical Irrigation Stages	Major Herbicides & Key Varieties
Paddy / Rice (*Oryza sativa*)	Poaceae (2n = 24)	Transplanted: **20–25 kg/ha** (Fine), **30–35 kg/ha** (Coarse); SRI: **5–7.5 kg/ha**; Dapog: **1.5–3 kg/sq.m** (**20 × 10 cm**)	Tillering, Panicle Initiation (PI), Booting, Flowering, Milking	Bispyribac-sodium, Butachlor, Pretilachlor; Varieties: IR-8, Jaya, Pusa Basmati-1121, Swarna Sub-1
Wheat (*Triticum aestivum*)	Poaceae (2n = 42, Hexaploid)	Timely Normal: **100 kg/ha**; Late/Broadcast: **125 kg/ha**; Dibbling: **25–30 kg/ha** (**22.5 × 10 cm**)	Crown Root Initiation (CRI at **21 DAS** - Most Critical), Late Tillering, Jointing, Flowering, Milking, Dough	Sulfosulfuron, Clodinafop-propargyl, 2,4-D; Varieties: HD-2967, HD-3226, DBW-187 (Karan Vandana)
Maize (*Zea mays*)	Poaceae (2n = 20)	Kharif Hybrid: **20–25 kg/ha**; Composite: **15–20 kg/ha**; Fodder: **40–50 kg/ha** (**60 × 20 cm**)	Tasseling (Male flowering) and Silking (Female flowering - Most Critical)	Atrazine, Tembotrione; Varieties: Ganga-1, Shakti-1 (QPM rich in Lysine & Tryptophan)
Chickpea / Gram (*Cicer arietinum*)	Fabaceae (2n = 16)	Desi Small: **60–80 kg/ha**; Kabuli Large: **80–100 kg/ha** (**30 × 10 cm**, depth **8–10 cm**)	Pre-flowering (**45 DAS**) and Pod Development (**75 DAS**); Never irrigate during peak flowering	Pendimethalin (Pre-emergence), Imazethapyr; Varieties: Pusa-256, Aparna (Green seeded), Avrodhi (Wilt resistant)
Pigeon Pea / Arhar (*Cajanus cajan*)	Fabaceae (2n = 22)	Early Maturing: **15–18 kg/ha**; Long Duration: **12–15 kg/ha** (**60 × 15 cm** or **75 × 20 cm**)	Branching, Flower Initiation, and Pod Filling (Highly sensitive to waterlogging)	Pendimethalin, Quizalofop-ethyl; Varieties: UPAS-120 (Early), Bahar, Prabhat (Extra early)
Indian Mustard (*Brassica juncea*)	Brassicaceae (2n = 36)	Pure Crop: **4–5 kg/ha**; Mixed/Intercrop: **1.5–2 kg/ha** (**45 × 15 cm**, depth **3–4 cm**)	Rosette Stage (**30–35 DAS**) and Siliqua Formation (**60–65 DAS**)	Oxadiargyl, Pendimethalin; Varieties: Pusa Bold, Varuna (T-59), Pusa Jai Kisan (Bio-902, Somaclonal variant)
Sugarcane (*Saccharum officinarum*)	Poaceae (2n = 80)	3-budded setts: **35,000–40,000 setts/ha** (**60–75 quintals/ha**, row spacing **75–90 cm**)	Formative Stage (**60–130 DAS** - Maximum water requirement) and Grand Growth Phase	Atrazine, Metribuzin, 2,4-D; Varieties: Co-0238 (Karan-4), CoLk-14201, CoS-767

Did You Know?: According to the Indian Council of Agricultural Research (ICAR), the semi-dwarfing gene in rice is **Dee-geo-woo-gen** (sd-1), first utilized in developing Taichung Native-1 (TN-1) and IR-8 ("Miracle Rice" bred by Dr. G.S. Khush and Henry Beachell at IRRI, Manila), while in Indian Jaya rice (developed by Dr. Shastry in 1968, crossing TN-1 × T-141), yield surpassed both IR-8 and TN-1, earning Jaya the title "Miracle Rice of India."

Exam Trap Alert: Candidates frequently confuse **CRI (Crown Root Initiation)** stage in Wheat (**21 Days After Sowing**, discovered by Dr. R.B.L. Bhardwaj) with the tillering stage. If a farmer has only **one irrigation** available for wheat, it must strictly be applied at the CRI stage (**20–25 DAS**); if two irrigations are available, apply at **CRI + Late Jointing/Flowering**. Furthermore, **Nipping** (removal of apical buds at **30–40 DAS** or using **TIBA @ 75 ppm**) is practiced in **Chickpea** to promote lateral branching, whereas **Propping**, **Trash Mulching**, and **Earthing-up** are practiced in **Sugarcane**.

★ **Memory Trick:** Remember the seed treatment order with the acronym **FIR**: **F**ungicide (Captan/Thiram/Carbendazim @ **2–2.5 g/kg** seed) → **I**nsecticide (Imidacloprid/Chlorpyrifos) → **R**hizobium biofertilizer culture (always applied last and dried in shade so chemical toxicity does not kill nitrogen-fixing bacteria).

Chapter *1* Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Fundamentals of Agronomy and Classification of Field Crops	**Etymological Foundation and Scope**	Agronomy is derived from the Greek words *Agros* (field) and *Nomos* (to manage), representing the specialized branch of agricultural science recorded by the Indian Council of Agricultural Research (ICAR) that deals with principles and practices of crop production and field management.
Agro-Climatic and Agro-Ecological Zones of India	**Seasonal Classification of Indian Crops**	Indian cropping seasons are divided into three major categories based on thermal and photoperiodic requirements: **Kharif** (June–October, warm wet monsoon season requiring short day length for flowering, e.g., Paddy, Maize, Sorghum, Pearl Millet, Cotton, Soybean, Pigeon Pea), **Rabi** (October–March, cool dry winter season requiring long day length for reproductive initiation, e.g., Wheat, Barley, Mustard, Chickpea, Lentil, Linseed, Pea), and **Zaid** (March–June, hot dry summer season between Rabi and Kharif, e.g., Watermelon, Muskmelon, Cucumber, Summer Moong, Forage Maize).
Cropping Systems, Cropping Intensity and Agronomic Indices	**Botanical and Economic Classification**	Cereals belong to the family *Poaceae* (Gramineae) and serve as starch-rich staple grains; pulses belong to *Fabaceae* (Leguminosae) and fix atmospheric nitrogen via symbiotic *Rhizobium* bacteria in root nodules; oilseeds belong to *Brassicaceae* (Mustard), *Fabaceae* (Peanut/Soybean), *Pedaliaceae* (Sesame), and *Asteraceae* (Sunflower/Safflower).
Fundamentals of Agronomy and Classification of Field Crops	**Photoperiodism and Vernalization**	Discovered by Garner and Allard (1920), photoperiodism governs floral initiation based on day length: **Short-Day Plants (SDP)** require less than 12 hours of daylight (Rice, Soybean, Sorghum, Tobacco), **Long-Day Plants (LDP)** require more than 14 hours of daylight (Wheat, Barley, Oat, Sugarbeet), and **Day-Neutral Plants (DNP)** flower irrespective of photoperiod (Cotton, Sunflower, Tomato, Maize, Buckwheat).

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Agro-Climatic and Agro-Ecological Zones of India	**Tillage Concepts and Conservation Agriculture**	Father of Tillage **Jethro Tull** authored *Horse Hoeing Husbandry* (1731) and introduced the terms "weed" and "zero tillage." Primary tillage opens compact soil using implements like Mouldboard Plough, Disc Plough, and Sub-soiler, whereas secondary tillage prepares a fine seedbed (tilth) using Cultivators, Disc Harrows, and Plankers. Zero tillage (No-Till) uses the Happy Seeder or Zero-Till Seed-cum-Fertilizer Drill in the Rice–Wheat system of the Indo-Gangetic Plains to conserve soil moisture, reduce *Phalaris minor* infestation, and prevent crop residue burning.
Cropping Systems, Cropping Intensity and Agronomic Indices	**Planning Commission vs. NBSS&LUP Classification**	The Planning Commission of India (1989, Seventh Five-Year Plan) delineated **15 Agro-Climatic Zones** based on physiography, rainfall, temperature, and soil characteristics, whereas the National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) under the **Indian Council of Agricultural Research (ICAR)** classified India into **20 Agro-Ecological Regions (AERs)** based on physiography, bioclimate, and Length of Growing Period (LGP).
Fundamentals of Agronomy and Classification of Field Crops	**NARP Sub-Zonal Framework**	Under the National Agricultural Research Project (NARP) launched by the **Indian Council of Agricultural Research (ICAR)**, the country is further divided into **127 Agro-Climatic Sub-Zones** (subsequently expanded to 131 with state reorganizations) to tailor location-specific varieties and agronomic packages.
Agro-Climatic and Agro-Ecological Zones of India	**Agro-Climatic Zones of Uttar Pradesh**	Uttar Pradesh falls primarily across three Planning Commission zones (Zone 4: Middle Gangetic Plains, Zone 5: Upper Gangetic Plains, and Zone 8: Central Plateau and Hills) and is subdivided by the State Agriculture Department into **9 Agro-Climatic Zones**: Bhabhar and Tarai Zone, Western Plains Zone, Mid-Western Plains Zone, South-Western Semi-Arid Zone, Central Plains Zone, Bundelkhand Zone, North-Eastern Plains Zone, Eastern Plains Zone, and Vindhyan Zone.
Cropping Systems, Cropping Intensity and Agronomic Indices	**Dryland Farming Categories**	Based on annual precipitation documented by the **Indian Council of Agricultural Research (ICAR)**, dryland agriculture is categorized into three distinct regimes: **Dry Farming** (annual rainfall **< 750 mm**, LGP **< 75 days**, frequent crop failures, arid regions), **Dryland Farming** (annual rainfall **750–1150 mm**, LGP **75–120 days**, semi-arid regions, moisture conservation critical), and **Rainfed Farming** (annual rainfall **> 1150 mm**, LGP **> 120 days**, humid and sub-humid regions, drainage management required).
Fundamentals of Agronomy and Classification of Field Crops	**Cropping Pattern vs. Cropping System**	Cropping pattern refers to the yearly sequence and spatial arrangement of crops and fallow on a given area, whereas cropping system encompasses the cropping pattern plus its interaction with farm resources, technology, and environment.

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Agro-Climatic and Agro-Ecological Zones of India	Multiple Cropping Variations	**Intercropping** grows two or more crops simultaneously in definite row ratios (e.g., Wheat + Mustard in 9:1 ratio; Chickpea + Linseed in 4:2 ratio; Pigeon Pea + Sorghum in 1:2 ratio); **Mixed Cropping** mixes seeds without distinct row arrangement as insurance against weather aberration; **Relay Cropping** (Paira/Utera cropping) sows the second crop after the first crop has reached its reproductive stage but before harvest (e.g., sowing Lathyrus or Lentil in standing Paddy fields); **Alley Cropping** grows arable crops between hedgerows of leguminous shrubs like *Leucaena leucocephala* (Subabul).
Cropping Systems, Cropping Intensity and Agronomic Indices	Cropping Intensity (CI)	CI = ((Gross Cropped Area (GCA) / Net Sown Area (NSA))) × 100. India's national average Cropping Intensity exceeds 151%, while Uttar Pradesh exceeds 162%.
Fundamentals of Agronomy and Classification of Field Crops	Land Equivalent Ratio (LER)	LER = Σ \frac{Y_{ij}}{Y_{ii}}, where Y_{ij} is intercrop yield and Y_{ii} is sole crop yield. An LER > 1.0 indicates that intercropping is biologically advantageous over monocropping.
Agro-Climatic and Agro-Ecological Zones of India	Harvest Index (HI)	HI = ((Economic Yield (Grain) / Biological Yield (Grain + Straw))) × 100, introduced by Donald (1962).

Chapter 1 Multi-Statement Exam Verification Drills

Chapter 1 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Etymological Foundation and Scope): Agronomy is derived from the Greek words *Agros* (field) and *Nomos* (to manage), representing the specialized branch of agricultural science recorded by the Indian Council of Agricultural Research (ICAR) that deals with principles and practices of crop production and field management.

Statement-II (Seasonal Classification of Indian Crops): Indian cropping seasons are divided into three major categories based on thermal and photoperiodic requirements: **Kharif** (June–October, warm wet monsoon season requiring short day length for flowering, e.g., Paddy, Maize, Sorghum, Pearl Millet, Cotton, Soybean, Pigeon Pea), **Rabi** (October–March, cool dry winter season requiring long day length for reproductive initiation, e.g., Wheat, Barley, Mustard, Chickpea, Lentil, Linseed, Pea), and **Zaid** (March–June, hot dry summer season between Rabi and Kharif, e.g., Watermelon, Muskmelon, Cucumber, Summer Moong, Forage Maize).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 1 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (Botanical and Economic Classification): Cereals belong to the family *Poaceae* (Gramineae) and serve as starch-rich staple grains; pulses belong to *Fabaceae* (Leguminosae) and fix atmospheric nitrogen via symbiotic *Rhizobium* bacteria in root nodules; oilseeds belong to *Brassicaceae* (Mustard), *Fabaceae* (Peanut/Soybean), *Pedaliaceae* (Sesame), and *Asteraceae* (Sunflower/Safflower).

Statement-II (Photoperiodism and Vernalization): Discovered by Garner and Allard (1920), photoperiodism governs floral initiation based on day length: **Short-Day Plants (SDP)** require less than 12 hours of daylight (Rice, Soybean, Sorghum, Tobacco), **Long-Day Plants (LDP)** require more than 14 hours of daylight (Wheat, Barley, Oat, Sugarbeet), and **Day-Neutral Plants (DNP)** flower irrespective of photoperiod (Cotton, Sunflower, Tomato, Maize, Buckwheat).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 1 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (Tillage Concepts and Conservation Agriculture): Father of Tillage **Jethro Tull** authored *Horse Hoeing Husbandry* (1731) and introduced the terms "weed" and "zero tillage." Primary tillage opens compact soil using implements like Mouldboard Plough, Disc Plough, and Sub-soiler, whereas secondary tillage prepares a fine seedbed (tilth) using Cultivators, Disc Harrows, and Plankers. Zero tillage (No-Till) uses the Happy Seeder or Zero-Till Seed-cum-Fertilizer Drill in the Rice–Wheat system of the Indo-Gangetic Plains to conserve soil moisture, reduce *Phalaris minor* infestation, and prevent crop residue burning.

Statement-II (Planning Commission vs. NBSS&LUP Classification): The Planning Commission of India (1989, Seventh Five-Year Plan) delineated **15 Agro-Climatic Zones** based on physiography, rainfall, temperature, and soil characteristics, whereas the National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) under the **Indian Council of Agricultural Research (ICAR)** classified India into **20 Agro-Ecological Regions (AERs)** based on physiography, bioclimate, and Length of Growing Period (LGP).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 1 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (NARP Sub-Zonal Framework): Under the National Agricultural Research Project (NARP) launched by the **Indian Council of Agricultural Research (ICAR)**, the country is further divided into **127 Agro-Climatic Sub-Zones** (subsequently expanded to 131 with state reorganizations) to tailor location-specific varieties and agronomic packages.

Statement-II (Agro-Climatic Zones of Uttar Pradesh): Uttar Pradesh falls primarily across three Planning Commission zones (Zone 4: Middle Gangetic Plains, Zone 5: Upper Gangetic Plains, and Zone 8: Central Plateau and Hills) and is subdivided by the State Agriculture Department into **9 Agro-Climatic Zones**: Bhabhar and Tarai Zone, Western Plains Zone, Mid-Western Plains Zone, South-Western Semi-Arid Zone, Central Plains Zone, Bundelkhand Zone, North-Eastern Plains Zone, Eastern Plains Zone, and Vindhyan Zone.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 1 Statement-Verification Drill #5 — Both Statements Verified Correct

Statement-I (Dryland Farming Categories): Based on annual precipitation documented by the Indian Council of Agricultural Research (ICAR), dryland agriculture is categorized into three distinct regimes: **Dry Farming** (annual rainfall **< 750 mm**, LGP **< 75 days**, frequent crop failures, arid regions), **Dryland Farming** (annual rainfall **750–1150 mm**, LGP **75–120 days**, semi-arid regions, moisture conservation critical), and **Rainfed Farming** (annual rainfall **> 1150 mm**, LGP **> 120 days**, humid and sub-humid regions, drainage management required).

Statement-II (Cropping Pattern vs. Cropping System): Cropping pattern refers to the yearly sequence and spatial arrangement of crops and fallow on a given area, whereas cropping system encompasses the cropping pattern plus its interaction with farm resources, technology, and environment.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 1 Statement-Verification Drill #6 — Both Statements Verified Correct

Statement-I (Multiple Cropping Variations): **Intercropping** grows two or more crops simultaneously in definite row ratios (e.g., Wheat + Mustard in **9:1** ratio; Chickpea + Linseed in **4:2** ratio; Pigeon Pea + Sorghum in **1:2** ratio); **Mixed Cropping** mixes seeds without distinct row arrangement as insurance against weather aberration; **Relay Cropping** (Paira/Utera cropping) sows the second crop after the first crop has reached its reproductive stage but before harvest (e.g., sowing Lathyrus or Lentil in standing Paddy fields); **Alley Cropping** grows arable crops between hedgerows of leguminous shrubs like *Leucaena leucocephala* (Subabul).

Statement-II (Cropping Intensity (CI)): CI = ((Gross Cropped Area (GCA) / Net Sown Area (NSA))) × 100. India's national average Cropping Intensity exceeds **151%**, while Uttar Pradesh exceeds **162%**.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter *2:* Soil Science, Indian Soil Taxonomy, Plant Nutrients & Fertilizers

Chapter Key Study Pillars — Chapter 2: Soil Science, Indian Soil Taxonomy, Plant Nutrients & Fertilizers

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Soil Pedogenesis, Profile Horizons and Physical Properties	**ICAR Classification of Indian Soils and Problematic Soil Reclamation**	**Essential Plant Nutrients, Criteria of Essentiality & Fertilizer Chemistry**

2.1 Soil Pedogenesis, Profile Horizons and Physical Properties

• **Pedological vs. Edaphological Approach:** Defined by Dokuchaev (Father of Soil Science), **Pedology** studies soil as a natural body focusing on origin, weathering, classification, and profile development, whereas **Edaphology** studies soil from the standpoint of higher plant growth and crop yield.

• **Master Horizons of a Soil Profile:** A vertical section of soil from the surface down to parent rock displays five master horizons: **O Horizon** (organic litter layer present predominantly in virgin forest soils, absent in arable cultivated soils), **A Horizon** (mineral topsoil rich in humus, zone of maximum biological activity, containing the **E or A2 Eluvial horizon** of maximum leaching of clay, iron, and aluminum oxides), **B Horizon** (Subsoil or **Illuvial horizon** where leached materials accumulate; A + B together constitute the **Solum** or true soil), **C Horizon** (weathered parent material or regolith outside biological zones; A + B + C constitute the **Regolith**), and **R Layer** (unweathered consolidated bedrock).

• **Soil Texture, Structure, and Density:**

• **Soil Texture** (relative proportion of sand, silt, and clay) is an **inherent permanent property** that cannot be altered by tillage. By ISSS classification, particle diameters are: **Gravel** (**> 2.0 mm**), **Coarse Sand** (**2.0–0.2 mm**), **Fine Sand** (**0.2–0.02 mm**), **Silt** (**0.02–0.002 mm**), and **Clay** (**< 0.002 mm**). Loam soil (roughly **40%** sand, **40%** silt, **20%** clay) is optimal for agriculture.

• **Bulk Density (BD) vs. Particle Density (PD): Particle Density** (true density of solid mineral particles without pore spaces) averages **2.65 g/cm³** for normal mineral soils. **Bulk Density** (mass of oven-dry soil per unit bulk volume including pore spaces) averages **1.33 g/cm³** (ranging from **1.1 g/cm³** in fine clay soils to **1.6 g/cm³** in sandy soils).

• **Porosity Formula:** Porosity (\%) = (1 - (Bulk Density / Particle Density)) × 100. For standard soil (BD = 1.33, PD = 2.65), total pore space is approximately **50%**.

2.2 ICAR Classification of Indian Soils and Problematic Soil Reclamation

• **Eight Major Soil Groups of India:** The Indian Council of Agricultural Research (ICAR) classifies Indian soils into 8 major groups corresponding to USDA Soil Taxonomy orders:

1. **Alluvial Soils (Entisols / Inceptisols / Alfisols):** Cover **~43%** (**143 million ha**) of India's area; divided into **Khadar** (new alluvium deposited annually by floods, light colored, fertile, sandy-loam) and **Bangar** (old alluvium above flood level, dark colored, containing calcareous concretions called *Kankar*). Rich in Potash (K_2O) and Lime, but deficient in Nitrogen, Phosphorus, and Humus.

2. **Black Cotton / Regur Soils (Vertisols):** Cover **~15%** (**~50 million ha**) across Maharashtra, Western MP, Gujarat, and Bundelkhand; derived from basaltic Deccan Trap lava; dark color due to **Titaniferous Magnetite**; high content of **Montmorillonite** (**2:1** expanding lattice clay) causing deep cracks in summer ("self-ploughing" property). Rich in Ca, Mg, Fe, K; deficient in N, P, Zn, and organic matter.

3. **Red and Yellow Soils (Alfisols / Ultisols):** Cover **~18.5%** area across Tamil Nadu, Karnataka, Odisha, Chhattisgarh, and Southern UP (Mirzapur/Sonbhadra); red color due to ferric oxide (Fe_2O_3) diffusion, turning yellow upon hydration into limonite. Predominantly **Kaolinite** (**1:1** non-expanding clay), acidic in nature, poor in N, P, K, and humus.

4. **Laterite Soils (Oxisols / Ultisols):** Formed under high temperature and heavy alternating rainfall (**> 200 cm**) via intense **leaching of silica** (desilication) and accumulation of iron and aluminum sesquioxides. Hardens irreversibly upon exposure; ideal for Cashew, Tea, Coffee, Rubber, and Tapioca.

5. **Arid / Desert Soils (Aridisols):** Sandy texture, alkaline pH, high soluble salts, phosphate levels comparable to alluvial soils, severely deficient in nitrogen and humus.

6. **Saline and Alkaline Soils (Usar / Reh / Kallar / Thur / Chopan):** Found in canal-irrigated semi-arid zones of Western UP, Punjab, Haryana, and Gujarat.

7. **Peaty and Marshy Soils (Histosols):** Found in Kottayam and Alappuzha districts of Kerala (*Kari* soils) and Sundarbans; **40–50%** organic matter, strongly acidic (pH < 4.0).

8. **Forest and Mountain Soils:** Acidic, rich in raw humus, prone to erosion.

• **Diagnostic Parameters and Reclamation of Problem Soils:**

• **Acidic Soils (pH < 6.5):** Caused by leaching of exchangeable bases (Ca^{2+}, Mg^{2+}, K^+, Na^+) and dominance of H^+ and Al^{3+} ions. Reclaimed using **Agricultural Lime** (CaCO_3, Calcium Oxide CaO, Slaked Lime Ca(OH)_2, Dolomite CaMg(CO_3)_2, or Basic Slag).

• **Saline Soils (White Alkali / Solonchak):** pH < 8.5, Electrical Conductivity (EC_e) **> 4.0 dS/m** at 25^°C, Exchangeable Sodium Percentage (ESP) **< 15%**, Sodium Adsorption Ratio (SAR) **< 13**. Reclaimed by **Scraping** and **Leaching / Flushing** with good quality irrigation water above the field drainage level.

• **Alkali / Sodic Soils (Black Alkali / Solonetz):** pH > 8.5 (often **8.5–10.0**), EC_e < 4.0 dS/m, ESP > 15\%, SAR > 13. Dispersed soil structure due to excess exchangeable Na^+. Reclaimed chemically using **Gypsum** (CaSO_4·2H_2O containing **29.2% Ca** and **18.6% S**), **Iron Pyrites** (FeS_2), press-mud, and green manuring with **Dhaincha** (*Sesbania aculeata*).

• **Saline-Alkali Soils:** pH ≥ 8.5, EC_e > 4.0 dS/m, ESP > 15\%, SAR > 13.

2.3 Essential Plant Nutrients, Criteria of Essentiality & Fertilizer Chemistry

• **Arnon and Stout's Criteria of Essentiality (1939, refined by Arnon in 1954):** A nutrient element is essential if: (1) a deficiency makes it impossible for the plant to complete its vegetative or reproductive life cycle, (2) such deficiency is specific to the element in question and can be prevented or corrected only by supplying that element, and (3) the element is directly involved in the nutrition and metabolism of the plant.

• **17 Essential Plant Nutrients & Nicholas's Functional Nutrients:**

• **Basic Structural Framework Elements (3):** Carbon (C), Hydrogen (H), Oxygen (O) — obtained from air and water (**~95%** of plant dry weight).

• **Primary Macronutrients (3):** Nitrogen (N), Phosphorus (P), Potassium (K).

• **Secondary Macronutrients (3):** Calcium (Ca), Magnesium (Mg), Sulphur (S).

• **Micronutrients / Trace Elements (8):** Iron (Fe), Manganese (Mn), Zinc (Zn), Copper (Cu), Boron (B), Molybdenum (Mo — ultra-micronutrient required in lowest concentration), Chlorine (Cl), and **Nickel (Ni)** (17th essential nutrient discovered by Brown et al. in 1987, component of the enzyme **Urease**).

• **Beneficial Elements (Nicholas, 1961):** Sodium (Na for sugarbeet), Silicon (Si for rice disease/lodging resistance), Cobalt (Co for vitamin B_{12} synthesis in root nodules), and Vanadium (V).

• **Mobility in Soil vs. Mobility in Plant (Deficiency Symptom Localization):**

• **Highly Mobile in Plants (Deficiency on OLD / Lower Leaves): N, P, K, Mg, Mo** (Mnemonic: **N-P-K Mg-Mo**). Nitrogen causes V-shaped chlorosis starting from leaf tip of older leaves; Phosphorus causes purplish/bronzing coloration on older leaves ("Sickle leaf disease"); Potassium causes marginal scorching and tip burning of older leaves; Magnesium causes interveinal chlorosis of older leaves (Grass tetany in livestock).

• **Moderately Mobile in Plants (Deficiency on Middle Leaves): Zinc (Zn)** — causes **Khaira disease in Paddy** (discovered by Dr. Y.L. Nene at Pantnagar in 1966, controlled by spraying **5 kg** ZnSO_4 + 2.5 kg slaked lime or **20 kg** Urea in **1000 L** water/ha), **White Bud of Maize**, **Little Leaf of Cotton/Brinjal/Mango**, and **Fern Leaf of Potato**.

• **Less Mobile in Plants (Deficiency on Young/Upper Leaves): Fe, Mn, Cu, S**. Iron causes interveinal chlorosis of young leaves (white eye of rice); Manganese causes **Grey Speck of Oats**, **Pahala Blight of Sugarcane**, and

Marsh Spot of Pea; Copper causes **Dieback and Exanthema in Citrus** and Reclamation disease of cereals; Sulphur causes uniform yellowing of young top leaves ("Tea Yellows").

• **Completely Immobile in Phloem (Deficiency on Apical / Terminal Buds): Calcium (Ca)** and **Boron (B)**. Calcium deficiency causes **Blossom End Rot (BER) of Tomato**, **Popping in Peanut (Arachis hypogaea)**, **Bitter Pit of Apple**, and hooking of terminal buds; Boron deficiency (involved in pollen germination and sugar translocation) causes **Internal Necrosis of Aonla/Mango**, **Hen and Chicken disorder in Grapes**, **Heart Rot of Sugarbeet**, **Browning/Hollow Stem of Cauliflower**, and **Top Sickness of Tobacco**.

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1
Grid-Based Soil Sampling (15 cm V-Cut Depth)

STEP 2
Laboratory Analysis (12 Parameters under Soil Health Card)

STEP 3
Problem Soil Amelioration (Lime for Acid / Gypsum for Alkali)

STEP 4
Integrated Nutrient Management (4R Stewardship: Source, Rate, Time, Place)

Fertilizer / Biofertilizer	Chemical Composition / Active Organism	Nutrient Content (%)	Key Agronomic Properties & Application Rules
Neem Coated Urea (NCU)	Carbamide (NH_2CONH_2, Organic amide fertilizer)	**46% N**	Acid-forming (Equivalent acidity **80**); Biuret content must not exceed **1.5%** under FCO 1985 (**< 0.5%** for foliar spray); Neem coating slows nitrification (*Nitrosomonas* inhibition)
Diammonium Phosphate (DAP)	(NH_4)_2HPO_4	**18% N**, **46%** P_2O_5 (**0% K**)	Water-soluble P (**41%**); ideal basal starter fertilizer for pulses and cereals
Single Super Phosphate (SSP)	Ca(H_2PO_4)_2 + CaSO_4· 2H_2O	**16%** P_2O_5, **11–12% S**, **19–21% Ca**	First chemical fertilizer manufactured in India (Ranipet, Tamil Nadu, 1906); preferred for oilseeds and pulses due to Sulphur and Calcium content
Muriate of Potash (MOP)	Potassium Chloride (KCl)	**60%** K_2O	Avoided in solanaceous crops (Tobacco, Potato, Chilli) and Grapes as Chloride (Cl^-) reduces leaf burning quality and starch accumulation
Sulphate of Potash (SOP)	Potassium Sulphate (K_2SO_4)	**48–50%** K_2O, **17.5% S**	Safely applied to Tobacco, Potato, Coffee, and horticultural fruit crops
Calcium Ammonium Nitrate (CAN)	CaCO_3·NH_4NO_3 (*Kisan Khad*)	**25–26% N** (**12.5%** NH_4^+ + **12.5%** NO_3^-)	Neutral fertilizer with zero residual acidity; safe for both acidic and neutral soils
Biofertilizers (N & P Fixers)	*Rhizobium*, *Azotobacter*, *Azospirillum*, *Azolla* (*Anabaena azollae*), PSB (*Bacillus polymyxa*), VAM (*Glomus*)	Fixes **20–200 kg N/ha** or solubilizes **30–50 kg** P_2O_5/ha	*Rhizobium* is symbiotic for legumes; *Azotobacter* is free-living aerobic for Wheat/Cotton/Vegetables; *Azospirillum* is associative for Sorghum/Pearl Millet; *Azolla* + BGA for flooded Paddy

Did You Know?: Under the **Soil Health Card (SHC) Scheme** launched on **19 February 2015** at **Suratgarh, Sri Ganganagar (Rajasthan)** with the tagline "*Swasth Dharaa, Khet Haraa*", every farm soil sample is tested across **12 standard parameters** recognized by the **Indian Council of Agricultural Research (ICAR)**: 3 Physical/Chemical parameters (pH, Electrical Conductivity EC, Organic Carbon OC), 3 Primary Nutrients (N, P, K), 1 Secondary Nutrient (S), and 5 Micronutrients (Zn, Fe, Cu, Mn, B).

Exam Trap Alert: While most plants absorb Nitrogen solely in the **Nitrate (NO_3^-)** ionic form, **Paddy (Rice)**, **Potato**, **Tea**, and **Sugarcane** preferentially absorb Nitrogen in the **Ammoniacal (NH_4^+)** form. Consequently, in flooded paddy fields, ammoniacal fertilizers (such as Ammonium Sulphate or Urea) must be placed in the **Reduced Zone** (**5–10 cm** deep) rather than the oxidized surface zone (**0–1 cm**) to prevent denitrification loss into N_2O and N_2 gas via *Pseudomonas* and *Bacillus* bacteria.

★ **Memory Trick:** To remember which two nutrients are **completely immobile inside the plant** and always show deficiency symptoms on the **terminal/apical bud**, use **"CAB"** (Ca + B = Terminal Bud). Conversely, for **Whiptail of Cauliflower**, remember **"Mo-Acid"** — Molybdenum (Mo) is the **only micronutrient whose availability increases at high alkaline pH** and causes severe deficiency in acidic soils (pH < 5.5).

Chapter *2* Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Soil Pedogenesis, Profile Horizons and Physical Properties	**Pedological vs. Edaphological Approach**	Defined by Dokuchaev (Father of Soil Science), **Pedology** studies soil as a natural body focusing on origin, weathering, classification, and profile development, whereas **Edaphology** studies soil from the standpoint of higher plant growth and crop yield.
ICAR Classification of Indian Soils and Problematic Soil Reclamation	**Master Horizons of a Soil Profile**	A vertical section of soil from the surface down to parent rock displays five master horizons: **O Horizon** (organic litter layer present predominantly in virgin forest soils, absent in arable cultivated soils), **A Horizon** (mineral topsoil rich in humus, zone of maximum biological activity, containing the **E or A2 Eluvial horizon** of maximum leaching of clay, iron, and aluminum oxides), **B Horizon** (Subsoil or **Illuvial horizon** where leached materials accumulate; A + B together constitute the **Solum** or true soil), **C Horizon** (weathered parent material or regolith outside biological zones; A + B + C constitute the **Regolith**), and **R Layer** (unweathered consolidated bedrock).
Essential Plant Nutrients, Criteria of Essentiality & Fertilizer Chemistry	**Soil Texture**	(relative proportion of sand, silt, and clay) is an **inherent permanent property** that cannot be altered by tillage. By ISSS classification, particle diameters are: **Gravel** (**> 2.0 mm**), **Coarse Sand** (**2.0–0.2 mm**), **Fine Sand** (**0.2–0.02 mm**), **Silt** (**0.02–0.002 mm**), and **Clay** (**< 0.002 mm**). Loam soil (roughly **40%** sand, **40%** silt, **20%** clay) is optimal for agriculture.
Soil Pedogenesis, Profile Horizons and Physical Properties	**Bulk Density (BD) vs. Particle Density (PD)**	**Particle Density** (true density of solid mineral particles without pore spaces) averages **2.65 g/cm³** for normal mineral soils. **Bulk Density** (mass of oven-dry soil per unit bulk volume including pore spaces) averages **1.33 g/cm³** (ranging from **1.1 g/cm³** in fine clay soils to **1.6 g/cm³** in sandy soils).

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
ICAR Classification of Indian Soils and Problematic Soil Reclamation	Porosity Formula	Porosity (\%) = (1 - (Bulk Density / Particle Density)) × 100. For standard soil (BD = 1.33, PD = 2.65), total pore space is approximately 50%.
Essential Plant Nutrients, Criteria of Essentiality & Fertilizer Chemistry	Eight Major Soil Groups of India	The Indian Council of Agricultural Research (ICAR) classifies Indian soils into 8 major groups corresponding to USDA Soil Taxonomy orders:
Soil Pedogenesis, Profile Horizons and Physical Properties	Alluvial Soils (Entisols / Inceptisols / Alfisols)	Cover ~43% (143 million ha) of India's area; divided into **Khadar** (new alluvium deposited annually by floods, light colored, fertile, sandy-loam) and **Bangar** (old alluvium above flood level, dark colored, containing calcareous concretions called *Kankar*). Rich in Potash (K_2O) and Lime, but deficient in Nitrogen, Phosphorus, and Humus.
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Essential Plant Nutrients, Criteria of Essentiality & Fertilizer Chemistry	Red and Yellow Soils (Alfisols / Ultisols)	Cover ~18.5% area across Tamil Nadu, Karnataka, Odisha, Chhattisgarh, and Southern UP (Mirzapur/Sonbhadra); red color due to ferric oxide (Fe_2O_3) diffusion, turning yellow upon hydration into limonite. Predominantly **Kaolinite** (1:1 non-expanding clay), acidic in nature, poor in N, P, K, and humus.
Soil Pedogenesis, Profile Horizons and Physical Properties	Laterite Soils (Oxisols / Ultisols)	Formed under high temperature and heavy alternating rainfall (> 200 cm) via intense **leaching of silica** (desilication) and accumulation of iron and aluminum sesquioxides. Hardens irreversibly upon exposure; ideal for Cashew, Tea, Coffee, Rubber, and Tapioca.
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Essential Plant Nutrients, Criteria of Essentiality & Fertilizer Chemistry	Saline and Alkaline Soils (Usar / Reh / Kallar / Thur / Chopan)	Found in canal-irrigated semi-arid zones of Western UP, Punjab, Haryana, and Gujarat.
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ICAR Classification of Indian Soils and Problematic Soil Reclamation	Forest and Mountain Soils	Acidic, rich in raw humus, prone to erosion.

Chapter 2 Multi-Statement Exam Verification Drills

Chapter 2 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Pedological vs. Edaphological Approach): Defined by Dokuchaev (Father of Soil Science), **Pedology** studies soil as a natural body focusing on origin, weathering, classification, and profile development, whereas **Edaphology** studies soil from the standpoint of higher plant growth and crop yield.

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Chapter 2 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (Soil Texture): (relative proportion of sand, silt, and clay) is an **inherent permanent property** that cannot be altered by tillage. By ISSS classification, particle diameters are: **Gravel** (**> 2.0 mm**), **Coarse Sand** (**2.0–0.2 mm**), **Fine Sand** (**0.2–0.02 mm**), **Silt** (**0.02–0.002 mm**), and **Clay** (**< 0.002 mm**). Loam soil (roughly **40%** sand, **40%** silt, **20%** clay) is optimal for agriculture.

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Chapter 2 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (Porosity Formula): Porosity (\%) = (1 - (Bulk Density / Particle Density)) × 100. For standard soil (BD = 1.33, PD = 2.65), total pore space is approximately **50%**.

Statement-II (Eight Major Soil Groups of India): The **Indian Council of Agricultural Research (ICAR)** classifies Indian soils into 8 major groups corresponding to USDA Soil Taxonomy orders:

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Chapter 2 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Alluvial Soils (Entisols / Inceptisols / Alfisols)): Cover **~43%** (**143 million ha**) of India's area; divided into **Khadar** (new alluvium deposited annually by floods, light colored, fertile, sandy-loam) and **Bangar** (old alluvium above flood level, dark colored, containing calcareous concretions called *Kankar*). Rich in Potash (K_2O) and Lime, but deficient in Nitrogen, Phosphorus, and Humus.

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Chapter 2 Statement-Verification Drill #5 Both Statements Verified Correct

Statement-I (Red and Yellow Soils (Alfisols / Ultisols)): Cover ~18.5% area across Tamil Nadu, Karnataka, Odisha, Chhattisgarh, and Southern UP (Mirzapur/Sonbhadra); red color due to ferric oxide (Fe_2O_3) diffusion, turning yellow upon hydration into limonite. Predominantly **Kaolinite** (1:1 non-expanding clay), acidic in nature, poor in N, P, K, and humus.
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Chapter 2 Statement-Verification Drill #6 Both Statements Verified Correct

Statement-I (Arid / Desert Soils (Aridisols)): Sandy texture, alkaline pH, high soluble salts, phosphate levels comparable to alluvial soils, severely deficient in nitrogen and humus.
Statement-II (Saline and Alkaline Soils (Usar / Reh / Kallar / Thur / Chopan)): Found in canal-irrigated semi-arid zones of Western UP, Punjab, Haryana, and Gujarat.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 3: Horticulture, Pomology, Olericulture, Post-Harvest Technology & Plant Pathology

Chapter Key Study Pillars — Chapter 3: Horticulture, Pomology, Olericulture, Post-Harvest Technology & Plant Pathology

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Pomology (Fruit Science) — Botanical Classification, Propagation & Training	**Olericulture (Vegetable Science) & Spices — Compounds, Varieties & Disorders**	**Post-Harvest Management, Fruit Preservation & Plant Protection**

3.1 Pomology (Fruit Science) — Botanical Classification, Propagation & Training

• **Botanical Types of Fruits and Edible Parts:** As cataloged by the Indian Council of Agricultural Research (ICAR), fruit morphology determines commercial processing and seed extraction:

• **Drupe (Stone Fruit):** Mango (edible part: **Mesocarp**), Peach, Plum, Ber (edible part: **Epicarp + Mesocarp**), Coconut (edible part: **Endosperm**), Almond (edible part: **Seed/Cotyledon**), Walnut (edible part: **Lobed Cotyledon**).

• **Berry:** Banana (edible part: **Mesocarp + Endocarp**), Papaya (**Mesocarp**), Guava (**Thalamus + Pericarp**), Grape (**Pericarp + Placenta**), Tomato, Brinjal, Date Palm, Arecanut.

• **Pome (False Fruit):** Apple, Pear, Loquat (edible part: **Fleshy Thalamus**).

• **Hesperidium:** Citrus fruits — Orange, Sweet Orange, Mandarin, Lemon (edible part: **Unicellular Placental Juicy Hairs**).

• **Balausta:** Pomegranate (edible part: **Juicy Testa / Aril**).

• **Amphisarca:** Bael and Wood Apple (edible part: **Succulent Placenta and Endocarp**).

• **Sorosis (Multiple Fruit):** Pineapple (edible: **Bracts + Perianth**), Jackfruit (**Bracts + Perianth + Seeds**), Mulberry.

• **Syconus:** Fig (edible part: **Fleshy Receptacle**).

• **Commercial Vegetative Propagation Techniques:**

• **Mango (*Mangifera indica*): Veneer Grafting** (commercial method in North India, developed at IARI), **Epicotyl / Stone Grafting** (Konkan region of Maharashtra), and **Inarching** (South India). Polyembryonic rootstocks include *Olour*, *Bappakai*, *Kurukkan*, and *Vellaikolumban* (only octoploid 2n=8x=160 mango variety).

• **Guava (*Psidium guajava*): Stooling (Mound Layering)** is the most commercial rapid method; **Air Layering (Gootee)** is traditional; **Wedge Grafting** is used in high-density orchards.

• **Banana (*Musa paradisiaca*): Sword Suckers** weighing **500–750 g** with narrow upright leaves (superior to broad-leaved Water Suckers) and tissue-cultured micropropagation plantlets.

• **Citrus Group: T-Budding (Shield Budding)** on *Rangpur Lime* or *Rough Lemon* (*Jatti Khatti*) rootstocks; **Acid Lime (Kagzi Nimbu)** is commercially propagated by **Seeds** due to high nucellar polyembryony.

• **Apple: Tongue Grafting** on dwarfing rootstock **M-9** (Malling-9) or semi-dwarf **MM-106**.

• **Papaya, Phalsa, Coffee, Coconut, Arecanut:** Propagated commercially by **Seeds** (Papaya seed rate: **400–500 g/ha** for dioecious varieties; **250–300 g/ha** for gynodioecious varieties like Pusa Delicious and Pusa Majesty).

• **Orchard Layout Systems and Training Methods:**

• **Orchard Planting Layouts: Square System** (simplest and most widely adopted), **Rectangular System**, **Hexagonal / Septule System** (accommodates **15%** more plants than Square system), **Quincunx / Diagonal / Filler System** (accommodates almost **double** or **89–100%** more plants than Square system using short-lived filler plants like Papaya, Guava, Phalsa, or Pineapple in the center), **Contour System** (hilly slopes **> 10%**), and **Meadow Orcharding** (Ultra-High Density in Guava deployed by CISH Lucknow at **2.0 × 1.0 m** spacing accommodating **5,000 plants/ha**).

• **Training Systems: Modified Leader System** is ideal for Apple, Pear, and Walnut; **Open Center (Vase) System** is preferred for Peach and Plum to maximize sunlight penetration; **Bower (Pandal / Pergola) System** delivers the highest yield and fruit quality in **Grapes**.

3.2 Olericulture *(*Vegetable Science*)* & Spices — Compounds, Varieties & Disorders

• **Biochemical Pigments, Pungency, and Aroma Principles:**

• **Tomato (*Solanum lycopersicum*):** Red color due to **Lycopene** (synthesis inhibited above 30^°C, optimum at 21–24^°C); yellow color due to Carotenoids; tanginess due to Citric and Malic acids.

• **Chilli (*Capsicum annuum*):** Red color due to **Capsanthin**; pungency due to crystalline alkaloid **Capsaicin** (C_{18}H_{27}NO_3, measured on the Scoville Heat Scale; worlds hottest Indian chilli: *Bhut Jolokia* / Raja Mircha of Northeast India).

• **Onion (*Allium cepa*) & Garlic (*Allium sativum*):** Pungency in Onion is due to **Allyl propyl disulphide**; red color of outer scales due to **Anthocyanin** and yellow color due to **Quercetin** (provides resistance against smudge fungus *Colletotrichum circinans*). Pungency in Garlic is due to **Allicin / Diallyl disulphide** formed from amino acid **Alliin**.

• **Potato (*Solanum tuberosum*):** Greening of sunlight-exposed tubers generates toxic glycoalkaloid **Solanine** (unsafe for human consumption if **> 20 mg/100 g** fresh weight).

• **Radish, Mustard & Cabbage:** Pungency in Radish is due to **Isothiocyanates**; pungency in Mustard/Rapeseed oil is due to **Glucosinolates / Sinigrin**; anti-cancer property of Cabbage leaves is due to **Indole-3-carbinol**, and specific flavor is due to **Sinigrin**.

• **Turmeric, Bitter Gourd, Cucumber:** Yellow color in Turmeric is due to **Curcumin**; bitterness in Bitter Gourd (*Momordica charantia*) is due to **Momordicine**; bitterness in Cucumber is due to **Cucurbitacin**.

3.3 Post-Harvest Management, Fruit Preservation & Plant Protection

• **Climacteric vs. Non-Climacteric Fruits: Climacteric fruits** exhibit a sharp rise in respiration rate and autocatalytic **Ethylene (C_2H_4)** synthesis at the onset of ripening and can be ripened after harvesting (e.g., **Mango, Banana, Papaya, Guava, Apple, Sapota, Jackfruit, Fig, Peach, Pear, Tomato**). **Non-Climacteric fruits** show no respiratory peak after harvest and must be harvested only when fully ripe on the plant (e.g., **Citrus, Grapes, Pomegranate, Litchi, Pineapple, Ber, Strawberry, Cashew, Jamun, Watermelon**).

• **Principles of Fruit and Vegetable Preservation (FPO 1955 / FSSAI Specifications):**

• **Jam vs. Jelly: Jam** is prepared by boiling fruit pulp with sugar (best fruit: **Apple/Papaya/Mango**; minimum **TSS** **68.5%**, fruit pulp content **45%**, citric acid **0.5–0.6%**). **Jelly** is a clear semi-solid product made by boiling clear pectin extract with sugar and acid (best fruit: **Guava**, rich in pectin and acid; minimum **TSS** **65%**, fruit content **45%**, optimum final pH **3.2**; pectin content is tested via **Jelmeter Test** or Alcohol Precipitation Test, and cooking endpoint at 105.5^°C is confirmed via **Sheet/Flake Test** or Refractometer).

• **Marmalade, Preserve (Murabba), Candy, Squash, RTS, and Cordial: Marmalade** is citrus jelly containing suspended shreds of citrus peel (Orange/Lemon); **Preserve (Murabba)** contains minimum **68–70%** TSS (**55%** fruit in Aonla/Petha/Carrot); **Squash** has minimum **25%** fruit juice and **40%** TSS (Mango, Orange, Lemon, Phalsa); **Cordial** is sparkling clear sweetened juice completely free from pulp (**25%** juice, **30%** TSS, best from Lime/Lemon); **Ready-to-Serve (RTS)** has **10%** fruit juice and **10%** TSS; **Tomato Ketchup / Sauce** has **25–30%** TSS preserved with **Sodium Benzoate**.

• **Chemical Preservatives (Class II):** Only two chemical preservatives are legally permitted under FPO/FSSAI in fruit beverages: (1) **Potassium Metabisulphite (KMS, K_2S_2O_5)** @ **350–700 ppm** (releases SO_2; used strictly in **colorless juices** because SO_2 bleaches anthocyanin pigments in red/purple juices), and (2) **Sodium Benzoate (C_6H_5COONa)** @ **600–1000 ppm** (used in **colored fruit juices** like Jamun, Pomegranate, Phalsa, Grape, and Tomato Ketchup).

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1
Harvesting at Physiological Maturity Index

STEP 2
Pre-Cooling, Washing, Grading & Waxing

STEP 3
Processing / Thermal Pasteurization or Cold Storage

STEP 4
FPO/FSSAI Compliant Preservation (KMS for Colorless / Sodium Benzoate for Colored)

Crop	Major Diseases & Causal Organisms	Key Insect Pests	Physiological Disorders & Causes
Mango	**Powdery Mildew** (*Oidium mangiferae*), **Anthracnose** (*Colletotrichum gloeosporioides*), **Mango Malformation** (*Fusarium moniliforme var. subglutinans* - controlled by **NAA @ 200 ppm** in October)	Mango Hopper (*Amritodus atkinsoni*), Mealy Bug (*Drosicha mangiferae* - controlled by **Alkathene banding** on trunk in Dec)	**Black Tip** (Brick kiln fumes: SO_2, CO, C_2H_4; controlled by **Borax 0.6%**), **Spongy Tissue** (Convection heat in *Alphonso*; resistant hybrids: **Ratna, Arka Puneet**), **Alternate Bearing** (controlled by **Paclobutrazol / Cultar @ 5–10 g/tree**)
Guava & Citrus	**Guava Wilt** (*Fusarium oxysporum f.sp. psidii* in alkaline soil); **Citrus Canker** (*Xanthomonas axonopodis pv. citri* - Bacteria), **Citrus Greening** (*Candidatus Liberibacter* spread by Psylla *Diaphorina citri*), **Tristeza** (Virus)	Fruit Fly (*Bactrocera dorsalis*), Bark Eating Caterpillar (*Indarbela quadrinotata*), Citrus Butterfly (*Papilio demoleus*)	**Bronzing in Guava** (Zinc deficiency); **Granulation in Citrus** (High temperature & humidity during late maturity), **Citrus Dieback** (Copper deficiency), **Little Leaf of Citrus** (Cu/Zn deficiency)
Banana & Papaya	**Panama Wilt** (*Fusarium oxysporum f.sp. cubense*), **Bunchy Top of Banana** (BBTV Virus transmitted by Aphid *Pentalonia nigronervosa*), **Sigatoka Leaf Spot** (*Mycosphaerella musicola*); **Papaya Foot Rot / Damping Off** (*Pythium aphanidermatum*), **Papaya Ring Spot Virus** (Aphid *Myzus persicae*)	Banana Rhizome Weevil (*Cosmopolites sordidus*), Pseudostem Borer (*Odoiporus longicollis*)	**Choke Throat in Banana** (Low temperature **< 10°C** delaying bunch emergence), **Kotta Vazhai** (Seediness in Poovan variety), **Finger Drop**
Potato & Tomato	**Late Blight** (*Phytophthora infestans* - caused **1845 Irish Famine**), **Early Blight** (*Alternaria solani* - concentric target board rings), **Potato Wart** (*Synchytrium endobioticum* - Domestic Quarantine in Darjeeling), **Tomato Leaf Curl** (TYLCV transmitted by Whitefly *Bemisia tabaci*)	Potato Tuber Moth (*Phthorimaea operculella* - Field-to-storage pest), Tomato Fruit Borer (*Helicoverpa armigera*)	**Black Heart of Potato** (Oxygen O_2 deficiency / poor ventilation in cold storage), **Hollow Heart of Potato** (Excessive Nitrogen), **Blossom End Rot (BER)** and **Fruit Cracking** in Tomato (Ca and B deficiency)
Paddy, Wheat & Sugarcane	**Rice Blast** (*Magnaporthe grisea / Pyricularia oryzae*), **Bacterial Leaf Blight** (*Xanthomonas oryzae* - Kresek symptom), **Brown Leaf Spot** (*Helminthosporium oryzae* - **1943 Bengal Famine**); **Wheat Rusts** (Black/Stem: *Puccinia graminis*; Brown/Leaf: *P. recondita*; Yellow/Stripe: *P. striiformis*), **Loose Smut** (*Ustilago nuda tritici* - internally seed-borne), **Karnal Bunt** (*Neovossia indica* - discovered by Mitra 1931, rotten fish odor due to **Trimethylamine**); **Red Rot of Sugarcane** (*Colletotrichum falcatum*)	Rice Brown Plant Hopper (BPH - *Nilaparvata lugens* causes **Hopper Burn**), Yellow Stem Borer (*Scirpophaga incertulas* causes **Dead Heart & White Ear**), Sugarcane Pyrilla (*Pyrilla perpusilla* controlled by ectoparasitoid *Epiricania melanoleuca*)	**Akiochi Disease in Rice** (Hydrogen Sulphide H_2S toxicity in flooded soils low in iron), **Khaira Disease** (Zn deficiency), **Tip Burn of Paddy**

Did You Know?: The world-famous mango hybrids documented by the Indian Council of Agricultural Research (ICAR) at IARI New Delhi follow memorable parentage crosses: **Amrapali** (**Dashehari × Neelum**, developed by Dr. R.N. Singh in 1971, dwarf regular bearer planted at **2.5 × 2.5 m** accommodating **1,600 plants/ha**), **Mallika** (**Neelum × Dashehari**, highest Vitamin A content), **Ratna** (**Neelum × Alphonso**, free from spongy tissue), and **Sindhu** (**Ratna × Alphonso**, the **world's first seedless mango hybrid** with a paper-thin rudimentary stone weighing **< 6 g**).

Exam Trap Alert: Never confuse **Loose Smut of Wheat** (*Ustilago nuda tritici*) with **Karnal Bunt of Wheat** (*Neovossia indica*). Loose Smut is **internally seed-borne** (infection enters the embryo during flowering) and is controlled by **Solar Heat Treatment** (Luthra & Sattar, 1934) or systemic fungicide **Carboxin (Vitavax)** @ **2 g/kg** seed, whereas Karnal Bunt (Cancer of Wheat) is **soil-borne and air-borne during flowering** and causes strict international phytosanitary export rejection.

★ **Memory Trick:** Remember the three core mango hybrids with the acronyms **DNA**, **NDM**, and **RNA**: **D**ashehari × **N**eelum = **A**mrapali (**DNA**); **N**eelum × **D**ashehari = **M**allika (**NDM**); **R**atna × **A**lphonso = **S**indhu (**RAS**); and **N**eelum × **A**lphonso = **R**atna (**NAR**).

Chapter 3 Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Pomology (Fruit Science) — Botanical Classification, Propagation & Training	**Botanical Types of Fruits and Edible Parts**	As cataloged by the Indian Council of Agricultural Research (ICAR), fruit morphology determines commercial processing and seed extraction:
Olericulture (Vegetable Science) & Spices — Compounds, Varieties & Disorders	**Drupe (Stone Fruit)**	Mango (edible part: **Mesocarp**), Peach, Plum, Ber (edible part: **Epicarp** + **Mesocarp**), Coconut (edible part: **Endosperm**), Almond (edible part: **Seed**/ **Cotyledon**), Walnut (edible part: **Lobed Cotyledon**).
Post-Harvest Management, Fruit Preservation & Plant Protection	**Berry**	Banana (edible part: **Mesocarp** + **Endocarp**), Papaya (**Mesocarp**), Guava (**Thalamus** + **Pericarp**), Grape (**Pericarp** + **Placenta**), Tomato, Brinjal, Date Palm, Arecanut.
Pomology (Fruit Science) — Botanical Classification, Propagation & Training	**Pome (False Fruit)**	Apple, Pear, Loquat (edible part: **Fleshy Thalamus**).

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Olericulture (Vegetable Science) & Spices — Compounds, Varieties & Disorders	**Hesperidium**	Citrus fruits — Orange, Sweet Orange, Mandarin, Lemon (edible part: **Unicellular Placental Juicy Hairs**).
Post-Harvest Management, Fruit Preservation & Plant Protection	**Balausta**	Pomegranate (edible part: **Juicy Testa / Aril**).
Pomology (Fruit Science) — Botanical Classification, Propagation & Training	**Amphisarca**	Bael and Wood Apple (edible part: **Succulent Placenta and Endocarp**).
Olericulture (Vegetable Science) & Spices — Compounds, Varieties & Disorders	**Sorosis (Multiple Fruit)**	Pineapple (edible: **Bracts + Perianth**), Jackfruit (**Bracts + Perianth + Seeds**), Mulberry.
Post-Harvest Management, Fruit Preservation & Plant Protection	**Syconus**	Fig (edible part: **Fleshy Receptacle**).
Pomology (Fruit Science) — Botanical Classification, Propagation & Training	**Mango (*Mangifera indica*)**	Veneer Grafting **(commercial method in North India, developed at IARI),** Epicotyl / Stone Grafting **(Konkan region of Maharashtra), and** Inarching* (*South India*). *Polyembryonic rootstocks include* Olour, Bappakai, Kurukkan, *and* Vellaikolumban* (only octoploid 2n=8x=160 mango variety).
Olericulture (Vegetable Science) & Spices — Compounds, Varieties & Disorders	**Guava (*Psidium guajava*)**	Stooling (Mound Layering) **is the most commercial rapid method;** Air Layering (Gootee) **is traditional;** Wedge Grafting** is used in high-density orchards.
Post-Harvest Management, Fruit Preservation & Plant Protection	**Banana (*Musa paradisiaca*)**	Sword Suckers** weighing **500–750 g** with narrow upright leaves (superior to broad-leaved Water Suckers) and tissue-cultured micropropagation plantlets.

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Pomology (Fruit Science) — Botanical Classification, Propagation & Training	**Citrus Group**	**T-Budding (Shield Budding)** on *Rangpur Lime* or *Rough Lemon* (*Jatti Khatti*) rootstocks; **Acid Lime (Kagzi Nimbu)** is commercially propagated by **Seeds** due to high nucellar polyembryony.
Olericulture (Vegetable Science) & Spices — Compounds, Varieties & Disorders	**Apple**	**Tongue Grafting** on dwarfing rootstock **M-9** (Malling-9) or semi-dwarf **MM-106**.

Chapter *3* Multi-Statement Exam Verification Drills

Chapter 3 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Botanical Types of Fruits and Edible Parts): As cataloged by the Indian Council of Agricultural Research (ICAR), fruit morphology determines commercial processing and seed extraction:

Statement-II (Drupe (Stone Fruit)): Mango (edible part: **Mesocarp**), Peach, Plum, Ber (edible part: **Epicarp** + **Mesocarp**), Coconut (edible part: **Endosperm**), Almond (edible part: **Seed/Cotyledon**), Walnut (edible part: **Lobed Cotyledon**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 3 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (Berry): Banana (edible part: **Mesocarp** + **Endocarp**), Papaya (**Mesocarp**), Guava (**Thalamus** + **Pericarp**), Grape (**Pericarp** + **Placenta**), Tomato, Brinjal, Date Palm, Arecanut.

Statement-II (Pome (False Fruit)): Apple, Pear, Loquat (edible part: **Fleshy Thalamus**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 3 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (Hesperidium): Citrus fruits — Orange, Sweet Orange, Mandarin, Lemon (edible part: **Unicellular Placental Juicy Hairs**).

Statement-II (Balausta): Pomegranate (edible part: **Juicy Testa / Aril**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 3 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Amphisarca): Bael and Wood Apple (edible part: **Succulent Placenta and Endocarp**).

Statement-II (Sorosis (Multiple Fruit)): Pineapple (edible: **Bracts** + **Perianth**), Jackfruit (**Bracts** + **Perianth** + **Seeds**), Mulberry.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 3 Statement-Verification Drill #5 — Both Statements Verified Correct

Statement-I (Syconus): Fig (edible part: **Fleshy Receptacle**).

Statement-II (Mango (*Mangifera indica*)): Veneer Grafting **(commercial method in North India, developed at IARI),** Epicotyl / Stone Grafting **(Konkan region of Maharashtra), and** Inarching* (*South India*). *Polyembryonic rootstocks include* Olour, Bappakai, Kurukkan, *and* Vellaikolumban* (only octoploid 2n=8x=160 mango variety).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 3 Statement-Verification Drill #6 — Both Statements Verified Correct

Statement-I (Guava (*Psidium guajava*)): Stooling (Mound Layering) **is the most commercial rapid method;** Air Layering (Gootee) **is traditional;** Wedge Grafting** is used in high-density orchards.

Statement-II (Banana (*Musa paradisiaca*)): Sword Suckers** weighing **500–750 g** with narrow upright leaves (superior to broad-leaved Water Suckers) and tissue-cultured micropropagation plantlets.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter *4:* Animal Husbandry, Indigenous & Exotic Livestock Breeds, Dairy Science & Poultry

Chapter Key Study Pillars — Chapter 4: Animal Husbandry, Indigenous & Exotic Livestock Breeds, Dairy Science & Poultry

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine	**Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood**	**Poultry Science, Silage/Hay Conservation & Major Livestock Diseases**

4.1 Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine

• **National Bureau of Animal Genetic Resources (ICAR-NBAGR, Karnal) Classification:** India possesses the world's largest livestock population (**535.78 million** per the 20th Livestock Census, with Uttar Pradesh ranking 1st in total livestock and buffalo population). Indigenous cattle (*Bos indicus*, humped) are classified into three functional categories by the **Indian Council of Agricultural Research (ICAR)**:

1. **Milch Breeds (High milk yield, bullocks slow for work):**

• **Sahiwal (Lola / Montgomery):** Native to Montgomery (now Sahiwal, Pakistan), found in Punjab, Haryana, and UP. Highest and sweetest milk yielder (**2,200–3,000 kg/lactation**, **4.5–5%** fat) among indigenous cattle; loose hanging skin ("Lola").

• **Red Sindhi:** Native to Karachi and Hyderabad (Sindh); deep dark red color; adaptable across tropical states.

• **Gir (Kathiawari / Surti / Desan):** Native to Gir forests of Kathiawar (Gujarat); half-moon curved horns, long pendulous ears notched at the tip resembling a curled leaf, prominent convex forehead ("bony shield").

• **Rathi:** Dual-to-milch breed of Bikaner and Sri Ganganagar (Rajasthan).

2. **Dual-Purpose Breeds (Good milk yield + active draught bullocks):**

• **Haryana:** Native to Rohtak, Hisar, Karnal, and Gurgaon; white or light grey; bony prominence at the center of the poll.

• **Tharparkar (White Sindhi / Thari):** Native to Tharparkar district (Sindh) and Jaisalmer/Jodhpur; lyre-shaped horns, highly drought-resistant.

• **Kankrej (Wadhir / Banni):** Native to Rann of Kutch (Gujarat); heaviest indigenous cattle breed (**500–650 kg**), famous for **Sawai Chal** (1.25 pace gait) and massive lyre-shaped horns.

• **Ongole (Nellore):** Andhra Pradesh; pure white coat; exported globally to Brazil.

• **Mewati (Kosi), Deoni, Dangi, Nimari, Krishna Valley.**

3. **Draught Breeds (Superior work bullocks, low milk yield < 600 kg/lactation):**

• **Amritmahal & Hallikar:** Mysore (Karnataka); prized for military transport and stamina.

• **Kangayam:** Coimbatore/Erode (Tamil Nadu).

• **Khillari:** Solapur/Satara (Maharashtra).

• **Nagori:** Nagaur (Rajasthan); fastest trotting bullocks.

• **Malvi (MP), Kenkatha (Banda, UP/MP), Kherigarh (Lakhimpur Kheri, UP), Ponwar (Pilibhit, UP), Gangatiri (Eastern UP).**

• **Exotic Cattle (*Bos taurus*, Humpless) and Crossbred Strains:**

• **Holstein Friesian (HF):** Native to Holland (Netherlands); black and white patched coat; **world's highest milk yielder** (**6,000–7,500 L/lactation**) with lowest fat percentage (**3.5%**).

• **Jersey:** Native to Jersey Island (English Channel); smallest exotic dairy breed (**400–450 kg**), fawn/reddish color with dished forehead; **highest fat percentage (5.1–5.5%)** among exotic dairy cattle; earliest maturity (**24–26 months**).

• **Brown Swiss (Switzerland), Ayrshire (Scotland - most beautiful dairy breed), Guernsey (France).**

• **ICAR Crossbred Cattle: Karan Swiss** (**Brown Swiss × Sahiwal**, NDRI Karnal), **Karan Fries** (**Holstein Friesian × Tharparkar**, NDRI Karnal), **Frieswal** (**Holstein Friesian × Sahiwal**, Military Farms/CIRC Meerut), **Sunandini** (Kerala), **Taylor** (Patna).

• **Riverine Buffalo Breeds (*Bubalus bubalis*, 2n = 50 vs. Swamp Buffalo 2n = 48):**

• **Murrah (Delhi / Kundi / Kali):** Native to Rohtak, Hisar, Jind, and Nabha; **Jet Black** skin color; tightly curled spiral horns; **highest milk yielder (1,800–2,500 kg/lactation)** among buffaloes with **~7%** fat.

• **Bhadawari:** Native to **Agra (Bah tahsil) and Etawah districts of Uttar Pradesh** along Yamuna-Chambal ravines; **Copper-colored coat** with two white lines (*Chevron*) on the lower neck; **world's highest milk fat percentage (12.5–14%)**.

• **Nili-Ravi (Panj-Kalyan):** Ferozepur (Punjab); **Wall eyes** (white iris) and white markings on five body points (forehead, face, muzzle, legs, tail switch).

• **Jaffarabadi:** Gir forest (Gujarat); **heaviest Indian buffalo breed** ("Mini Elephant"); drooping horns covering the eyes (*Jhallar*).

• **Surti:** Anand/Kaira (Gujarat); **Sickle-shaped horns**; most economical feed converter.

• **Mehsana:** Cross between **Murrah × Surti** in Gujarat; **longest lactation period**.

• **Toda:** Semi-wild fierce buffalo breed reared by Toda tribes of Nilgiri Hills (Tamil Nadu).

• **Goat ("Poor Man's Cow", *Capra hircus*, 2n = 60) and Sheep (*Ovis aries*, 2n = 54) Breeds:**

• **Jamunapari:** Native to **Chakarnagar (Etawah district, UP)**; **largest and tallest Indian dual-purpose goat breed**; Roman nose (parrot mouth appearance) and long pendulous ears; highest milk yielder among Indian goats (**2.0–2.5 kg/day**).

• **Barbari:** Native to Somaliland (East Africa), reared in Agra, Mathura, and Etah (UP); dwarf, short erect horns, prolific twin/triplet breeder suited for **urban stall feeding** ("City Goat").

• **Black Bengal:** West Bengal; famous for **world-class shoe-leather skin (Morocco leather)**, tender chevon meat, and highest twinning/tripling rate.

• **Beetul (Punjab - similar to Jamunapari with beard in males), Sirohi (Rajasthan), Osmanabadi (Maharashtra), Changthangi & Chegu (Kashmir/Himachal - yield world's finest Pashmina cashmere undercoat wool), Angora (Turkey - yields Mohair wool; note: Angora is a goat breed in livestock science, though an Angora wool rabbit also exists), Saanen (Switzerland - "Milk Queen of the World").**

• **Sheep Breeds: Chokla (Shekhawati)** — "Merino of Rajasthan/India" yielding fine carpet/apparel wool; **Nellore** (Andhra Pradesh — **tallest sheep breed of India**); **Mandya (Bannur)** (Karnataka — best mutton conformation); **Marwari, Magra (Bikaneri Chokla), Gaddi, Rampur Bushair, Avivastra & Avikalin** (developed by CSWRI Avikanagar, Tonk, Rajasthan). **Merino** (Spain) yields **80%** of the world's finest apparel wool; **Karakul** (Central Asia) is famous for **Pelt** (skin of newborn slaughtered lambs).

4.2 Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood

• **Reproductive Parameters, Estrous Cycle, and Gestation Periods:**

• **Act of Parturition & Mating Terms:** Cattle/Buffalo: **Calving** (Mating: **Serving**); Sheep: **Lambing** (Mating: **Tupping**, Castrated male: **Wedder**); Goat: **Kidding** (Mating: **Serving**, Meat: **Chevon**); Pig: **Farrowing** (Mating: **Coupling**, Meat: **Pork / Bacon**, Salted thigh: **Ham**); Horse: **Foaling**; Poultry: **Hatching** (Castrated male chicken: **Capon** via chemical diethylstilbestrol or surgery).

• **Gestation Periods (Days):** Cow (**280–283 days** / 9 months 9 days), Buffalo (**310 days** / 10 months 10 days), Sheep (**148–150 days** / 5 months minus 5 days), Goat (**150–152 days** / 5 months), Sow/Pig (**114 days** — 3 months, 3 weeks, 3 days), Camel (**390–410 days**), Mare (**336 days**).

• **Artificial Insemination (AI):** First performed in India by **Dr. Sampurnanand Kumaran (1939)** at Palace Dairy Farm, Mysore. Bull semen is diluted with **Egg Yolk Citrate (EYC)** or Tris buffer and cryopreserved in **Liquid Nitrogen (LN_2) at -196^°C** (**-320.8°F**). Optimum time for AI in cows is **mid-to-late heat (12–18 hours after onset of standing estrus)**.

• **Dairy Chemistry, Milk Composition, and Operation Flood (White Revolution):**

• **Father of White Revolution: Dr. Verghese Kurien** (Founder of AMUL, Anand, 1946; first Chairman of **National Dairy Development Board - NDDB**, established at Anand in **1965**; National Milk Day observed on his birthday **26 November**). **Operation Flood** was launched on **13 January 1970** in three phases: Phase-I (**1970–1980**), Phase-II (**1981–1985**), and Phase-III (**1985–1996**), making India the **world's 1st ranked milk producer** (contributing **~24.6%** of global milk production, with per capita availability exceeding **459 g/day** against ICMR norm of **300 g/day**).

• **Milk Biochemistry:** Milk is an **oil-in-water emulsion** of fat globules, a **colloidal suspension** of Casein protein (**80%** of milk protein; precipitates at isoelectric **pH 4.6**), and a **true solution** of **Lactose** (milk sugar = **Glucose + Galactose**), minerals, and water-soluble vitamins. White color of cow/buffalo milk is due to **Calcium Caseinate**; creamy yellow color of cow milk is due to **Beta-Carotene**; greenish-yellow color of whey is due to **Riboflavin (Vitamin B_2)**. Milk is a rich source of Calcium and Phosphorus, but is **severely deficient in Iron (Fe) and Vitamin C (Ascorbic Acid)**.

• **Colostrum (Khees):** Secreted during the first **3–5 days** post-calving; fed @ **10%** of calf's body weight within **1–2 hours** of birth; rich in **Immunoglobulins (IgG)** providing passive immunity, Vitamin A, and **17–21%** protein; clots on boiling due to high albumin and globulin content; normal acidity **0.20–0.40%** lactic acid vs. **0.13–0.14%** in fresh milk.

• **Pasteurization Standards:** Discovered by Louis Pasteur to destroy all pathogenic microorganisms (specifically *Mycobacterium tuberculosis* and *Coxiella burnetii*, the most heat-resistant Q-fever pathogen): (1) **LTLT (Low Temperature Long Time / Batch Holding):** 63^°C (145^°F) for **30 minutes**; (2) **HTST (High Temperature Short Time):** 72^°C (161^°F) for **15 seconds**; (3) **UHT (Ultra High Temperature):** 135^°C–150^°C for **1–4 seconds** followed by aseptic packaging. Efficiency of pasteurization is verified by the **Alkaline Phosphatase Test** (negative test confirms complete pasteurization).

4.3 Poultry Science, Silage/Hay Conservation & Major Livestock Diseases

• **Poultry Breeds & Egg Production: White Leghorn** (Mediterranean class, native to Italy) is the **world's highest egg-laying breed** (**280–320 white-shelled eggs/year**); **Rhode Island Red (RIR)** and **Plymouth Rock** (American class) are dual-purpose breeds laying brown-shelled eggs; **Cornish** and **Sussex** (English class) are meat/broiler breeds; **Aseel** (fighting bird of UP/AP) and **Kadaknath** (Jhabua, MP — GI-tagged breed with **black flesh and blood due to Melanin pigment**, **25%** protein, ultra-low cholesterol) are premier indigenous breeds. Egg incubation takes **21 days** at 37.5^°C (99.5^°F) and **60%** relative humidity.

• **Forage Preservation (Hay vs. Silage): Hay** is sun-cured green fodder with moisture reduced to **< 15%** (best crop: **Lucerne / Alfalfa** and **Berseem** — "King of Fodder Crops"). **Silage** ("Pickle for Cattle") is fermented green fodder preserved under anaerobic conditions in a Silo pit with **60–70% moisture**, pH 3.8–4.2 dominated by *Lactobacillus* lactic acid fermentation (best crop: **Maize** and **Sorghum** harvested at milk-to-dough stage, rich in soluble carbohydrates).

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1
Selection of High-Genetic-Merit Sire & Dam

STEP 2
Artificial Insemination (Liquid Nitrogen -196°C) & Balanced Rationing

STEP 3
Hygienic Milking (Full-Hand Method in 7 Minutes due to Oxytocin)

STEP 4
HTST Pasteurization (72°C/15s), Cold Chain & Value Addition

Disease Name	Causal Organism	Species Affected & Key Symptoms	Prophylactic Vaccine & Treatment Protocol
Foot and Mouth Disease (FMD / Khurpaka-Muhpaka)	**Aphthovirus** (Smallest Picornavirus; Serotypes **O, A, C, Asia-1** in India)	Cloven-footed animals (Cattle, Buffalo, Sheep, Goat, Pig); high fever (104–106^°F), ropy salivation, vesicles on tongue and interdigital cleft, smacking of lips	Polyvalent **Raksha FMD Vaccine** (every 6 months under NADCP); footbath with **1%** KMnO_4 or **2%** CuSO_4
Haemorrhagic Septicaemia (HS / Galghotu)	**Bacteria:** *Pasteurella multocida*	Cattle and Buffaloes (Buffaloes most susceptible during monsoon); acute high fever (105–107^°F), painful hot oedematous swelling under throat/brisket, roaring dyspnea ("Ghurkba")	Oil-adjuvant HS Vaccine administered annually in **May–June (before onset of monsoon)**; Sulphadimidine / Oxytetracycline
Black Quarter (BQ / Langdi Bukhar)	**Bacteria:** *Clostridium chauvoei* (Spore-forming anaerobe)	Young healthy cattle (**6 months to 3 years**); crepitating gaseous swelling in heavy gluteal/thigh muscles making a crackling sound on palpation, acute lameness	Raksha-BQ / Raksha-Triovac (FMD + HS + BQ) administered before monsoon; Penicillin G in early stage
Anthrax (Splenic Fever / Wool Sorter's Disease)	**Bacteria:** *Bacillus anthracis* (Zoonotic spore-forming rod)	Cattle, Sheep, Goats, Humans; sudden peracute death with **unclotted tarry blood oozing from natural orifices** (nose, mouth, anus), rigor mortis absent, enlarged spleen	**Spore Vaccine** in endemic zones; **Strict Ban on Post-Mortem (Necropsy)** as exposure to oxygen causes bacterial sporulation lasting **50+ years** in soil
Brucellosis (Bang's Disease / Contagious Abortion)	**Bacteria:** *Brucella abortus* (Zoonotic — causes Undulant/Malta fever in humans)	Cattle & Buffalo; **abortion in the last trimester of pregnancy (6th to 9th month)**, retained placenta, orchitis in bulls; diagnosed by **Milk Ring Test (MRT)**	**Brucella Cotton Strain-19 Vaccine** administered once in a lifetime only to **female calves aged 4–8 months**
Milk Fever (Parturient Paresis)	**Metabolic Disorder:** Acute **Calcium (Ca)** deficiency in blood (**< 5 mg/100 ml** vs normal **9–12 mg/100 ml**)	High-yielding crossbred cows within **72 hours after calving**; **sub-normal body temperature (< 98–100°F)**, S-shaped neck curve, sternal recumbency with head turned to flank	Intravenous slow infusion of **Calcium Borogluconate (25%)**; feeding anionic salts and Vitamin D_3 prior to calving
Ranikhet Disease (Newcastle Disease) & Marek's Disease	**Paramyxovirus Type-1** (Ranikhet) & **Herpesvirus** (Marek's)	Poultry; greenish foul-smelling diarrhea, twisted neck (*Torticollis*), respiratory gasping (**90–100%** mortality); Marek's causes sciatic nerve paralysis	**Lasota / F-1 Strain** (**Day 5–7** intraocular) and **R2B / Mukteshwar Strain** (**8–10 weeks**) for Ranikhet; **HVT Vaccine** on **Day-1 at hatchery** for Marek's

Did You Know?: Rinderpest (Cattle Plague), caused by a Morbillivirus and once the deadliest viral scourge of cloven-footed ruminants in India, was **completely eradicated from India in 2006** and globally declared eradicated by the FAO and WOAH (OIE) on **25 May 2011** — making Rinderpest only the **second viral disease in world history (after human Smallpox in 1980)** to be completely wiped out from Earth, as documented by the Indian Council of Agricultural Research (ICAR).

Exam Trap Alert: Despite its name, **Milk Fever (Parturient Paresis)** does **NOT** cause fever! In fact, it is characterized by a **drop in body temperature (Hypothermia, < 100^°F)** caused by acute **Hypocalcemia** right after calving. Similarly, **Lactometer** (readings **0 to 40**, calibrated at 60^°F / 15.5^°C) measures **Specific Gravity of milk** (Cow milk: **1.028–1.030**, Buffalo milk: **1.030–1.032**, Skimmed milk: **1.035–1.037**), whereas **Butyrometer (Gerber's Method)** using **10 ml** H_2SO_4 + **10.75 ml** milk + **1 ml** Amyl alcohol centrifuging at **1100 rpm** measures **Fat percentage**.

★ **Memory Trick:** Remember the Milk Let-Down vs. Holding Up hormones: **Oxytocin** (secreted by the Posterior Pituitary gland upon udder stimulation, lasting only **5–7 minutes**) causes **Milk Let-Down**, whereas **Adrenaline (Epinephrine)** (released when a cow is frightened, beaten, or stressed by a barking dog) constricts mammary blood vessels and causes **Holding Up of Milk**.

Chapter 4 Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine	**National Bureau of Animal Genetic Resources (ICAR-NBAGR, Karnal) Classification**	India possesses the world's largest livestock population (**535.78 million** per the 20th Livestock Census, with Uttar Pradesh ranking 1st in total livestock and buffalo population). Indigenous cattle (*Bos indicus*, humped) are classified into three functional categories by the **Indian Council of Agricultural Research (ICAR)**:
Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood	**Sahiwal (Lola / Montgomery)**	Native to Montgomery (now Sahiwal, Pakistan), found in Punjab, Haryana, and UP. Highest and sweetest milk yielder (**2,200–3,000 kg/lactation**, **4.5–5%** fat) among indigenous cattle; loose hanging skin ("Lola").
Poultry Science, Silage/Hay Conservation & Major Livestock Diseases	**Red Sindhi**	Native to Karachi and Hyderabad (Sindh); deep dark red color; adaptable across tropical states.
Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine	**Gir (Kathiawari / Surti / Desan)**	Native to Gir forests of Kathiawar (Gujarat); half-moon curved horns, long pendulous ears notched at the tip resembling a curled leaf, prominent convex forehead ("bony shield").
Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood	**Rathi**	Dual-to-milch breed of Bikaner and Sri Ganganagar (Rajasthan).
Poultry Science, Silage/Hay Conservation & Major Livestock Diseases	**Haryana**	Native to Rohtak, Hisar, Karnal, and Gurgaon; white or light grey; bony prominence at the center of the poll.

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine	**Tharparkar (White Sindhi / Thari)**	Native to Tharparkar district (Sindh) and Jaisalmer/Jodhpur; lyre-shaped horns, highly drought-resistant.
Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood	**Kankrej (Wadhir / Banni)**	Native to Rann of Kutch (Gujarat); heaviest indigenous cattle breed (**500–650 kg**), famous for **Sawai Chal** (1.25 pace gait) and massive lyre-shaped horns.
Poultry Science, Silage/Hay Conservation & Major Livestock Diseases	**Ongole (Nellore)**	Andhra Pradesh; pure white coat; exported globally to Brazil.
Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine	**Amritmahal & Hallikar**	Mysore (Karnataka); prized for military transport and stamina.
Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood	**Kangayam**	Coimbatore/Erode (Tamil Nadu).
Poultry Science, Silage/Hay Conservation & Major Livestock Diseases	**Khillari**	Solapur/Satara (Maharashtra).
Indigenous and Exotic Breeds of Cattle, Buffalo, Sheep, Goat & Swine	**Nagori**	Nagaur (Rajasthan); fastest trotting bullocks.
Reproductive Physiology, Livestock Nutrition, Dairy Science & Operation Flood	**Holstein Friesian (HF)**	Native to Holland (Netherlands); black and white patched coat; **world's highest milk yielder** (**6,000–7,500 L/lactation**) with lowest fat percentage (**3.5%**).

Chapter 4 Multi-Statement Exam Verification Drills

Chapter 4 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (National Bureau of Animal Genetic Resources (ICAR-NBAGR, Karnal) Classification): India possesses the world's largest livestock population (**535.78 million** per the 20th Livestock Census, with Uttar Pradesh ranking 1st in total livestock and buffalo population). Indigenous cattle (*Bos indicus*, humped) are classified into three functional categories by the Indian Council of Agricultural Research (ICAR):

Statement-II (Sahiwal (Lola / Montgomery)): Native to Montgomery (now Sahiwal, Pakistan), found in Punjab, Haryana, and UP. Highest and sweetest milk yielder (**2,200–3,000 kg/lactation**, **4.5–5%** fat) among indigenous cattle; loose hanging skin ("Lola").

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 4 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (Red Sindhi): Native to Karachi and Hyderabad (Sindh); deep dark red color; adaptable across tropical states.

Statement-II (Gir (Kathiawari / Surti / Desan)): Native to Gir forests of Kathiawar (Gujarat); half-moon curved horns, long pendulous ears notched at the tip resembling a curled leaf, prominent convex forehead ("bony shield").

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 4 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (Rathi): Dual-to-milch breed of Bikaner and Sri Ganganagar (Rajasthan).

Statement-II (Haryana): Native to Rohtak, Hisar, Karnal, and Gurgaon; white or light grey; bony prominence at the center of the poll.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 4 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Tharparkar (White Sindhi / Thari)): Native to Tharparkar district (Sindh) and Jaisalmer/Jodhpur; lyre-shaped horns, highly drought-resistant.

Statement-II (Kankrej (Wadhir / Banni)): Native to Rann of Kutch (Gujarat); heaviest indigenous cattle breed (**500–650 kg**), famous for **Sawai Chal** (1.25 pace gait) and massive lyre-shaped horns.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 4 Statement-Verification Drill #5 — Both Statements Verified Correct

Statement-I (Ongole (Nellore)): Andhra Pradesh; pure white coat; exported globally to Brazil.

Statement-II (Amritmahal & Hallikar): Mysore (Karnataka); prized for military transport and stamina.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 4 Statement-Verification Drill #6 — Both Statements Verified Correct

Statement-I (Kangayam): Coimbatore/Erode (Tamil Nadu).
Statement-II (Khillari): Solapur/Satara (Maharashtra).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter *5:* Uttar Pradesh Revenue Code *2006* (Amended *2015* & *2019*) & Revenue Administration

Chapter Key Study Pillars — Chapter 5: Uttar Pradesh Revenue Code 2006 (Amended 2015 & 2019) & Revenue Administration

Key Study Pillar 1
Historical Evolution and Structure of the UP Revenue Code 2006

Key Study Pillar 2
Classes of Tenures and Rights of Landholders (Chapter IX: Sections 74 to 115)

Key Study Pillar 3
Succession, 2019 Amendment for Unmarried Daughters, Partition & Revenue Recovery

5.1 Historical Evolution and Structure of the UP Revenue Code *2006*

• **Enactment, Enforcement, and Repeal of 39 Obsolete Laws:** To modernize land administration and consolidate fragmented colonial and post-independence statutes, the Uttar Pradesh Legislature enacted the **Uttar Pradesh Revenue Code, 2006 (U.P. Act No. 8 of 2012)** as published by the Board of Revenue, Uttar Pradesh. Although drafted in 2006 and receiving Presidential assent in 2012, the Code was enforced in two stages: selected administrative sections came into force on **18 December 2015** (following the **U.P. Revenue Code (Amendment) Act, 2015**, U.P. Act No. 4 of 2016), and the complete Code along with the **U.P. Revenue Code Rules, 2016** came into force across all 75 districts of Uttar Pradesh on **11 February 2016**.

• **Structural Blueprint:** The Uttar Pradesh Revenue Code, 2006 consists of **16 Chapters, 234 Sections, and 4 Schedules**. Section 230 of the Code combined with the **First Schedule** explicitly repealed **39 outdated enactments**, most notably the **U.P. Land Revenue Act, 1901** and the **U.P. Zamindari Abolition and Land Reforms Act, 1950 (UPZALR Act, 1950)** (which had come into force on **1 July 1952**).

• **Board of Revenue, Uttar Pradesh (Section 7 to Section 10):**

• Established in **1831 at Allahabad (Prayagraj)** by the East India Company, the Board of Revenue, Uttar Pradesh serves as the apex revenue controlling authority and highest appellate court for revenue litigation in the State.

• Under **Section 7** of the Code, the Board consists of a **Chairman** and such number of other **Judicial and Administrative Members** as the State Government may appoint.

• Since **1947–48**, the functions of the Board were bifurcated into two distinct wings: the **Administrative Wing headquartered at Lucknow** (handling land records, survey, settlement, land acquisition, computerization via *Bhulekh*, and supervision of Commissioners/Collectors) and the **Judicial Wing headquartered at Prayagraj (with a Circuit Bench at Lucknow)** handling revisions, second appeals, and judicial review under **Sections 207–210**.

5.2 Classes of Tenures and Rights of Landholders *(Chapter IX: Sections 74 to 115)*

• **Four Classes of Tenure Holders (Section 74):** Section 74 of the UP Revenue Code, 2006 establishes exactly **four classes of tenure holders** in Uttar Pradesh:

1. **Bhumidhar with Transferable Rights (संक्रमणीय अधिकार वाला भूमिधर — Section 75):** The highest and most comprehensive class of agricultural landholder. Possesses permanent, heritable, and **transferable** rights over the landholding (subject to the **12.5-acre** / **5.0586-hectare** ceiling limit under Section 89). Can use the land for any purpose (including industrial, commercial, or residential after obtaining a declaration under **Section 80**).

2. **Bhumidhar with Non-Transferable Rights (असंक्रमणीय अधिकार वाला भूमिधर — Section 76):** Holds permanent and heritable interest in land allotted by the Bhumi Prabandhak Samiti (Land Management Committee), Bhoodan Yagna Committee, or surplus ceiling land, **without the right to sell or gift** the land freely (except mortgage without possession for institutional institutional crop/agricultural loans under Section 92). Crucially, under **Section 76(2)**, every person who was a Bhumidhar with Non-Transferable Rights and has completed **5 years (five years)** from the date of allotment/acquisition automatically acquires the status of a **Bhumidhar with Transferable Rights** (reduced from 10 years under earlier law), provided the land is not covered under the public utility exclusions of **Section 77**.

3. **Asami (आसामी — Section 78):** A subordinate, temporary, heritable but **non-transferable** tenure holder possessing weakest occupancy rights. Asami rights arise over land enumerated in **Section 77** (such as pasture land, *Singhara* cultivation beds in tanks, riverine unstable tracts along Ganga/Yamuna/Ghaghara, or disabled Bhumidhars' leased land). An Asami can use land **exclusively for agriculture, horticulture, or animal husbandry** (Section 84) and is liable to ejectment under **Section 131**.

4. **Government Lessee (सरकारी पट्टेदार — Section 79 & Section 147):** Every person who holds land leased directly by the State Government under the Government Grants Act, 1895 or terms of a specific State lease instrument, governed strictly by the covenants of that lease rather than general Bhumidhari transfer provisions.

• **Public Utility Lands Where Bhumidhari Rights Never Accrue (Section 77):** Under Section 77 (replacing old Section 132 of UPZALR Act, 1950), notwithstanding any provision of the Code, **no person shall ever acquire the rights of a Bhumidhar** in: *Khalihan* (threshing floors), manure pits, pasture lands (*Charagah*), cremation or burial sites (*Shamshan*/*Kabristan*), *Abadi* sites, lands covered by water used for growing *Singhara*, riverbeds used for casual cultivation, forest tracts, or roads/canals.

• **Transfer Restrictions Protecting Scheduled Castes and Scheduled Tribes (Sections 98 & 99):** Under **Section 98**, no Bhumidhar belonging to a **Scheduled Caste (SC)** shall have the right to transfer by way of sale, gift, mortgage, or lease any land to a person not belonging to a Scheduled Caste, **except with the previous written permission of the Collector (District Magistrate)** under prescribed statutory conditions (e.g., when the tenure holder has no surviving legal heir under Section 108/109, or has permanently settled in another district/state, or suffers from a fatal life-threatening disease specified in the Rules). Under **Section 99**, a Bhumidhar belonging to a **Scheduled Tribe (ST)** cannot transfer land to any non-ST person even with the Collector's permission!

5.3 Succession, *2019* Amendment for Unmarried Daughters, Partition & Revenue Recovery

• **Succession and the Historic UP Revenue Code (Amendment) Act, 2019 (Sections 107–115):**

• Under **Section 107**, only a **Bhumidhar with Transferable Rights** can bequeath his holding by **Will (वसीयत)**, which must be in writing, attested by two witnesses, and **registered** (an SC/ST Bhumidhar cannot bequeath land by Will to a non-SC/non-ST person without the Collector's prior approval).

• Under **Section 108 (General Order of Succession to Male Tenure Holders)** as amended by the **Uttar Pradesh Revenue Code (Amendment) Act, 2019 (U.P. Act No. 7 of 2019)**: (a) First preference goes equally to **Widow, Unmarried Daughter, and Male Lineal Descendants** per stirpes; critically, the **2019 Amendment also inserted Married Daughters** into the primary succession framework alongside sons/widows where applicable, and explicitly enabled individuals from the **Third Gender (Transgender persons)** to inherit agricultural holdings as natural heirs without gender discrimination!

• Under **Section 115 (Escheat / राजगामी संपत्ति):** When a Bhumidhar or Asami dies intestate leaving **no legal heir** entitled to succeed under the Code, all rights in the landholding revert to the **Gram Panchayat / Bhumi Prabandhak Samiti** (and the Collector takes possession if the Gram Panchayat fails to act).

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1 — **Agricultural Holding Acquisition / Succession / Sale Deed**

STEP 2 — **Lekhpal Field Inquiry & Tahsildar Mutation Order (Section 34/35)**

STEP 3 — **Updation of Six-Yearly Record of Rights (Khatauni - Section 31)**

STEP 4 — **Annual Three-Crop Partal & Digital Bhulekh Verification**

Section Number	Statutory Provision Title in UP Revenue Code 2006	Competent Revenue Authority	Key Examination Highlights & Procedural Timelines
Section 24	Disputes regarding boundaries (*Medhbandi / Patthargadi*)	**Sub-Divisional Officer (SDO / SDM)**	Summary inquiry on application or Lekhpal report; boundary demarcation must be concluded within **3 months** (**90 days**); appeal lies to Commissioner within **30 days**
Section 30 & 30(2)	Maintenance of Village Map (*Shajra*) & Field Book (*Khasra*) and physical partition of *Minjumla* numbers	**Collector (DM)**	*Minjumla* plots (jointly shared sub-divisions of a Gata number) are physically partitioned under Section 30(2) read with Rules 26–27
Section 31 & 32	Record of Rights (*Khatauni*) & Correction of Clerical Errors	**Collector / SDO / Tahsildar**	*Khatauni* contains **13 Columns** and is revised every **6 years**; undisputed clerical errors corrected by Tahsildar, disputed corrections decided by SDO under Section 38
Section 33, 34 & 35	Mutation (*Dakhil-Kharij*) on Succession (Sec 33) or Transfer/Sale (Sec 34/35)	**Revenue Inspector (Kanungo)** for undisputed succession; **Tahsildar** for transfer/disputed cases	Undisputed mutation decided within **45 days**, disputed mutation within **90 days**; appeal to SDO within **30 days** ; penalty stored in Consolidated Fund

Section Number	Statutory Provision Title in UP Revenue Code 2006	Competent Revenue Authority	Key Examination Highlights & Procedural Timelines
Section 59 & 60	Entrustment of Land/ Property to **Gram Panchayat** & **Bhumi Prabandhak Samiti (BPS)**	**State Government / Gram Pradhan (Chairperson) & Lekhpal (Secretary)**	Gram Pradhan is ex-officio Chairman and **Lekhpal is ex-officio Secretary** of the Bhumi Prabandhak Samiti (Land Management Committee)
Section 67 & 67A	Prevention of Damage, Misappropriation & Wrongful Occupation of Gram Panchayat Property	**Assistant Collector / Tahsildar**	Lekhpal reports encroachment in **R.C. Form 19**; eviction and damages recovery ordered within **90 days**; Section 67A protects house sites built by poor families before **29 Nov 2012**
Section 80 & 82	Declaration of Agricultural Holding for **Non-Agricultural Use** (*Abadi / Industrial / Commercial*)	**Sub-Divisional Officer (SDO / SDM)**	Replaced old Section 143 of UPZALR Act 1950; SDO must decide application within **45 working days** (per 2019 Amendment, deemed approved if not decided within 45 days); Section 82 cancels declaration on reconversion
Section 89 & 98	Ceiling Restriction (**12.5 Acres**) on Acquisition & SC Land Transfer Permission	**State Government / Collector (DM)**	Maximum land acquisition by transfer capped at **5.0586 hectares (12.5 Acres)** across UP (relaxable by State Govt for industrial/educational projects under Sec 89(3)); Sec 98 requires DM permission for SC-to-non-SC sale
Section 116 & 117	Suit for Division of Holding (*Batwara / Partition of Jot*)	**Sub-Divisional Officer (SDO / SDM)**	Any co-tenure holder can sue for partition before SDO, making the **Gram Panchayat a mandatory party**; preliminary and final decrees passed within **6 months**
Section 170	Processes for Recovery of Arrears of Land Revenue (*Malguzari Vasuli*)	**Collector / Tahsildar**	Seven statutory recovery modes: (a) Writ of Demand (*Dastak*), (b) Arrest and detention up to **15 days** (exempting women, minors, senior citizens **> 65 yrs**), (c) Attachment of movable property, (d) Attachment of bank account/locker, (e) Attachment of holding, (f) Lease/Sale of holding, (g) Attachment of other immovable property

Did You Know?: Under the Board of Revenue, Uttar Pradesh digital modernization initiative (**e-Khasra / Real-Time Khatauni**), the traditional 21-column *Khasra* (Field Book) has been upgraded to a **46-Column Digital e-Khasra** (incorporating crop insurance, disaster relief, sharecropper details, irrigation source, and tree count), while the traditional 13-Column *Khatauni* (Record of Rights) has been upgraded to a **19-Column Real-Time Khatauni (RTK)** where each co-sharer's exact mathematical share and transfer history are updated instantaneously upon registration!

Exam Trap Alert: Do not confuse **Khasra** with **Khatauni**! **Khasra (Field Book, RC Form-4)** is a **plot-wise register maintained annually (for 1 Fasli Year: 1 July to 30 June)** recording crop details across three seasonal *Partals* (Kharif Partal starting **10 August**, Rabi Partal starting **1 January**, and Zaid Partal starting **1 May**) — it is **NOT** a record of title/ ownership. **Khatauni (Record of Rights, RC Form-7)** is a **tenure-holder-wise register revised every 6 years** under Section 31 that serves as the statutory **Record of Rights (अधिकार अभिलेख)**.

★ **Memory Trick:** Remember the three core UP Revenue Code section upgrades from the old UPZALR Act 1950 using **"80-98-116"**: **Section 80** = Non-Agricultural Conversion (old Sec 143); **Section 98** = Collector's Permission for SC Land Sale (old Sec 157A); **Section 116** = Partition of Holding by SDO (old Sec 176).

Chapter 5 Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Historical Evolution and Structure of the UP Revenue Code 2006	**Enactment, Enforcement, and Repeal of 39 Obsolete Laws**	To modernize land administration and consolidate fragmented colonial and post-independence statutes, the Uttar Pradesh Legislature enacted the **Uttar Pradesh Revenue Code, 2006 (U.P. Act No. 8 of 2012)** as published by the Board of Revenue, Uttar Pradesh. Although drafted in 2006 and receiving Presidential assent in 2012, the Code was enforced in two stages: selected administrative sections came into force on **18 December 2015** (following the **U.P. Revenue Code (Amendment) Act, 2015**, U.P. Act No. 4 of 2016), and the complete Code along with the **U.P. Revenue Code Rules, 2016** came into force across all 75 districts of Uttar Pradesh on **11 February 2016**.
Classes of Tenures and Rights of Landholders (Chapter IX: Sections 74 to 115)	**Structural Blueprint**	The Uttar Pradesh Revenue Code, 2006 consists of **16 Chapters, 234 Sections, and 4 Schedules**. Section 230 of the Code combined with the **First Schedule** explicitly repealed **39 outdated enactments**, most notably the **U.P. Land Revenue Act, 1901** and the **U.P. Zamindari Abolition and Land Reforms Act, 1950 (UPZALR Act, 1950)** (which had come into force on **1 July 1952**).
Succession, 2019 Amendment for Unmarried Daughters, Partition & Revenue Recovery	**Four Classes of Tenure Holders (Section 74)**	Section 74 of the UP Revenue Code, 2006 establishes exactly **four classes of tenure holders** in Uttar Pradesh:
Historical Evolution and Structure of the UP Revenue Code 2006	**Bhumidhar with Transferable Rights (संक्रमणीय अधिकार वाला भूमिधर — Section 75)**	The highest and most comprehensive class of agricultural landholder. Possesses permanent, heritable, and **transferable** rights over the landholding (subject to the **12.5-acre** / **5.0586-hectare** ceiling limit under Section 89). Can use the land for any purpose (including industrial, commercial, or residential after obtaining a declaration under **Section 80**).
Classes of Tenures and Rights of Landholders (Chapter IX: Sections 74 to 115)	**Bhumidhar with Non-Transferable Rights (असंक्रमणीय अधिकार वाला भूमिधर — Section 76)**	Holds permanent and heritable interest in land allotted by the Bhumi Prabandhak Samiti (Land Management Committee), Bhoodan Yagna Committee, or surplus ceiling land, **without the right to sell or gift** the land freely (except mortgage without possession for institutional institutional crop/agricultural loans under Section 92). Crucially, under **Section 76(2)**, every person who was a Bhumidhar with Non-Transferable Rights and has completed **5 years (five years)** from the date of allotment/acquisition automatically acquires the status of a **Bhumidhar with Transferable Rights** (reduced from 10 years under earlier law), provided the land is not covered under the public utility exclusions of **Section 77**.
Succession, 2019 Amendment for Unmarried Daughters, Partition & Revenue Recovery	**Asami (आसामी — Section 78)**	A subordinate, temporary, heritable but **non-transferable** tenure holder possessing weakest occupancy rights. Asami rights arise over land enumerated in **Section 77** (such as pasture land, *Singhara* cultivation beds in tanks, riverine unstable tracts along Ganga/Yamuna/Ghaghara, or disabled Bhumidhars' leased land). An Asami can use land **exclusively for agriculture, horticulture, or animal husbandry** (Section 84) and is liable to ejectment under **Section 131**.

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Historical Evolution and Structure of the UP Revenue Code 2006	**Government Lessee (सरकारी पट्टेदार — Section 79 & Section 147)**	Every person who holds land leased directly by the State Government under the Government Grants Act, 1895 or terms of a specific State lease instrument, governed strictly by the covenants of that lease rather than general Bhumidhari transfer provisions.
Classes of Tenures and Rights of Landholders (Chapter IX: Sections 74 to 115)	**Public Utility Lands Where Bhumidhari Rights Never Accrue (Section 77)**	Under Section 77 (replacing old Section 132 of UPZALR Act, 1950), notwithstanding any provision of the Code, **no person shall ever acquire the rights of a Bhumidhar** in: *Khalihan* (threshing floors), manure pits, pasture lands (*Charagah*), cremation or burial sites (*Shamshan/Kabristan*), *Abadi* sites, lands covered by water used for growing *Singhara*, riverbeds used for casual cultivation, forest tracts, or roads/canals.
Succession, 2019 Amendment for Unmarried Daughters, Partition & Revenue Recovery	**Transfer Restrictions Protecting Scheduled Castes and Scheduled Tribes (Sections 98 & 99)**	Under **Section 98**, no Bhumidhar belonging to a **Scheduled Caste (SC)** shall have the right to transfer by way of sale, gift, mortgage, or lease any land to a person not belonging to a Scheduled Caste, **except with the previous written permission of the Collector (District Magistrate)** under prescribed statutory conditions (e.g., when the tenure holder has no surviving legal heir under Section 108/109, or has permanently settled in another district/state, or suffers from a fatal life-threatening disease specified in the Rules). Under **Section 99**, a Bhumidhar belonging to a **Scheduled Tribe (ST)** cannot transfer land to any non-ST person even with the Collector's permission!
Historical Evolution and Structure of the UP Revenue Code 2006	**Under Section 115 (Escheat / राजगामी संपत्ति)**	**When a Bhumidhar or Asami dies intestate leaving** no legal heir **entitled to succeed under the Code, all rights in the landholding revert to the** Gram Panchayat / Bhumi Prabandhak Samiti** (and the Collector takes possession if the Gram Panchayat fails to act).

Chapter 5 Multi-Statement Exam Verification Drills

Chapter 5 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Enactment, Enforcement, and Repeal of 39 Obsolete Laws): To modernize land administration and consolidate fragmented colonial and post-independence statutes, the Uttar Pradesh Legislature enacted the **Uttar Pradesh Revenue Code, 2006 (U.P. Act No. 8 of 2012)** as published by the Board of Revenue, Uttar Pradesh. Although drafted in 2006 and receiving Presidential assent in 2012, the Code was enforced in two stages: selected administrative sections came into force on **18 December 2015** (following the **U.P. Revenue Code (Amendment) Act, 2015**, U.P. Act No. 4 of 2016), and the complete Code along with the **U.P. Revenue Code Rules, 2016** came into force across all 75 districts of Uttar Pradesh on **11 February 2016**.

Statement-II (Structural Blueprint): The Uttar Pradesh Revenue Code, 2006 consists of **16 Chapters, 234 Sections, and 4 Schedules**. Section 230 of the Code combined with the **First Schedule** explicitly repealed **39 outdated enactments**, most notably the **U.P. Land Revenue Act, 1901** and the **U.P. Zamindari Abolition and Land Reforms Act, 1950 (UPZALR Act, 1950)** (which had come into force on **1 July 1952**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 5 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (Four Classes of Tenure Holders (Section 74)): Section 74 of the UP Revenue Code, 2006 establishes exactly **four classes of tenure holders** in Uttar Pradesh:

Statement-II (Bhumidhar with Transferable Rights (संक्रमणीय अधिकार वाला भूमिधर — Section 75)): The highest and most comprehensive class of agricultural landholder. Possesses permanent, heritable, and **transferable** rights over the landholding (subject to the **12.5-acre** / **5.0586-hectare** ceiling limit under Section 89). Can use the land for any purpose (including industrial, commercial, or residential after obtaining a declaration under **Section 80**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 5 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (Bhumidhar with Non-Transferable Rights (असंक्रमणीय अधिकार वाला भूमिधर — Section 76)): Holds permanent and heritable interest in land allotted by the Bhumi Prabandhak Samiti (Land Management Committee), Bhoodan Yagna Committee, or surplus ceiling land, **without the right to sell or gift** the land freely (except mortgage without possession for institutional institutional crop/agricultural loans under Section 92). Crucially, under **Section 76(2)**, every person who was a Bhumidhar with Non-Transferable Rights and has completed **5 years (five years)** from the date of allotment/acquisition automatically acquires the status of a **Bhumidhar with Transferable Rights** (reduced from 10 years under earlier law), provided the land is not covered under the public utility exclusions of **Section** 77.

Statement-II (Asami (आसामी — Section 78)): A subordinate, temporary, heritable but **non-transferable** tenure holder possessing weakest occupancy rights. Asami rights arise over land enumerated in **Section** 77 (such as pasture land, *Singhara* cultivation beds in tanks, riverine unstable tracts along Ganga/Yamuna/Ghaghara, or disabled Bhumidhars' leased land). An Asami can use land **exclusively for agriculture, horticulture, or animal husbandry** (Section 84) and is liable to ejectment under **Section 131**.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 5 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Government Lessee (सरकारी पट्टेदार — Section 79 & Section 147)): Every person who holds land leased directly by the State Government under the Government Grants Act, 1895 or terms of a specific State lease instrument, governed strictly by the covenants of that lease rather than general Bhumidhari transfer provisions.

Statement-II (Public Utility Lands Where Bhumidhari Rights Never Accrue (Section 77)): Under Section 77 (replacing old Section 132 of UPZALR Act, 1950), notwithstanding any provision of the Code, **no person shall ever acquire the rights of a Bhumidhar** in: *Khalihan* (threshing floors), manure pits, pasture lands (*Charagah*), cremation or burial sites (*Shamshan*/*Kabristan*), *Abadi* sites, lands covered by water used for growing *Singhara*, riverbeds used for casual cultivation, forest tracts, or roads/canals.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 5 Statement-Verification Drill #5 Both Statements Verified Correct

Statement-I (Transfer Restrictions Protecting Scheduled Castes and Scheduled Tribes (Sections 98 & 99)): Under **Section 98**, no Bhumidhar belonging to a **Scheduled Caste (SC)** shall have the right to transfer by way of sale, gift, mortgage, or lease any land to a person not belonging to a Scheduled Caste, **except with the previous written permission of the Collector (District Magistrate)** under prescribed statutory conditions (e.g., when the tenure holder has no surviving legal heir under Section 108/109, or has permanently settled in another district/state, or suffers from a fatal life-threatening disease specified in the Rules). Under **Section 99**, a Bhumidhar belonging to a **Scheduled Tribe (ST)** cannot transfer land to any non-ST person even with the Collector's permission!

Statement-II (Under Section 115 (Escheat / राजगामी संपत्ति)): When a Bhumidhar or Asami dies intestate leaving no legal heir **entitled to succeed under the Code, all rights in the landholding revert to the** Gram Panchayat / Bhumi Prabandhak Samiti** (and the Collector takes possession if the Gram Panchayat fails to act).

✔ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter *6:* Land Measurement Units, Chains (Jarib), Surveying Instruments & Village Records

Chapter Key Study Pillars — Chapter 6: Land Measurement Units, Chains (Jarib), Surveying Instruments & Village Records

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Traditional & Metric Land Area Measurement Units in Uttar Pradesh	**Chain Surveying — Types of Jarib (Survey Chains) and Accessories**	**Duties of Lekhpal, Village Registers & Surveying Instruments**

6.1 Traditional & Metric Land Area Measurement Units in Uttar Pradesh

• **Standard Metric vs. Traditional Bigha System:** Under the Uttar Pradesh Land Revenue administration supervised by the **Board of Revenue, Uttar Pradesh**, official revenue records (*Khasra* and *Khatauni*) record land area in **Hectares** (**1 Hectare = 10,000 square meters = 2.47105 Acres**), while field-level local transactions and chain surveys rely on the **Pucca (Shahjahani) Bigha, Biswa, Biswansi**, and **Kachwansi** hierarchy.

• **Complete Linear and Area Conversion Ladder (Standard Pucca Bigha of Uttar Pradesh):**

• **1 Karam (Gatha / Latha)** = **99 inches** = **8 feet 3 inches** (**8.25 feet**) = **2.75 Yards (Gaj)** = **5.5 Hath** (**1 Hath = 18 inches = 0.5 Gaj**) = **2.5146 meters**.

• **1 Unwansi** = **24.5025 sq. inches**.

• **1 Kachwansi** = **20 Unwansi** = **1 Square Gatha**? No! Look at the exact UP Revenue scale:

• **20 Unwansi = 1 Kachwansi**

• **20 Kachwansi = 1 Biswansi (1 Square Karam / 1 Square Latha = 8.25 ft × 8.25 ft = 68.0625 sq. feet = 7.5625 sq. yards)**

• **20 Biswansi = 1 Biswa = 20 Square Latha = 1,361.25 sq. feet = 151.25 sq. yards = 126.46 sq. meters**

• **20 Biswa = 1 Pucca Bigha (1 Square Shahjahani Jarib = 55 yards × 55 yards = 3,025 sq. yards = 27,225 sq. feet = 2,529.285 sq. meters = 0.2529 Hectare)**

• **1 Hectare Conversions:**

• **1 Hectare = 10,000 sq. meters = 11,959.9 sq. yards = 107,639 sq. feet = 100 Ares** (**1 Are = 100 sq. meters**)

• **1 Hectare = 2.47105 Acres** (**1 Acre = 4,840 sq. yards = 43,560 sq. feet = 4,046.86 sq. meters = 10 Square Gunter Chains = 1.6 Pucca Bigha = 4.8 Kachcha Bigha**)

• **1 Hectare = 3.95368 Pucca Bighas** (approx. **3.95 Pucca Bigha** in UP)

• **1 Pucca Bigha = 3 Kachcha Bighas** (**1 Kachcha Bigha = 1,008.33 sq. yards = 843 sq. meters = 6.67 Biswa**).

6.2 Chain Surveying — Types of Jarib (Survey Chains) and Accessories

• **Five Standard Types of Jarib (Survey Chains):**Every standard survey chain (except Gathadar/Revenue chain) is divided into **100 metallic links (*Kadi*)** made of **4 mm** galvanized mild steel wire with brass handles at both ends and brass tallies (*Phully*) at every **10 links** (**5 meters** in a **20 m** metric chain):

1. **Shahjahani Jarib (Pucca Bigha Chain):** Total length = **165 feet** (**55 Yards / Gaj**); consists of **200 links** of **9.9 inches** (**0.825 feet**) each. Used since the reign of Mughal Emperor Shah Jahan (**1 Square Shahjahani Jarib = 55 × 55 = 3,025 sq. yards = 1 Pucca Bigha**).

2. **Gunter's Chain (Surveyor's Chain):** Invented by English mathematician **Edmund Gunter in 1620**; total length = **66 feet** (**22 Yards = 4 Rods/Poles** where **1 Rod = 16.5 feet**); consists of **100 links** of **7.92 inches** (**0.66 feet**) each. Essential for British-era Acre and Furlong surveys: **10 Gunter Chains = 1 Furlong (220 Yards)**; **80 Gunter Chains = 1 Mile (1,760 Yards)**; **10 Square Gunter Chains = 1 Acre (4,840 sq. yards)**.

3. **Engineer's Chain:** Total length = **100 feet**; consists of **100 links** of **1 foot** (**12 inches**) each.

4. **Revenue Chain:** Total length = **33 feet** (**11 Yards**); consists of **16 links** of **2 feet 0.75 inches** (**2.0625 feet**) each; mainly used in cadastral surveys.

5. **Metric Chain:** Available in **20 meters** (**100 links** of **20 cm** each) and **30 meters** (**150 links** of **20 cm** each).

6.3 Duties of Lekhpal, Village Registers & Surveying Instruments

• **Surveying Instruments Used by Revenue Officials:**

• **Shajra (Village Map):** Cloth/digital map of the village showing plot boundaries (*Gata* numbers), wells, canals, roads, and *Abadi* sites; inspected during all three seasonal *Partals*.

• **Compass (Prismatic Compass vs. Surveyor's Compass):** Prismatic Compass measures **Whole Circle Bearing (WCB)** from 0° to 360° clockwise from Magnetic North, whereas Surveyor's Compass measures **Quadrantal / Reduced Bearing (QB)** from 0° to 90° from North or South toward East or West.

• **Cross Staff, Optical Square & Prism Square:** Used for setting out right angles (90°) to the main survey chain line; **Optical Square** operates on the principle of **double reflection** using two mirrors fixed at an angle of **45°** to each other (so the incident and reflected rays are perpendicular at 90°).

• **Planimeter:** Mechanical or digital instrument used on a map to accurately measure the **area of an irregular plane figure**.

• **Dumpy Level & Theodolite: Dumpy Level** determines relative elevations (leveling) in the vertical plane only, whereas a **Theodolite** measures both horizontal and vertical angles with high precision.

• **Key Registers Maintained by the Lekhpal under UP Land Records Manual:**

• **Khasra (Field Book - RC Form 4):** Preserved by the Lekhpal for 1 year and then deposited with the **Registrar Kanungo (Office Revenue Inspector)** on or before **31 July** every year.

• **Khatauni (Record of Rights - RC Form 7):** Prepared every 6 years (**19 Columns** in Real-Time Khatauni); deposited with the Registrar Kanungo.

• **Khewat:** Register of Zamindars/Proprietors prior to the abolition of Zamindari in 1952 (no longer maintained after UPZALR Act, 1950).

• **Dakhil-Kharij Register, Boundary Mark (*Chanda*/*Burji*) Inspection Register, Family Register (*Parivar Register* — maintained by Gram Panchayat Adhikari / VDO under UP Panchayat Raj Act, 1947, NOT by the Lekhpal!), and Diary (Roznamcha - RC Form 2):** The **Lekhpal's Diary (Roznamcha)** records daily official tours and occurrences from **1 August to 31 July**.

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1 — Baseline Triangulation & Station Fixing with Ranging Rods

STEP 2 — Chain Unfolding & Linear Measurement via Shahjahani/Metric Jarib

STEP 3 — Perpendicular Offset Taking via Optical Square (45° Mirrors)

STEP 4 — Area Computation in Bigha-Biswa / Hectares & Shajra Plotting

Measurement Unit / Survey Chain	Standard Dimensions & Sub-Divisions	Exact Equivalent in Feet / Yards / Meters	Primary Revenue & Survey Application
1 Pucca Bigha (Uttar Pradesh)	**20 Biswa = 400 Biswansi = 3 Kachcha Bigha**	**27,225 sq. ft** = **3,025 sq. yards** = **2,529.28 sq. m**	Standard land measurement unit across UP; **1 Hectare = 3.9537 Pucca Bigha**
1 Acre (Imperial Unit)	**4 Roods = 160 Square Poles = 10 Sq. Gunter Chains**	**43,560 sq. ft** = **4,840 sq. yards** = **4,046.86 sq. m**	Equals **1.6 Pucca Bigha** (**32 Biswa**) or **0.4047 Hectare**; **1 Hectare = 2.471 Acres**
1 Hectare (Metric Unit)	**100 Ares = 10,000 Square Meters**	**107,639 sq. ft** = **11,959.9 sq. yards**	Official statutory unit in *Khasra*, *Khatauni*, and PM-KISAN land records
Shahjahani Jarib	**200 Links** (**1 Link = 9.9 inches = 0.825 ft**)	Total Length: **165 feet** (**55 Yards**)	**1 Sq. Shahjahani Jarib = 55 × 55 = 3,025 sq. yards = 1 Pucca Bigha**
Gunter's Chain (1620)	**100 Links** (**1 Link = 7.92 inches = 0.66 ft**)	Total Length: **66 feet** (**22 Yards**)	**10 Chains = 1 Furlong**; **80 Chains = 1 Mile**; **10 Sq. Chains = 1 Acre**
Revenue Chain	**16 Links** (**1 Link = 2.0625 ft = 2 ft 0.75 in**)	Total Length: **33 feet** (**11 Yards**)	Cadastral field plotting (**40 Sq. Revenue Chains = 1 Acre**)

Measurement Unit / Survey Chain	Standard Dimensions & Sub-Divisions	Exact Equivalent in Feet / Yards / Meters	Primary Revenue & Survey Application
Engineer's Chain	**100 Links** (**1 Link = 1 foot = 12 inches**)	Total Length: **100 feet** (**33.33 Yards**)	Civil engineering, highway, and canal alignment surveys

Did You Know?: The word **Lekhpal** replaced the colonial designation **Patwari** in Uttar Pradesh in **1952** during the tenure of Chief Minister **Pandit Govind Ballabh Pant** and Revenue Minister **Chaudhary Charan Singh** (architect of the UP Zamindari Abolition Act, 1950), as documented by the **Board of Revenue, Uttar Pradesh**. Furthermore, Emperor **Sher Shah Suri** (assisted by Todar Mal) introduced the *Sikandari Gaj* (**32 digits / 39 inches**) and hempen rope (*Jarib*), which Emperor **Akbar** and **Raja Todar Mal** replaced in **1580 AD (Ain-i-Dahsala / Zabti System)** with the **Bamboo Jarib joined by iron rings (*Tanab*)** and the *Ilahi Gaj* (**41 digits / 33 inches**) covering four land classes: **Polaj** (cultivated annually), **Parauti** (fallow for 1–2 years), **Chachar** (fallow for 3–4 years), and **Banjar** (uncultivated for 5+ years).

Exam Trap Alert: Candidates often confuse the **Agricultural Year (Fasli Year)** with the **Financial Year**. In Uttar Pradesh revenue administration under Section 4(11) of the UP Revenue Code, 2006, the **Agricultural Year (कृषि वर्ष / फसली वर्ष)** begins on **1st July and ends on 30th June** of the next calendar year! Also remember the formula to convert a Gregorian Calendar Year to a **Fasli Year** (introduced by Emperor Akbar in 1556 AD): Fasli Year = Gregorian Year - 593 (for January to June) or Gregorian Year - 592 (from 1st July to 31st December).

★ **Memory Trick:** Memorize the **Three Seasonal Partal (Field Inspection) Start Dates** of the Lekhpal using **"10 Aug - 1 Jan - 1 May"**: **Kharif Partal** begins on **10 August**; **Rabi Partal** begins on **1 January**; and **Zaid Partal** begins on **1 May**.

Chapter *6* Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Traditional & Metric Land Area Measurement Units in Uttar Pradesh	**Standard Metric vs. Traditional Bigha System**	Under the Uttar Pradesh Land Revenue administration supervised by the **Board of Revenue, Uttar Pradesh**, official revenue records (*Khasra* and *Khatauni*) record land area in **Hectares** (**1 Hectare = 10,000 square meters = 2.47105 Acres**), while field-level local transactions and chain surveys rely on the **Pucca (Shahjahani) Bigha**, **Biswa**, **Biswansi**, and **Kachwansi** hierarchy.
Chain Surveying — Types of Jarib (Survey Chains) and Accessories	**1 Karam (Gatha / Latha)**	= **99 inches** = **8 feet 3 inches** (**8.25 feet**) = **2.75 Yards (Gaj)** = **5.5 Hath** (**1 Hath = 18 inches = 0.5 Gaj**) = **2.5146 meters**.
Duties of Lekhpal, Village Registers & Surveying Instruments	**1 Unwansi**	= **24.5025 sq. inches**.
Traditional & Metric Land Area Measurement Units in Uttar Pradesh	**1 Kachwansi**	= **20 Unwansi** = **1 Square Gatha**? No! Look at the exact UP Revenue scale:

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Chain Surveying — Types of Jarib (Survey Chains) and Accessories	**Five Standard Types of Jarib (Survey Chains)**	Every standard survey chain (except Gathadar/Revenue chain) is divided into **100 metallic links (*Kadi*)** made of **4 mm** galvanized mild steel wire with brass handles at both ends and brass tallies (*Phully*) at every **10 links** (**5 meters** in a **20 m** metric chain):
Duties of Lekhpal, Village Registers & Surveying Instruments	**Shahjahani Jarib (Pucca Bigha Chain)**	Total length = **165 feet** (**55 Yards / Gaj**); consists of **200 links** of **9.9 inches** (**0.825 feet**) each. Used since the reign of Mughal Emperor Shah Jahan (**1 Square Shahjahani Jarib = 55 × 55 = 3,025 sq. yards = 1 Pucca Bigha**).
Traditional & Metric Land Area Measurement Units in Uttar Pradesh	**Gunter's Chain (Surveyor's Chain)**	Invented by English mathematician **Edmund Gunter in *1620***; total length = **66 feet** (**22 Yards = 4 Rods/Poles** where **1 Rod = 16.5 feet**); consists of **100 links** of **7.92 inches** (**0.66 feet**) each. Essential for British-era Acre and Furlong surveys: **10 Gunter Chains = 1 Furlong (220 Yards)**; **80 Gunter Chains = 1 Mile (1,760 Yards)**; **10 Square Gunter Chains = 1 Acre (4,840 sq. yards)**.
Chain Surveying — Types of Jarib (Survey Chains) and Accessories	**Engineer's Chain**	Total length = **100 feet**; consists of **100 links** of **1 foot** (**12 inches**) each.
Duties of Lekhpal, Village Registers & Surveying Instruments	**Revenue Chain**	Total length = **33 feet** (**11 Yards**); consists of **16 links** of **2 feet 0.75 inches** (**2.0625 feet**) each; mainly used in cadastral surveys.
Traditional & Metric Land Area Measurement Units in Uttar Pradesh	**Metric Chain**	Available in **20 meters** (**100 links** of **20 cm** each) and **30 meters** (**150 links** of **20 cm** each).
Chain Surveying — Types of Jarib (Survey Chains) and Accessories	**Shajra (Village Map)**	Cloth/digital map of the village showing plot boundaries (*Gata* numbers), wells, canals, roads, and *Abadi* sites; inspected during all three seasonal *Partals*.
Duties of Lekhpal, Village Registers & Surveying Instruments	**Compass (Prismatic Compass vs. Surveyor's Compass)**	Prismatic Compass measures **Whole Circle Bearing (WCB)** from 0° to 360° clockwise from Magnetic North, whereas Surveyor's Compass measures **Quadrantal / Reduced Bearing (QB)** from 0° to 90° from North or South toward East or West.
Traditional & Metric Land Area Measurement Units in Uttar Pradesh	**Cross Staff, Optical Square & Prism Square**	Used for setting out right angles (90°) to the main survey chain line; **Optical Square** operates on the principle of **double reflection** using two mirrors fixed at an angle of **45°** to each other (so the incident and reflected rays are perpendicular at 90°).
Chain Surveying — Types of Jarib (Survey Chains) and Accessories	**Planimeter**	Mechanical or digital instrument used on a map to accurately measure the **area of an irregular plane figure**.

Chapter *6* Multi-Statement Exam Verification Drills

Chapter 6 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Standard Metric vs. Traditional Bigha System): Under the Uttar Pradesh Land Revenue administration supervised by the Board of Revenue, Uttar Pradesh, official revenue records (*Khasra* and *Khatauni*) record land area in **Hectares** (**1 Hectare = 10,000 square meters = 2.47105 Acres**), while field-level local transactions and chain surveys rely on the **Pucca (Shahjahani) Bigha**, **Biswa**, **Biswansi**, and **Kachwansi** hierarchy.

Statement-II (1 Karam (Gatha / Latha)): = **99 inches** = **8 feet 3 inches** (**8.25 feet**) = **2.75 Yards (Gaj)** = **5.5 Hath** (**1 Hath = 18 inches = 0.5 Gaj**) = **2.5146 meters**.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 6 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (1 Unwansi): = **24.5025 sq. inches**.

Statement-II (1 Kachwansi): = **20 Unwansi** = **1 Square Gatha**? No! Look at the exact UP Revenue scale:

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 6 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (Five Standard Types of Jarib (Survey Chains)): Every standard survey chain (except Gathadar/Revenue chain) is divided into **100 metallic links (*Kadi*)** made of **4 mm** galvanized mild steel wire with brass handles at both ends and brass tallies (*Phully*) at every **10 links** (**5 meters** in a **20 m** metric chain):

Statement-II (Shahjahani Jarib (Pucca Bigha Chain)): Total length = **165 feet** (**55 Yards / Gaj**); consists of **200 links** of **9.9 inches** (**0.825 feet**) each. Used since the reign of Mughal Emperor Shah Jahan (**1 Square Shahjahani Jarib = 55 × 55 = 3,025 sq. yards = 1 Pucca Bigha**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 6 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Gunter's Chain (Surveyor's Chain)): Invented by English mathematician **Edmund Gunter in 1620**; total length = **66 feet** (**22 Yards = 4 Rods/Poles** where **1 Rod = 16.5 feet**); consists of **100 links** of **7.92 inches** (**0.66 feet**) each. Essential for British-era Acre and Furlong surveys: **10 Gunter Chains = 1 Furlong (220 Yards)**; **80 Gunter Chains = 1 Mile (1,760 Yards)**; **10 Square Gunter Chains = 1 Acre (4,840 sq. yards)**.

Statement-II (Engineer's Chain): Total length = **100 feet**; consists of **100 links** of **1 foot** (**12 inches**) each.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 6 Statement-Verification Drill #5 — Both Statements Verified Correct

Statement-I (Revenue Chain): Total length = **33 feet** (**11 Yards**); consists of **16 links** of **2 feet 0.75 inches** (**2.0625 feet**) each; mainly used in cadastral surveys.

Statement-II (Metric Chain): Available in **20 meters** (**100 links** of **20 cm** each) and **30 meters** (**150 links** of **20 cm** each).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 6 Statement-Verification Drill #6 — Both Statements Verified Correct

Statement-I (Shajra (Village Map)): Cloth/digital map of the village showing plot boundaries (*Gata* numbers), wells, canals, roads, and *Abadi* sites; inspected during all three seasonal *Partals*.

Statement-II (Compass (Prismatic Compass vs. Surveyor's Compass)): Prismatic Compass measures **Whole Circle Bearing (WCB)** from 0° to 360° clockwise from Magnetic North, whereas Surveyor's Compass measures **Quadrantal / Reduced Bearing (QB)** from 0° to 90° from North or South toward East or West.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 7: Panchayati Raj System in India & Uttar Pradesh, 73rd Constitutional Amendment & PESA

Chapter Key Study Pillars — Chapter 7: Panchayati Raj System in India & Uttar Pradesh, 73rd Constitutional Amendment & PESA

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Evolution of Panchayati Raj & Major National Committees	**The 73rd Constitutional Amendment Act, 1992 (Part IX: Articles 243 to 243-O)**	**Panchayati Raj Statutory Framework Specific to Uttar Pradesh**

7.1 Evolution of Panchayati Raj & Major National Committees

• **Historical Roots & Constitutional Directive:** Lord **Ripon** is revered as the **Father of Local Self-Government in India** for his historic **Resolution of 18 May 1882** (Magna Carta of Local Democracy). After Independence, **Article 40** of the Constitution of India (Directive Principles of State Policy - Gandhian Principle) directed the State to take steps to organize **Village Panchayats** and endow them with powers of self-government.

• **Chronological Sequence of Landmark Panchayati Raj Committees:**

1. **Balwant Rai Mehta Committee (January 1957, Report Nov 1957):** Appointed to review the failing **Community Development Programme (launched 2 October 1952)** and **National Extension Service (2 October 1953)**. Recommended **"Democratic Decentralization"** and a **3-Tier Panchayati Raj System**: **Gram Panchayat** (village level, directly elected), **Panchayat Samiti** (block level, executive body, indirectly elected), and **Zila Parishad** (district level, advisory/supervisory body chaired by District Collector). Consequently, Prime Minister Pt. Jawaharlal Nehru inaugurated India's **first Panchayati Raj institution on 2 October 1959 at Bagdari village, Nagaur district (Rajasthan)**, followed by **Andhra Pradesh** on 11 October 1959.

2. **Ashok Mehta Committee (December 1977, Report Aug 1978):** Appointed by the Janata Government; recommended replacing the 3-tier structure with a **2-Tier System**: **Zila Parishad** at the district level (as the primary executive planning point) and **Mandal Panchayat** (**15,000–20,000** population across a group of villages); advocated **open participation of political parties**, compulsory taxation powers, **Nyaya Panchayats** presided over by a qualified judge, reservation for SC/ST based on population, and a **Minister for Panchayati Raj** in the State Cabinet.

3. **G.V.K. Rao Committee (1985):** Appointed by the Planning Commission to review Rural Development and Poverty Alleviation administrative arrangements; described bureaucratized development as **"Grass without Roots"**; recommended creating the post of **District Development Commissioner (DDC)** as CEO of Zila Parishad.

4. **L.M. Singhvi Committee (1986):** Appointed by the Rajiv Gandhi Government on *"Revitalization of Panchayati Raj Institutions for Democracy and Development"*; **first committee to recommend Constitutional Recognition** (adding a new chapter to the Constitution) and establishment of Nyaya Panchayats and Panchayati Raj Tribunals.

5. **P.K. Thungon Committee (1988) & V.N. Gadgil Committee (1988):** Prepared the blueprint for fixed **5-year tenure**, State Finance Commission, State Election Commission, and reservation for SC, ST, and Women, culminating in the **73rd Constitutional Amendment Act, 1992**.

7.2 The 73rd Constitutional Amendment Act, 1992 (Part IX: Articles 243 to 243-O)

• **Enactment and Enforcement:** Passed during the Prime Ministership of **P.V. Narasimha Rao**, the **73rd Constitutional Amendment Act, 1992** received Presidential assent on **20 April 1993** and came into force on **24 April 1993** (celebrated annually across India as **National Panchayati Raj Day** since 2010). It inserted **Part IX ("The Panchayats")** comprising **16 Articles (Article 243 to Article 243-O)** and added the **Eleventh Schedule** containing **29 Functional Subjects** (under Article 243-G). **Madhya Pradesh** became the first state to implement the 73rd Amendment and hold direct elections in 1994.

• **Compulsory vs. Voluntary Provisions under Part IX:**

• **Article 243-A (Gram Sabha):** The constitutional foundation of grassroots direct democracy; comprises **all persons registered in the electoral rolls** (**18+ years**) of a village within the Panchayat area (as contrasted with the Gram Panchayat, which consists of all adult residents in UP under the 1947 Act prior to harmonization).

• **Article 243-B & 243-C (3-Tier Structure):** Mandatory **3-tier system** (Village, Intermediate/Block, and District levels) across all states, except states having a **population not exceeding 20 Lakhs (2 Million)**, which are exempted from constituting the Intermediate (Block) tier. All members at all three tiers are elected **directly** by the people, while Chairpersons at Intermediate and District levels are elected **indirectly** by and from amongst the elected members.

• **Article 243-D (Reservation of Seats):** Mandatory reservation for **Scheduled Castes (SC)** and **Scheduled Tribes (ST)** in exact proportion to their population, and mandatory reservation of **not less than One-Third (1/3 or 33.33%) of total seats (and Chairperson posts)** for **Women** (including SC/ST women). Reservation for **Backward Classes (OBC)** is **voluntary** (left to the State Legislature; in Uttar Pradesh, OBC reservation is capped at **27%**).

• **Article 243-E (Duration of Panchayats):** Uniform **5-year term** from the date appointed for its first meeting. If a Panchayat is dissolved prematurely before the expiry of 5 years, fresh elections must be held within **6 months** of dissolution, and the newly reconstituted Panchayat holds office **only for the remainder of the unexpired period** (if the remaining period is **< 6 months**, holding a by-election is not mandatory).

• **Article 243-F (Minimum Age):** Minimum age to contest a Panchayat election is **21 years** (not 25 years!).

• **Article 243-I (State Finance Commission - SFC):** Constituted by the **Governor every 5 years** to review the financial position of Panchayats and recommend devolution of state taxes, duties, tolls, and grants-in-aid.

• **Article 243-K (State Election Commission - SEC):** Headed by a **State Election Commissioner appointed by the Governor**; exclusively conducts all elections to Panchayats (and Municipalities under Art 243-ZA). The State Election Commissioner can be removed from office **only in the same manner and on the same sites as a Judge of a High Court**!

• **Article 243-M & PESA Act, 1996:** Exempts **Nagaland, Meghalaya, and Mizoram**, Sixth Schedule tribal areas, and the hill areas of Manipur and Darjeeling. Based on the **Dileep Singh Bhuria Committee (1995)**, Parliament enacted the **Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA Act)** extending Part IX with tribal autonomy over minor forest produce, minor minerals, and land alienation across **10 Fifth Schedule States** (Andhra Pradesh, Telangana, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, and Rajasthan).

7.3 Panchayati Raj Statutory Framework Specific to Uttar Pradesh

• **Twin Statutes Governing UP Panchayati Raj:**

1. **United Provinces Panchayat Raj Act, 1947** (enforced 7 **December 1947**): Governs **Gram Sabha** and **Gram Panchayat**. Minimum population to constitute a Gram Sabha in UP is **1,000**. Based on village population, the number of Gram Panchayat Wards/Members is strictly fixed:

• Population up to **1,000** → **9 Members**

• Population **1,001 to 2,000** → **11 Members**

• Population **2,001 to 3,000** → **13 Members**

• Population above **3,000** → **15 Members**

2. **Uttar Pradesh Kshettra Panchayats and Zila Panchayats Adhiniyam, 1961**: Enforced the 3-tier system in UP (**Gram Panchayat** headed by *Gram Pradhan* directly elected; **Kshettra Panchayat** at Block level headed by *Block Pramukh* indirectly elected, with **BDO (Block Development Officer)** as Executive Officer; **Zila Panchayat** at District level headed by *Zila Panchayat Adhyaksha* indirectly elected, with *Mukhya Vikas Adhikari* (*CDO*) or *Apar Mukhya Adhikari* (*AMA*) as Executive Officer).

• **Meetings, Quorum, and Removal (No-Confidence Motion) in UP:**

• **Gram Sabha Meetings:** Mandatory **2 general meetings per year** — one **Kharif Meeting** (immediately after Kharif harvest in Nov–Dec) and one **Rabi Meeting** (immediately after Rabi harvest in May–June). **Quorum for a Gram Sabha meeting is 1/5th (20%) of total members** (if adjourned for lack of quorum, no quorum is required for the adjourned meeting).

• **Gram Panchayat Meetings:** Must meet **at least once every month** (maximum gap between two meetings cannot exceed 2 months). **Quorum for a Gram Panchayat meeting is 1/3rd (33.33%) of elected members**.

• **Six Standing Committees of Gram Panchayat in UP (Section 29):** (1) **Planning and Development Committee** (*Niyojan evam Vikas Samiti* - chaired by Gram Pradhan), (2) **Education Committee** (*Shiksha Samiti* - chaired by Gram Pradhan), (3) **Administration Committee** (*Prashasanik Samiti* - chaired by Gram Pradhan),

(4) **Construction Works Committee** (*Nirman Karya Samiti* - chaired by a member nominated by Gram Panchayat), (5) **Health and Welfare Committee** (*Swasthya evam Kalyan Samiti* - chaired by nominated member), and (6) **Water Management Committee** (*Jal Prabandhan Samiti* - chaired by nominated member).

• **Removal of Gram Pradhan (Section 14 of UP Act 1947):** A No-Confidence Motion against a Gram Pradhan requires **15 days' prior notice** signed by at least **1/2** (**50%**) **of Gram Sabha members** delivered to the **District Panchayat Raj Officer (DPRO)**, cannot be brought within the **first 2 years** of assuming office, and if defeated, cannot be brought again for **1 year**; passage requires a **2/3rd majority of members present and voting** (with a quorum of **1/3rd** of Gram Sabha). A Gram Pradhan submits his **resignation to the DPRO (District Panchayat Raj Officer)**.

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1
Gram Sabha General Body (Art 243-A: Kharif & Rabi Meetings)

STEP 2
Gram Panchayat & 6 Standing Committees prepare GPDP Plan

STEP 3
Kshettra Panchayat (Block Level) & Zila Panchayat Consolidation

STEP 4
State Finance Commission (Art 243-I) Grants & Social Audit Execution

Constitutional Article	Subject Matter under Part IX (73rd Amendment, 1992)	Mandatory vs. Discretionary Nature	Key Constitutional / UP Statutory Detail
Article 243 & 243-A	Definitions & **Gram Sabha**	Mandatory	Gram Sabha exercises powers determined by State Legislature; UP quorum is **1/5th** of registered voters
Article 243-B & 243-C	Constitution & **Composition of Panchayats**	Mandatory (3 Tiers)	States with population **< 20 Lakhs** exempted from Intermediate tier; all ward members elected directly
Article 243-D	**Reservation of Seats** (SC, ST, Women, OBC)	Mandatory for SC, ST & **1/3** Women; Voluntary for OBC	Minimum **1/3** reservation for Women in UP (several states like Bihar, MP, Uttarakhand, HP, Rajasthan have raised it to **50%**)
Article 243-E & 243-F	**5-Year Duration** & **Disqualifications** (**21 Years** Age)	Mandatory	Fresh election within **6 months** of premature dissolution; minimum age to contest is **21 years**
Article 243-G & 243-H	**Powers, Authority (29 Subjects)** & **Power to Impose Taxes**	Discretionary / Voluntary	Eleventh Schedule contains **29 subjects**; taxation powers delegated by State Legislature
Article 243-I	**State Finance Commission (SFC)**	Mandatory (Every 5 Years)	Appointed by the **Governor** every 5 years to recommend tax sharing and grants-in-aid
Article 243-J	**Audit of Accounts** of Panchayats	Mandatory Framework	Accounts audited by the **Chief Audit Officer, Co-operative Societies and Panchayats** in UP
Article 243-K	**State Election Commission (SEC)**	Mandatory	Appointed by Governor; removed only like a **High Court Judge**; Electoral roll revision and election supervision

Constitutional Article	Subject Matter under Part IX (73rd Amendment, 1992)	Mandatory vs. Discretionary Nature	Key Constitutional / UP Statutory Detail
Article 243-ZD	**District Planning Committee (DPC)** (under Part IX-A)	Mandatory (74th Amendment)	Consolidates plans prepared by Panchayats and Municipalities in the district; **4/5th** members elected from Zila Panchayat & Municipalities

Did You Know?: The **e-GramSwaraj Portal** (**egramswaraj.gov.in**) and the **SVAMITVA Scheme** (*Survey of Villages Abadi and Mapping with Improvised Technology in Village Areas*) were both launched on **National Panchayati Raj Day, 24 April 2020**! Under SVAMITVA, drone-based LiDAR/photogrammetric mapping by the Survey of India demarcates residential *Abadi* properties inside the *Lal Dora* (where revenue records historically did not exist) and issues legal **Property Cards (*Gharauni* in Uttar Pradesh)** enabling rural homeowners to avail institutional bank loans.

Exam Trap Alert: Never confuse the **Quorum of Gram Sabha (1/5th)** with the **Quorum of Gram Panchayat (1/3rd)** in Uttar Pradesh! Also, remember that the **Gram Panchayat Adhikari (VDO)** or **Gram Vikas Adhikari** is a **government servant** serving as the **Secretary of the Gram Panchayat** (maintaining the *Parivar Register*, Birth/Death Register under RBD Act 1969, and Cashbook), whereas the **Lekhpal** is the **Secretary of the Bhumi Prabandhak Samiti (Land Management Committee)** under Section 60 of the UP Revenue Code, 2006!

★ **Memory Trick:** Memorize the **5 Key Panchayati Raj Committees in Chronological Order** with the mnemonic **"B-A-G-L-T"**: Balwant Rai Mehta (**1957**) → Ashok Mehta (**1977**) → G.V.K. Rao (**1985**) → L.M. Singhvi (**1986**) → P.K. Thungon (**1988**). And for Part IX Articles (**243-A** to **243-O**), remember **"D = Reservation (Dalit/Women), E = Five-Year Expiry, I = Income (Finance Commission), K = King of Elections (State Election Commission)"**.

Chapter 7 Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Evolution of Panchayati Raj & Major National Committees	**Historical Roots & Constitutional Directive**	Lord **Ripon** is revered as the **Father of Local Self-Government in India** for his historic **Resolution of 18 May 1882** (Magna Carta of Local Democracy). After Independence, **Article 40** of the Constitution of India (Directive Principles of State Policy - Gandhian Principle) directed the State to take steps to organize **Village Panchayats** and endow them with powers of self-government.
The 73rd Constitutional Amendment Act, 1992 (Part IX: Articles 243 to 243-O)	**Balwant Rai Mehta Committee (January 1957, Report Nov 1957)**	Appointed to review the failing **Community Development Programme (launched 2 October 1952)** and **National Extension Service (2 October 1953)**. Recommended **"Democratic Decentralization"** and a **3-Tier Panchayati Raj System**: **Gram Panchayat** (village level, directly elected), **Panchayat Samiti** (block level, executive body, indirectly elected), and **Zila Parishad** (district level, advisory/supervisory body chaired by District Collector). Consequently, Prime Minister Pt. Jawaharlal Nehru inaugurated India's **first Panchayati Raj institution on 2 October 1959 at Bagdari village, Nagaur district (Rajasthan)**, followed by **Andhra Pradesh** on 11 October 1959.

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Panchayati Raj Statutory Framework Specific to Uttar Pradesh	**Ashok Mehta Committee (December 1977, Report Aug 1978)**	Appointed by the Janata Government; recommended replacing the 3-tier structure with a **2-Tier System**: **Zila Parishad** at the district level (as the primary executive planning point) and **Mandal Panchayat** (**15,000–20,000** population across a group of villages); advocated **open participation of political parties**, compulsory taxation powers, **Nyaya Panchayats** presided over by a qualified judge, reservation for SC/ST based on population, and a **Minister for Panchayati Raj** in the State Cabinet.
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Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
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Panchayati Raj Statutory Framework Specific to Uttar Pradesh	**Article 243-F (Minimum Age)**	Minimum age to contest a Panchayat election is **21 years** (not 25 years!).
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The 73rd Constitutional Amendment Act, 1992 (Part IX: Articles 243 to 243-O)	**Article 243-K (State Election Commission - SEC)**	Headed by a **State Election Commissioner appointed by the Governor**; exclusively conducts all elections to Panchayats (and Municipalities under Art 243-ZA). The State Election Commissioner can be removed from office **only in the same manner and on the same sites as a Judge of a High Court**!

Chapter 7 Multi-Statement Exam Verification Drills

Chapter 7 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Historical Roots & Constitutional Directive): Lord **Ripon** is revered as the **Father of Local Self-Government in India** for his historic **Resolution of 18 May 1882** (Magna Carta of Local Democracy). After Independence, **Article 40** of the Constitution of India (Directive Principles of State Policy - Gandhian Principle) directed the State to take steps to organize **Village Panchayats** and endow them with powers of self-government.

Statement-II (Balwant Rai Mehta Committee (January 1957, Report Nov 1957)): Appointed to review the failing **Community Development Programme (launched 2 October 1952)** and **National Extension Service (2 October 1953)**. Recommended **"Democratic Decentralization"** and a **3-Tier Panchayati Raj System**: **Gram Panchayat** (village level, directly elected), **Panchayat Samiti** (block level, executive body, indirectly elected), and **Zila Parishad** (district level, advisory/supervisory body chaired by District Collector). Consequently, Prime Minister Pt. Jawaharlal Nehru inaugurated India's **first Panchayati Raj institution on 2 October 1959 at Bagdari village, Nagaur district (Rajasthan)**, followed by **Andhra Pradesh** on 11 October 1959.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 7 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (Ashok Mehta Committee (December 1977, Report Aug 1978)): Appointed by the Janata Government; recommended replacing the 3-tier structure with a **2-Tier System**: **Zila Parishad** at the district level (as the primary executive planning point) and **Mandal Panchayat** (**15,000–20,000** population across a group of villages); advocated **open participation of political parties**, compulsory taxation powers, **Nyaya Panchayats** presided over by a qualified judge, reservation for SC/ST based on population, and a **Minister for Panchayati Raj** in the State Cabinet.

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Chapter 7 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Enactment and Enforcement): Passed during the Prime Ministership of **P.V. Narasimha Rao**, the **73rd Constitutional Amendment Act, 1992** received Presidential assent on **20 April 1993** and came into force on **24 April 1993** (celebrated annually across India as **National Panchayati Raj Day** since 2010). It inserted **Part IX ("The Panchayats")** comprising **16 Articles (Article 243 to Article 243-O)** and added the **Eleventh Schedule** containing **29 Functional Subjects** (under Article 243-G). **Madhya Pradesh** became the first state to implement the 73rd Amendment and hold direct elections in 1994.

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Chapter 7 Statement-Verification Drill #5 — Both Statements Verified Correct

Statement-I (Article 243-B & 243-C (3-Tier Structure)): Mandatory **3-tier system** (Village, Intermediate/Block, and District levels) across all states, except states having a **population not exceeding 20 Lakhs (2 Million)**, which are exempted from constituting the Intermediate (Block) tier. All members at all three tiers are elected **directly** by the people, while Chairpersons at Intermediate and District levels are elected **indirectly** by and from amongst the elected members.

Statement-II (Article 243-D (Reservation of Seats)): Mandatory reservation for **Scheduled Castes (SC)** and **Scheduled Tribes (ST)** in exact proportion to their population, and mandatory reservation of **not less than One-Third (1/3 or 33.33%) of total seats (and Chairperson posts)** for **Women** (including SC/ST women). Reservation for **Backward Classes (OBC)** is **voluntary** (left to the State Legislature; in Uttar Pradesh, OBC reservation is capped at **27%**).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 7 Statement-Verification Drill #6 — Both Statements Verified Correct

Statement-I (Article 243-E (Duration of Panchayats)): Uniform **5-year term** from the date appointed for its first meeting. If a Panchayat is dissolved prematurely before the expiry of 5 years, fresh elections must be held within **6 months** of dissolution, and the newly reconstituted Panchayat holds office **only for the remainder of the unexpired period** (if the remaining period is **< 6 months**, holding a by-election is not mandatory).

Statement-II (Article 243-F (Minimum Age)): Minimum age to contest a Panchayat election is **21 years** (not 25 years!).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 8: Agricultural Economics, MSP, Rural Credit Institutions & Flagship Rural Schemes

Chapter Key Study Pillars — Chapter 8: Agricultural Economics, MSP, Rural Credit Institutions & Flagship Rural Schemes

Key Study Pillar 1	Key Study Pillar 2	Key Study Pillar 3
Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing	**Agricultural Credit, NABARD, Kisan Credit Card (KCC) & Crop Insurance**	**Flagship Rural Development, Livelihood & Infrastructure Schemes**

8.1 Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing

• **Commission for Agricultural Costs and Prices (CACP):** Originally established on **1 January 1965** as the **Agricultural Prices Commission (APC)** on the recommendation of the **L.K. Jha Committee (Foodgrains Prices Committee, 1964)** and chaired first by Prof. M.L. Dantwala, it was renamed **CACP in March 1985**. CACP is an attached statutory/expert office under the Ministry of Agriculture and Farmers Welfare that **recommends** Minimum Support Prices, while the **final decision to approve and announce MSP** rests with the **Cabinet Committee on Economic Affairs (CCEA)** chaired by the Prime Minister.

• **22 Mandated MSP Crops + 1 FRP Crop (Total 23 Crops):** MSP is announced twice a year (prior to Kharif and Rabi sowing) for **22 mandated crops** (comprising **14 Kharif crops**, **6 Rabi crops**, and **2 Commercial crops**: Copra and Raw Jute), while **Fair and Remunerative Price (FRP)** is announced for **Sugarcane** (replaced Statutory Minimum Price - SMP in 2009 under the Sugarcane Control Order, 1966):

• **7 Cereals:** Paddy, Wheat, Maize, Sorghum (Jowar), Pearl Millet (Bajra), Barley, and Ragi (Finger Millet).

• **5 Pulses:** Gram (Chickpea), Arhar (Tur / Pigeon Pea), Moong (Green Gram), Urad (Black Gram), and Masur (Lentil).

• **7 Oilseeds:** Peanut (Arachis hypogaea), Rapeseed-Mustard, Soybean, Sesamum (Til), Sunflower, Safflower, and Nigerseed.

• **3 Commercial Crops:** Cotton, Raw Jute, and Copra (Milling & Ball Copra) + **Sugarcane (FRP)**.

• **CACP Cost Concepts (A_2, A_2 + FL, and C_2) & Swaminathan Formula:**

• **Cost A_2:** All actual paid-out expenses incurred by the farmer in cash and kind on seeds, fertilizers, pesticides, hired human/bullock/machine labor, irrigation charges, and lease rent paid for leased-in land.

• **Cost A_2 + FL:** Cost A_2 plus the **imputed value of unpaid Family Labor (FL)**. Since the **Union Budget 2018–19**, the Government of India fixes MSP at a minimum of **1.5 times** (**150%**) **of all-India weighted average Cost A_2 + FL**.

• **Cost C_2 (Comprehensive Cost):** Cost A_2 + FL plus **imputed rental value of owned land** and **interest on value of owned fixed capital assets** (excluding land). The **National Commission on Farmers (NCF, 2004–2006)** chaired by **Dr. M.S. Swaminathan** recommended fixing MSP at **C2 + 50%**.

8.2 Agricultural Credit, NABARD, Kisan Credit Card (KCC) & Crop Insurance

• **NABARD (National Bank for Agriculture and Rural Development):** Established on **12 July 1982** under the NABARD Act, 1981 (Headquarters: **Mumbai**) on the recommendation of the **B. Sivaraman Committee (CRAFICARD, 1979)** during the **Sixth Five-Year Plan**, with an initial paid-up capital of **₹100 Crore** (**50:50** between GOI and RBI; today **100%** owned by the Government of India). NABARD manages the **Rural Infrastructure Development Fund (RIDF, established 1995–96)**.

• **Kisan Credit Card (KCC) & Regional Rural Banks (RRBs):**

• **Regional Rural Banks (RRBs):** Established on **2 October 1975** on the recommendation of the **M. Narasimham Working Group (1975)**; the **first RRB in India was Prathama Grameen Bank** headquartered at **Moradabad (Uttar Pradesh)** sponsored by Syndicate Bank. Capital share in RRBs follows the fixed statutory ratio of **50%** **Central Government : 35%** **Sponsor Bank : 15%** **State Government**.

• **Kisan Credit Card (KCC):** Launched in **August 1998** by NABARD and RBI on the recommendation of the **R.V. Gupta Committee**. Provides a **5-year** validity smart/RuPay card with collateral-free agricultural loan up to **₹1.60 Lakh** (extended to Animal Husbandry and Fisheries farmers in 2019 up to **₹2.00 Lakh**). Short-term crop loans up to **₹3.00 Lakh** carry a **7%** per annum interest rate, with a **3%** Prompt Repayment Incentive (PRI), resulting in an **effective interest rate of just 4% per annum** for farmers who repay on time!

8.3 Flagship Rural Development, Livelihood & Infrastructure Schemes

• **Comprehensive Rural Development Scheme Matrix:** Rural development initiatives administered by the Ministry of Rural Development, Ministry of Panchayati Raj, and Ministry of Agriculture (with technical oversight from the **Indian Council of Agricultural Research (ICAR)** and state implementation via the **Board of Revenue, Uttar Pradesh**) form the core of UP Lekhpal, VDO, and PCS exams.

Process Flowchart:

Step-by-Step Conceptual Process Flowchart

STEP 1
CACP Cost Assessment (A2 + FL) & CCEA MSP Announcement

STEP 2
KCC Institutional Credit (4% Effective Interest) & PMFBY Insurance

STEP 3
FCI / NAFED / e-NAM Procurement & Direct Benefit Transfer

STEP 4
Rural Asset Creation under MGNREGA, PMGSY, PMAY-G & NRLM

Scheme Name & Launch Date	Launch Location / Committee / Ministry	Funding Pattern (Centre : State) & Target	Key Statutory / Operational Provisions for Exams
MGNREGA (NREGA Act 2005; launched **2 Feb 2006** in 200 districts at Bandlapalli, Anantapur, AP; pan-India **1 April 2008**; renamed MGNREGA **2 Oct 2009**)	Ministry of Rural Development	**100%** Unskilled Wage by Centre; **75:25** Material Cost	Legal guarantee of **100 days of unskilled manual work** per rural household (**150 days** for drought/disaster/FRA tribal households); minimum **1/3** (**33.33%**) **women beneficiaries**; Unemployment Allowance if work not provided within **15 days**; minimum **60:40 Wage-to-Material ratio**
PM-KISAN (*Pradhan Mantri Kisan Samman Nidhi*) — Launched **24 Feb 2019** (effective retrospectively from **1 Dec 2018**)	Launched at **Gorakhpur (Uttar Pradesh)**; Ministry of Agriculture	**100%** Central Sector Scheme	Direct income support of **₹6,000 per year** in **3 equal four-monthly installments of ₹2,000 each** via DBT into Aadhaar-seeded bank accounts of all landholding farmer families (excluding institutional landholders, income tax payers, and pensioners getting **≥ ₹10,000/month**)
PMFBY (*Pradhan Mantri Fasal Bima Yojana*) — Launched **18 Feb 2016** (implemented Kharif 2016)	Launched at Sehore (MP); replaced NAIS & MNAIS	Actuarial subsidy shared **50:50** (**90:10** in NE States); Made **voluntary for all farmers** from Kharif 2020	Uniform flat farmer premium: **2.0%** **for all Kharif crops**, **1.5%** **for all Rabi crops**, and **5.0%** **for Annual Commercial and Horticultural crops**; covers pre-sowing to **14 days** post-harvest losses
PMAY-G (*Pradhan Mantri Awaas Yojana - Gramin*) — Restructured IAY (1985) and launched **20 Nov 2016**	Launched at **Agra (Uttar Pradesh)**; Ministry of Rural Development	**60:40** (Plain States); **90:10** (NE & Himalayan States); **100%** UTs	Unit assistance of **₹1.20 Lakh** **in Plain areas** and **₹1.30 Lakh** **in Hilly/Difficult/IAP areas**, plus **₹12,000** under Swachh Bharat Mission-G for toilet construction and **90/95 person-days of MGNREGA wage employment**; minimum house area increased from 20 sq.m to **25 sq. meters** including hygienic cooking space
DAY-NRLM (*Deendayal Antyodaya Yojana - National Rural Livelihoods Mission / Aajeevika*) — Launched **3 June 2011** (renamed Nov 2015)	Launched at Banswara (Rajasthan); replaced **SGSY (1 April 1999)**	**60:40** (**90:10** NE/ Himalayan)	Organizes at least one woman from every rural poor household into **Self-Help Groups (SHGs)** (**10–20 members**); includes **Lakhpati Didi Initiative** targeting **3 Crore rural SHG women** earning **≥ ₹1 Lakh/year** and **Namo Drone Didi** (**15,000 women SHGs** provided agricultural drones with **80%** subsidy up to **₹8 Lakh**)
PMGSY (*Pradhan Mantri Gram Sadak Yojana*) — Launched **25 Dec 2000** by PM Atal Bihari Vajpayee	Ministry of Rural Development	**60:40** (since 2015–16; originally **100%** Central)	All-weather single-lane road connectivity to unconnected habitations with population **≥ 500** **in Plains** and **≥ 250** **in NE, Hill, Tribal & Desert areas** (**≥ 100** in LWE blocks); **PMGSY-IV (2024–29)** connects **25,000** unconnected habitations
Jal Jeevan Mission (JJM - Har Ghar Jal) — Launched **15 August 2019**	Ministry of Jal Shakti	**50:50** (Plains); **90:10** (NE/ Himalayan); **100%** UTs	Functional Household Tap Connection (**FHTC**) providing **55 Litres Per Capita Per Day (55 lpcd)** of safe drinking water to every rural household; **Goa** became India's first **100%** *Har Ghar Jal* certified state

Scheme Name & Launch Date	Launch Location / Committee / Ministry	Funding Pattern (Centre : State) & Target	Key Statutory / Operational Provisions for Exams
e-NAM (*National Agriculture Market*) — Launched **14 April 2016**	Implemented by **SFAC** (Small Farmers' Agribusiness Consortium, est. 1994)	**100%** Central Assistance (**₹75 Lakh** per APMC Mandi)	Pan-India electronic trading portal networking existing APMC Mandis under "*One Nation, One Market*" with unified trading license and single-point market fee

Did You Know?: India's landmark agricultural revolutions and their founding pioneers recognized by the Indian Council of Agricultural Research (ICAR) include: **Green Revolution** (Foodgrains — **Dr. M.S. Swaminathan** in India, **Dr. Norman E. Borlaug** globally; term coined by **William S. Gaud** in *1968*), **White Revolution** (Milk — **Dr. Verghese Kurien**), **Blue Revolution** (Fisheries — **Dr. Hiralal Chaudhuri & Dr. Arun Krishnan**), **Yellow Revolution** (Oilseeds — **Sam Pitroda**), **Golden Revolution** (Horticulture & Honey — **Nirpakh Tutej**), **Silver Revolution** (Eggs/Poultry — **Indira Gandhi**), **Pink Revolution** (Onion, Prawn & Pharmaceuticals — **Durgesh Patel**), **Red Revolution** (Tomato & Meat — **Vishal Tewari**), **Grey Revolution** (Fertilizers), **Black Revolution** (Petroleum/Biofuel), **Golden Fibre Revolution** (Jute), **Silver Fibre Revolution** (Cotton), **Parbhani Revolution** (Okra/Bhindi), and **Evergreen / Rainbow Revolution** (Holistic sustainable agriculture — **Dr. M.S. Swaminathan**).

Exam Trap Alert: Do not confuse **NABARD's founding date (12 July 1982)** with **Regional Rural Banks' founding date (2 October 1975)**! Furthermore, farmers **do NOT hold direct individual accounts in NABARD** — NABARD is purely an **apex refinancing and supervisory institution** that channels credit through State Co-operative Banks (SCBs), Regional Rural Banks (RRBs), and Commercial Banks.

★ **Memory Trick:** Remember the **PMFBY Crop Insurance Premium Rates** with **"1.5 - 2.0 - 5.0 (R-K-C)"**: Rabi = **1.5%**, Kharif = **2.0%**, and Commercial/Horticultural = **5.0%**.

Chapter *8* Comprehensive Analytical & Statutory Revision Matrix

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing	**Commission for Agricultural Costs and Prices (CACP)**	Originally established on **1 January 1965** as the **Agricultural Prices Commission (APC)** on the recommendation of the **L.K. Jha Committee (Foodgrains Prices Committee, 1964)** and chaired first by Prof. M.L. Dantwala, it was renamed **CACP in March 1985**. CACP is an attached statutory/expert office under the Ministry of Agriculture and Farmers Welfare that **recommends** Minimum Support Prices, while the **final decision to approve and announce MSP** rests with the **Cabinet Committee on Economic Affairs (CCEA)** chaired by the Prime Minister.
Agricultural Credit, NABARD, Kisan Credit Card (KCC) & Crop Insurance	**22 Mandated MSP Crops + 1 FRP Crop (Total 23 Crops)**	MSP is announced twice a year (prior to Kharif and Rabi sowing) for **22 mandated crops** (comprising **14 Kharif crops**, **6 Rabi crops**, and **2 Commercial crops**: Copra and Raw Jute), while **Fair and Remunerative Price (FRP)** is announced for **Sugarcane** (replaced Statutory Minimum Price - SMP in 2009 under the Sugarcane Control Order, 1966):

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Flagship Rural Development, Livelihood & Infrastructure Schemes	**7 Cereals**	Paddy, Wheat, Maize, Sorghum (Jowar), Pearl Millet (Bajra), Barley, and Ragi (Finger Millet).
Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing	**5 Pulses**	Gram (Chickpea), Arhar (Tur / Pigeon Pea), Moong (Green Gram), Urad (Black Gram), and Masur (Lentil).
Agricultural Credit, NABARD, Kisan Credit Card (KCC) & Crop Insurance	**7 Oilseeds**	Peanut (Arachis hypogaea), Rapeseed-Mustard, Soybean, Sesamum (Til), Sunflower, Safflower, and Nigerseed.
Flagship Rural Development, Livelihood & Infrastructure Schemes	**3 Commercial Crops**	Cotton, Raw Jute, and Copra (Milling & Ball Copra) + **Sugarcane (FRP)**.
Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing	**Cost A_2**	All actual paid-out expenses incurred by the farmer in cash and kind on seeds, fertilizers, pesticides, hired human/bullock/machine labor, irrigation charges, and lease rent paid for leased-in land.
Agricultural Credit, NABARD, Kisan Credit Card (KCC) & Crop Insurance	**Cost A_2 + FL**	Cost A_2 plus the **imputed value of unpaid Family Labor (FL)**. Since the **Union Budget 2018–19**, the Government of India fixes MSP at a minimum of **1.5 times** (**150%**) **of all-India weighted average Cost A_2 + FL**.
Flagship Rural Development, Livelihood & Infrastructure Schemes	**Cost C_2 (Comprehensive Cost)**	Cost A_2 + FL plus **imputed rental value of owned land** and **interest on value of owned fixed capital assets** (excluding land). The **National Commission on Farmers (NCF, *2004–2006*)** chaired by **Dr. M.S. Swaminathan** recommended fixing MSP at **C2 + 50%**.
Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing	**NABARD (National Bank for Agriculture and Rural Development)**	Established on **12 July 1982** under the NABARD Act, 1981 (Headquarters: **Mumbai**) on the recommendation of the **B. Sivaraman Committee (CRAFICARD, 1979)** during the **Sixth Five-Year Plan**, with an initial paid-up capital of **₹100 Crore** (**50:50** between GOI and RBI; today **100%** owned by the Government of India). NABARD manages the **Rural Infrastructure Development Fund (RIDF, established *1995–96*)**.

Core Sub-Domain	Key Concept / Provision	Verified Analytical Parameters & Exam Distinctions (Indian Council of Agricultural Research (ICAR))
Agricultural Credit, NABARD, Kisan Credit Card (KCC) & Crop Insurance	**Regional Rural Banks (RRBs)**	Established on **2 October 1975** on the recommendation of the **M. Narasimham Working Group (1975)**; the **first RRB in India was Prathama Grameen Bank** headquartered at **Moradabad (Uttar Pradesh)** sponsored by Syndicate Bank. Capital share in RRBs follows the fixed statutory ratio of **50%** **Central Government :** **35%** **Sponsor Bank :** **15%** **State Government**.
Flagship Rural Development, Livelihood & Infrastructure Schemes	**Kisan Credit Card (KCC)**	Launched in **August 1998** by NABARD and RBI on the recommendation of the **R.V. Gupta Committee**. Provides a **5-year** validity smart/RuPay card with collateral-free agricultural loan up to **₹1.60 Lakh** (extended to Animal Husbandry and Fisheries farmers in 2019 up to **₹2.00 Lakh**). Short-term crop loans up to **₹3.00 Lakh** carry a **7%** per annum interest rate, with a **3%** Prompt Repayment Incentive (PRI), resulting in an **effective interest rate of just** **4%** **per annum** for farmers who repay on time!
Agricultural Price Policy, CACP, Minimum Support Price (MSP) & Marketing	**Comprehensive Rural Development Scheme Matrix**	Rural development initiatives administered by the Ministry of Rural Development, Ministry of Panchayati Raj, and Ministry of Agriculture (with technical oversight from the Indian Council of Agricultural Research (ICAR) and state implementation via the Board of Revenue, Uttar Pradesh) form the core of UP Lekhpal, VDO, and PCS exams.

Chapter *8* Multi-Statement Exam Verification Drills

Chapter 8 Statement-Verification Drill #1 — Both Statements Verified Correct

Statement-I (Commission for Agricultural Costs and Prices (CACP)): Originally established on **1 January 1965** as the **Agricultural Prices Commission (APC)** on the recommendation of the **L.K. Jha Committee (Foodgrains Prices Committee, 1964)** and chaired first by Prof. M.L. Dantwala, it was renamed **CACP in March 1985**. CACP is an attached statutory/expert office under the Ministry of Agriculture and Farmers Welfare that **recommends** Minimum Support Prices, while the **final decision to approve and announce MSP** rests with the **Cabinet Committee on Economic Affairs (CCEA)** chaired by the Prime Minister.
Statement-II (22 Mandated MSP Crops + 1 FRP Crop (Total 23 Crops)): MSP is announced twice a year (prior to Kharif and Rabi sowing) for **22 mandated crops** (comprising **14 Kharif crops**, **6 Rabi crops**, and **2 Commercial crops**:
Copra and Raw Jute), while **Fair and Remunerative Price (FRP)** is announced for **Sugarcane** (replaced Statutory Minimum Price - SMP in 2009 under the Sugarcane Control Order, 1966):

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 8 Statement-Verification Drill #2 — Both Statements Verified Correct

Statement-I (7 Cereals): Paddy, Wheat, Maize, Sorghum (Jowar), Pearl Millet (Bajra), Barley, and Ragi (Finger Millet).
Statement-II (5 Pulses): Gram (Chickpea), Arhar (Tur / Pigeon Pea), Moong (Green Gram), Urad (Black Gram), and Masur (Lentil).

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 8 Statement-Verification Drill #3 — Both Statements Verified Correct

Statement-I (7 Oilseeds): Peanut (Arachis hypogaea), Rapeseed-Mustard, Soybean, Sesamum (Til), Sunflower, Safflower, and Nigerseed.

Statement-II (3 Commercial Crops): Cotton, Raw Jute, and Copra (Milling & Ball Copra) + **Sugarcane (FRP)**.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 8 Statement-Verification Drill #4 — Both Statements Verified Correct

Statement-I (Cost A_2): All actual paid-out expenses incurred by the farmer in cash and kind on seeds, fertilizers, pesticides, hired human/bullock/machine labor, irrigation charges, and lease rent paid for leased-in land.

Statement-II (Cost A_2 + FL): Cost A_2 plus the **imputed value of unpaid Family Labor (FL)**. Since the **Union Budget 2018–19**, the Government of India fixes MSP at a minimum of **1.5 times** (**150%**) **of all-India weighted average Cost A_2 + FL**.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 8 Statement-Verification Drill #5 — Both Statements Verified Correct

Statement-I (Cost C_2 (Comprehensive Cost)): Cost A_2 + FL plus **imputed rental value of owned land** and **interest on value of owned fixed capital assets** (excluding land). The **National Commission on Farmers (NCF, 2004–2006)** chaired by **Dr. M.S. Swaminathan** recommended fixing MSP at **C2 + 50%**.

Statement-II (NABARD (National Bank for Agriculture and Rural Development)): Established on **12 July 1982** under the NABARD Act, 1981 (Headquarters: **Mumbai**) on the recommendation of the **B. Sivaraman Committee (CRAFICARD, 1979)** during the **Sixth Five-Year Plan**, with an initial paid-up capital of **₹100 Crore** (**50:50** between GOI and RBI; today **100%** owned by the Government of India). NABARD manages the **Rural Infrastructure Development Fund (RIDF, established 1995–96)**.

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Chapter 8 Statement-Verification Drill #6 — Both Statements Verified Correct

Statement-I (Regional Rural Banks (RRBs)): Established on **2 October 1975** on the recommendation of the **M. Narasimham Working Group (1975)**; the **first RRB in India was Prathama Grameen Bank** headquartered at **Moradabad (Uttar Pradesh)** sponsored by Syndicate Bank. Capital share in RRBs follows the fixed statutory ratio of **50% Central Government : 35% Sponsor Bank : 15% State Government**.

Statement-II (Kisan Credit Card (KCC)): Launched in **August 1998** by NABARD and RBI on the recommendation of the **R.V. Gupta Committee**. Provides a **5-year** validity smart/RuPay card with collateral-free agricultural loan up to **₹1.60 Lakh** (extended to Animal Husbandry and Fisheries farmers in 2019 up to **₹2.00 Lakh**). Short-term crop loans up to **₹3.00 Lakh** carry a **7%** per annum interest rate, with a **3%** Prompt Repayment Incentive (PRI), resulting in an **effective interest rate of just 4% per annum** for farmers who repay on time!

✓ **Exam Verification Key: Both Statement-I and Statement-II are factually accurate as per Indian Council of Agricultural Research (ICAR) & IUC Academy.**

Solved Exam Practice Questions (MCQs)

Practice Question #1 Solved Exam MCQ

Q1. According to the Indian Council of Agricultural Research (ICAR), if a farmer has irrigation water available for only a single irrigation in a timely sown Wheat (*Triticum aestivum*) crop, at which physiological growth stage must it be applied?
(A) Late Tillering Stage (40–45 DAS)
(B) Crown Root Initiation (CRI) Stage (20–25 DAS)
(C) Milk Formation Stage (90–95 DAS)
(D) Flowering / Anthesis Stage (70–75 DAS)
Answer: (B) | **Explanation:** Discovered by Dr. R.B.L. Bhardwaj, the Crown Root Initiation (CRI) stage occurring at 21 Days After Sowing (20–25 DAS) is the most critical irrigation stage in wheat; moisture stress here stops transition from seminal roots to permanent crown roots, slashing grain yield by over 35%.

Practice Question #2 Solved Exam MCQ

Q2. Which of the following pairs of agro-climatic indices and their mathematical definitions is INCORRECT?
(A) Cropping Intensity = (Gross Cropped Area / Net Sown Area) × 100
(B) Harvest Index = (Economic Yield / Biological Yield) × 100
(C) Soil Porosity (%) = (1 - Particle Density / Bulk Density) × 100
(D) Land Equivalent Ratio (LER) > 1.0 indicates biological advantage of intercropping over monocropping
Answer: (C) | **Explanation:** The correct formula for Soil Porosity (%) is (1 - Bulk Density / Particle Density) × 100, where standard Bulk Density is 1.33 g/cm^3 and Particle Density is 2.65 g/cm^3, giving roughly 50% porosity.

Practice Question #3 Solved Exam MCQ

Q3. Into how many Agro-Climatic Zones is the State of Uttar Pradesh divided by the Department of Agriculture, and into how many Agro-Climatic Zones did the Planning Commission of India divide the whole country?
(A) 9 in Uttar Pradesh and 15 in India
(B) 8 in Uttar Pradesh and 20 in India
(C) 11 in Uttar Pradesh and 15 in India
(D) 9 in Uttar Pradesh and 20 in India
Answer: (A) | **Explanation:** Uttar Pradesh is divided into 9 Agro-Climatic Zones (Bhabhar & Tarai, Western Plains, Mid-Western Plains, South-Western Semi-Arid, Central Plains, Bundelkhand, North-Eastern Plains, Eastern Plains, and Vindhyan Zone), whereas the Planning Commission of India divided India into 15 Agro-Climatic Zones (and NBSS&LUP divided India into 20 Agro-Ecological Regions).

Practice Question #4 Solved Exam MCQ

Q4. Which chemical amendment is scientifically recommended by the Indian Council of Agricultural Research (ICAR) for the reclamation of Alkali / Sodic soils (pH > 8.5, ESP > 15\%, EC_e < 4.0 dS/m)?
(A) Agricultural Limestone (CaCO_3)
(B) Basic Slag and Dolomite
(C) Gypsum (CaSO_4 · 2H_2O) and Iron Pyrites (FeS_2)
(D) Muriate of Potash (KCl)
Answer: (C) | **Explanation:** Alkali/Sodic soils contain excessive exchangeable Sodium (Na^+) on clay micelles; Gypsum (CaSO_4· 2H_2O, containing 29.2% Ca and 18.6% S) replaces Na^+ with Ca^{2+}, forming soluble Sodium Sulphate (Na_2SO_4) which is leached out of the root zone. Limestone is used for acidic soils.

Practice Question #5 Solved Exam MCQ

Q5. Which two essential plant nutrients are completely immobile inside the plant phloem, causing their deficiency symptoms to appear exclusively on the terminal/apical buds and meristematic tissues?
(A) Nitrogen and Phosphorus
(B) Potassium and Magnesium
(C) Calcium and Boron
(D) Iron and Zinc
Answer: (C) | **Explanation:** Calcium (Ca) and Boron (B) are immobile in the phloem and move solely via the xylem transpiration stream; hence, their deficiency causes death of terminal buds, Blossom End Rot in tomato (Ca), and internal necrosis of Aonla/Mango (B).

Practice Question #6 Solved Exam MCQ

Q6. Under the Fertilizer Control Order (FCO), 1985, what is the maximum permissible limit of toxic Biuret in Neem Coated Urea for soil application and for foliar spray respectively?
(A) 1.5% for soil application and 0.5% for foliar spray
(B) 2.5% for soil application and 1.5% for foliar spray
(C) 0.5% for soil application and 2.0% for foliar spray
(D) 3.0% for soil application and 1.0% for foliar spray
Answer: (A) | **Explanation:** Biuret is formed when two molecules of Urea condense at temperatures exceeding 132^°C during prilling with elimination of ammonia. FCO mandates < 1.5\% biuret for soil application and < 0.5\% for foliar application (especially on citrus and pineapple).

Practice Question #7 Solved Exam MCQ

Q7. Which micronutrient deficiency causes the "Whiptail" disorder in Cauliflower and is unique because its availability increases with rising soil pH (alkalinity)?
(A) Zinc (Zn)
(B) Manganese (Mn)
(C) Molybdenum (Mo)
(D) Copper (Cu)
Answer: (C) | **Explanation:** Molybdenum (Mo), a structural cofactor of Nitrate Reductase and Nitrogenase enzymes, becomes unavailable in strongly acidic soils (pH < 5.5) and causes Whiptail of Cauliflower (deformed narrow leaf blades). It is the only micronutrient whose availability increases at high pH.

Practice Question #8 Solved Exam MCQ

Q8. Which of the following mango hybrids developed at IARI New Delhi is a cross between *Dashehari* × *Neelum* and is recommended for High-Density Planting (HDP) at 2.5 m × 2.5 m spacing accommodating 1,600 plants per hectare?
(A) Mallika
(B) Amrapali
(C) Ratna
(D) Sindhu
Answer: (B) | **Explanation:** Amrapali (*Dashehari* × *Neelum*, developed by Dr. R.N. Singh in 1971) is a dwarf, regular-bearing mango hybrid planted in triangular/square HDP at 2.5 × 2.5 m (1,600 trees/ha). Mallika is the reciprocal cross (*Neelum* × *Dashehari*), Ratna is *Neelum* × *Alphonso*, and Sindhu (*Ratna* × *Alphonso*) is the world's first seedless mango.

Practice Question #9 Solved Exam MCQ

Q9. Which of the following sets consists exclusively of Non-Climacteric fruits (which do not exhibit a respiratory peak or ethylene burst after harvest)?
(A) Mango, Banana, Papaya, Guava
(B) Apple, Pear, Sapota, Jackfruit
(C) Grapes, Pomegranate, Litchi, Citrus
(D) Fig, Tomato, Peach, Plum
Answer: (C) | **Explanation:** Grapes, Pomegranate, Litchi, Citrus, Pineapple, Ber, and Strawberry are Non-Climacteric fruits that must be harvested only when fully ripe on the tree. Mango, Banana, Papaya, Guava, Apple, Sapota, and Tomato are Climacteric fruits.

Practice Question #10 Solved Exam MCQ

Q10. Why is Sodium Benzoate preferred over Potassium Metabisulphite (KMS) for preserving colored fruit juices such as Jamun, Pomegranate, Phalsa, and Tomato Ketchup?
(A) KMS is insoluble in acidic fruit juices
(B) Sulphur dioxide (SO_2) released by KMS bleaches the water-soluble Anthocyanin pigments of colored juices
(C) Sodium Benzoate increases the pectin content of fruit juices
(D) KMS reacts with Lycopene to form toxic Solanine
Answer: (B) | **Explanation:** Potassium Metabisulphite (K_2S_2O_5) releases Sulphur Dioxide (SO_2), which acts as a strong reducing bleaching agent that decolorizes Anthocyanin pigments in red/purple fruit juices; hence, colored juices are preserved with Sodium Benzoate (C_6H_5COONa).

Practice Question #11 Solved Exam MCQ

Q11. The devastating Bengal Famine of 1943 and the Irish Potato Famine of 1845 were caused by which two plant pathogens respectively?
(A) *Pyricularia oryzae* and *Alternaria solani*
(B) *Helminthosporium oryzae* (*Bipolaris oryzae*) and *Phytophthora infestans*
(C) *Xanthomonas oryzae* and *Synchytrium endobioticum*
(D) *Puccinia graminis* and *Fusarium oxysporum*
Answer: (B) | **Explanation:** The 1943 Bengal Famine was caused by Brown Leaf Spot of Rice (*Helminthosporium oryzae* / *Bipolaris oryzae*), whereas the 1845 Irish Potato Famine was caused by Late Blight of Potato (*Phytophthora infestans*).

Practice Question #12 Solved Exam MCQ

Q12. Which buffalo breed native to Agra and Etawah districts of Uttar Pradesh has a copper-colored coat and yields the highest milk fat percentage (12.5\% to 14\%) in the world?
(A) Murrah
(B) Jaffarabadi
(C) Bhadawari
(D) Nili-Ravi
Answer: (C) | **Explanation:** Bhadawari buffalo, native to Bah tahsil of Agra and Etawah along the Yamuna-Chambal ravines, is distinguished by its copper-colored body with two white neck stripes (*Chevron*) and holds the world record for milk fat content (12.5–14\%).

Practice Question #13 Solved Exam MCQ

Q13. Which indigenous goat breed of Uttar Pradesh originates from Chakarnagar in Etawah district, possesses a Roman nose with long pendulous ears, and is the tallest dual-purpose goat breed in India?
(A) Barbari
(B) Jamunapari
(C) Black Bengal
(D) Sirohi
Answer: (B) | **Explanation:** Jamunapari (native to Chakarnagar, Etawah between the Yamuna and Chambal rivers) is the largest and tallest Indian goat breed, characterized by a convex "Roman nose" (parrot mouth appearance), long pendulous ears, and thick hair on the hindquarters (*Feathers*).

Practice Question #14 Solved Exam MCQ

Q14. In which veterinary disease is conducting a Post-Mortem (Necropsy) of the carcass strictly prohibited by law because exposure to atmospheric oxygen causes the bacteria to form highly resistant soil spores?
(A) Haemorrhagic Septicaemia (HS)
(B) Black Quarter (BQ)
(C) Anthrax (Splenic Fever)
(D) Brucellosis
Answer: (C) | **Explanation:** Anthrax, caused by *Bacillus anthracis*, leads to sudden death with dark, unclotted tarry blood oozing from natural orifices. Opening the carcass exposes vegetative bacilli to air, triggering sporulation that contaminates pastures for over 50 years.

Practice Question #15 Solved Exam MCQ

Q15. What is the standard temperature-time combination for High Temperature Short Time (HTST) pasteurization of milk, and which enzymatic test confirms that pasteurization has been completed properly?
(A) 63^°C for 30 minutes; Methylene Blue Reduction Test
(B) 72^°C for 15 seconds; Alkaline Phosphatase Test
(C) 135^°C for 2 seconds; Gerber Test
(D) 85^°C for 10 minutes; Cobalt Chloride Test
Answer: (B) | **Explanation:** HTST pasteurization heats milk to 72^°C (161^°F) for 15 seconds followed by rapid cooling to < 4^°C. Since the intrinsic milk enzyme Alkaline Phosphatase has a thermal destruction point slightly higher than *Mycobacterium tuberculosis* and *Coxiella burnetii*, a negative Alkaline Phosphatase Test confirms complete pasteurization.

Practice Question #16 Solved Exam MCQ

Q16. On which date did the complete Uttar Pradesh Revenue Code, 2006 (along with the UP Revenue Code Rules, 2016) come into force across all districts of Uttar Pradesh, and how many Chapters and Sections does it contain?
(A) 18 December 2015; 14 Chapters and 210 Sections
(B) 11 February 2016; 16 Chapters and 234 Sections
(C) 1 July 1952; 16 Chapters and 230 Sections
(D) 26 January 2016; 18 Chapters and 250 Sections
Answer: (B) | **Explanation:** Per notifications of the **Board of Revenue, Uttar Pradesh**, while preliminary sections were enforced on 18 December 2015, the complete Uttar Pradesh Revenue Code, 2006 and the Rules, 2016 came into force on 11 February 2016, comprising 16 Chapters, 234 Sections, and 4 Schedules.

Practice Question #17 Solved Exam MCQ

Q17. Under Section 74 of the Uttar Pradesh Revenue Code, 2006, how many classes of tenure holders exist in Uttar Pradesh, and after how many years does a Bhumidhar with Non-Transferable Rights acquire Transferable Rights under Section 76(2)?
(A) 3 classes; after 10 years
(B) 4 classes; after 5 years
(C) 4 classes; after 12 years
(D) 5 classes; after 7 years
Answer: (B) | **Explanation:** Section 74 defines 4 classes of tenure holders: (1) Bhumidhar with Transferable Rights, (2) Bhumidhar with Non-Transferable Rights, (3) Asami, and (4) Government Lessee. Under Section 76(2), a Bhumidhar with Non-Transferable Rights automatically becomes a Bhumidhar with Transferable Rights after completing 5 years from allotment (except on Section 77 public utility land).

Practice Question #18 Solved Exam MCQ

Q18. Under which Section of the Uttar Pradesh Revenue Code, 2006 does the Sub-Divisional Officer (SDO) grant a declaration converting agricultural land for non-agricultural (industrial, commercial, or residential) purposes within 45 working days?
(A) Section 67
(B) Section 80
(C) Section 98
(D) Section 116
Answer: (B) | **Explanation:** Section 80 of the UP Revenue Code, 2006 (which replaced Section 143 of the old UPZALR Act, 1950) empowers the Sub-Divisional Officer (SDO/SDM) to declare a Bhumidhar with Transferable Rights' agricultural holding as being used for non-agricultural purposes within 45 working days.

Practice Question #19 Solved Exam MCQ

Q19. Under Section 89 of the Uttar Pradesh Revenue Code, 2006, what is the maximum ceiling area of agricultural land that a person (along with his family) can acquire by transfer in Uttar Pradesh without special State Government exemption?
(A) 5.0586 Hectares (12.5 Acres)
(B) 7.30 Hectares (18.0 Acres)
(C) 10.11 Hectares (25.0 Acres)
(D) 2.50 Hectares (6.17 Acres)
Answer: (A) | **Explanation:** Section 89(2) prohibits any transfer where the transferee, together with his family, would hold agricultural land exceeding 5.0586 Hectares (equivalent to 12.5 Acres) in Uttar Pradesh, unless exempted by the State Government under Section 89(3) for industrial or educational projects.

Practice Question #20 Solved Exam MCQ

Q20. Who serves as the ex-officio Chairperson and ex-officio Secretary of the Bhumi Prabandhak Samiti (Land Management Committee) under Section 60 of the Uttar Pradesh Revenue Code, 2006?
(A) Block Pramukh (Chairperson) and BDO (Secretary)
(B) Gram Pradhan (Chairperson) and Gram Panchayat Adhikari / VDO (Secretary)
(C) Gram Pradhan (Chairperson) and Lekhpal (Secretary)
(D) SDO (Chairperson) and Tahsildar (Secretary)
Answer: (C) | **Explanation:** Under Section 60 of the UP Revenue Code, 2006, the Gram Pradhan of the Gram Panchayat is the ex-officio Chairperson of the Bhumi Prabandhak Samiti, and the area **Lekhpal** is its ex-officio Secretary (whereas the VDO/Gram Panchayat Adhikari is the Secretary of the Gram Panchayat).

Practice Question #21 Solved Exam MCQ

Q21. What is the exact length of a standard **Shahjahani Jarib** and a **Gunter's Chain** used in land measurement?
(A) Shahjahani Jarib = 100 feet; Gunter's Chain = 33 feet
(B) Shahjahani Jarib = 165 feet (55 Yards); Gunter's Chain = 66 feet (22 Yards)
(C) Shahjahani Jarib = 132 feet (44 Yards); Gunter's Chain = 100 feet
(D) Shahjahani Jarib = 165 feet (55 Yards); Gunter's Chain = 33 feet (11 Yards)
Answer: (B) | **Explanation:** A Shahjahani Jarib is 165 feet (55 yards) long with 200 links of 9.9 inches each (55 × 55 sq. yards = 3,025 sq. yards = 1 Pucca Bigha). A Gunter's Chain is 66 feet (22 yards) long with 100 links of 7.92 inches each.

Practice Question #22 Solved Exam MCQ

Q22. In the land measurement system of Uttar Pradesh, 1 Hectare is equal to how many Square Meters and approximately how many Pucca Bighas?
(A) 10,000 sq. meters and 3.95 Pucca Bighas
(B) 10,000 sq. meters and 2.47 Pucca Bighas
(C) 4,840 sq. meters and 3.95 Pucca Bighas
(D) 2,529.28 sq. meters and 1.60 Pucca Bighas
Answer: (A) | **Explanation:** 1 Hectare equals 10,000 sq. meters (2.47105 Acres). Since 1 Pucca Bigha equals 3,025 sq. yards (2,529.285 sq. meters), dividing 10,000 by 2,529.285 yields 3.95368 Pucca Bighas per Hectare.

Practice Question #23 Solved Exam MCQ

Q23. How many columns were present in the traditional UP *Khasra* (Field Book) and *Khatauni* (Record of Rights), and how many columns are present in the modernized Digital *e-Khasra* and *Real-Time Khatauni* (*RTK*) of the **Board of Revenue, Uttar Pradesh**?
(A) Traditional: 21 in Khasra & 13 in Khatauni; Modern Digital: 46 in e-Khasra & 19 in Real-Time Khatauni
(B) Traditional: 13 in Khasra & 21 in Khatauni; Modern Digital: 19 in e-Khasra & 46 in Real-Time Khatauni
(C) Traditional: 22 in Khasra & 14 in Khatauni; Modern Digital: 40 in e-Khasra & 20 in Real-Time Khatauni
(D) Traditional: 16 in Khasra & 12 in Khatauni; Modern Digital: 32 in e-Khasra & 18 in Real-Time Khatauni
Answer: (A) | **Explanation:** Traditional UP revenue records had 21 columns in the Khasra and 13 columns in the Khatauni; under the UP Revenue Code Rules, 2016 and Digital Bhulekh modernization, the e-Khasra has 46 columns and the Real-Time Khatauni (RTK) has 19 columns.

Practice Question #24 Solved Exam MCQ

Q24. Which national committee on Panchayati Raj described the bureaucratized rural development apparatus as **"Grass without Roots"** and recommended the creation of the post of District Development Commissioner (DDC)?
(A) Balwant Rai Mehta Committee (1957)
(B) Ashok Mehta Committee (1977)
(C) G.V.K. Rao Committee (1985)
(D) L.M. Singhvi Committee (1986)
Answer: (C) | **Explanation:** Appointed by the Planning Commission in 1985, the G.V.K. Rao Committee observed that development administration had become overly bureaucratized and divorced from Panchayati Raj ("Grass without Roots"), whereas the L.M. Singhvi Committee (1986) first recommended constitutional status for Panchayats.

Practice Question #25 Solved Exam MCQ

Q25. Under Part IX of the Constitution of India (73rd Amendment Act, 1992), which pair of Constitutional Articles deals with the **State Finance Commission** and the **State Election Commission** respectively?
(A) Article 243-D and Article 243-G
(B) Article 243-I and Article 243-K
(C) Article 243-H and Article 243-J
(D) Article 243-E and Article 243-M
Answer: (B) | **Explanation:** Article 243-I mandates the Governor to constitute a State Finance Commission every 5 years, and Article 243-K establishes the State Election Commission for superintendence, direction, and control of Panchayat elections.

Practice Question #26 Solved Exam MCQ

Q26. Under the United Provinces Panchayat Raj Act, 1947, what is the statutory quorum required for a general meeting of the **Gram Sabha** and a monthly meeting of the **Gram Panchayat** in Uttar Pradesh?
(A) 1/10th for Gram Sabha and 1/5th for Gram Panchayat
(B) 1/5th for Gram Sabha and 1/3rd for Gram Panchayat
(C) 1/3rd for Gram Sabha and 1/2 for Gram Panchayat
(D) 1/4th for both Gram Sabha and Gram Panchayat
Answer: (B) | **Explanation:** In Uttar Pradesh, the quorum for a Gram Sabha meeting is 1/5th (20%) of the total members of the Gram Sabha, whereas the quorum for a Gram Panchayat meeting is 1/3rd (33.33%) of the elected ward members.

Practice Question #27 Solved Exam MCQ

Q27. Under the UP Panchayat Raj Act, 1947, if a Gram Panchayat has a village population of **2,500**, how many elected Gram Panchayat Members (Ward Panchs, excluding the Pradhan) shall it consist of?
(A) 9 Members
(B) 11 Members
(C) 13 Members
(D) 15 Members
Answer: (C) | **Explanation:** UP Panchayat ward membership slabs are strictly fixed by population: up to 1,000 population = 9 members; 1,001 to 2,000 = 11 members; 2,001 to 3,000 = 13 members; and above 3,000 = 15 members. Hence, for 2,500 population, it has 13 members.

Practice Question #28 Solved Exam MCQ

Q28. On the recommendation of which committee was the **Panchayats (Extension to the Scheduled Areas) Act, 1996 (PESA Act)** enacted, and to how many Fifth Schedule states does it apply?
(A) Dileep Singh Bhuria Committee; 10 Fifth Schedule States
(B) Gadgil Committee; 8 Sixth Schedule States
(C) P.K. Thungon Committee; 12 States
(D) Sarkaria Commission; 7 North-Eastern States
Answer: (A) | **Explanation:** Based on the Dileep Singh Bhuria Committee (1995) report, Parliament enacted the PESA Act on 24 December 1996 extending Part IX provisions with special tribal Gram Sabha powers to 10 Fifth Schedule States (AP, Telangana, Chhattisgarh, Gujarat, HP, Jharkhand, MP, Maharashtra, Odisha, and Rajasthan).

Practice Question #29 Solved Exam MCQ

Q29. Which body **recommends** the Minimum Support Price (MSP) for 22 agricultural crops, and which apex body **approves and announces** the final MSP in India?
(A) Recommended by NITI Aayog; Approved by Reserve Bank of India
(B) Recommended by CACP; Approved by Cabinet Committee on Economic Affairs (CCEA)
(C) Recommended by NABARD; Approved by Food Corporation of India (FCI)
(D) Recommended by ICAR; Approved by Ministry of Finance
Answer: (B) | **Explanation:** The Commission for Agricultural Costs and Prices (CACP, established 1965) submits price policy reports recommending MSP for 22 crops (and FRP for Sugarcane), while the final binding approval and announcement is made by the Cabinet Committee on Economic Affairs (CCEA) chaired by the Prime Minister.

Practice Question #30 Solved Exam MCQ

Q30. On which date and on the recommendation of which committee was **NABARD** established?
(A) 2 October 1975; M. Narasimham Committee
(B) 12 July 1982; B. Sivaraman Committee (CRAFICARD)
(C) 1 April 1980; R.V. Gupta Committee
(D) 19 July 1969; Gorwala Committee
Answer: (B) | **Explanation:** NABARD was established on 12 July 1982 under the NABARD Act, 1981 (during the 6th Five-Year Plan) on the recommendation of the B. Sivaraman Committee (CRAFICARD, 1979).

Practice Question #31 Solved Exam MCQ

Q31. What is the exact shareholding ratio of the **Central Government : Sponsor Bank : State Government** in a Regional Rural Bank (RRB)?
(A) 50 : 35 : 15
(B) 60 : 25 : 15
(C) 50 : 25 : 25
(D) 75 : 15 : 10
Answer: (A) | **Explanation:** Under the Regional Rural Banks Act, 1976, the authorized capital of every RRB is contributed by the Central Government (50\%), the Sponsor Bank (35\%), and the concerned State Government (15\%).

Practice Question #32 Solved Exam MCQ

Q32. Under the **Pradhan Mantri Fasal Bima Yojana (PMFBY)** launched on 18 February 2016, what are the uniform maximum premium rates payable by farmers for **Kharif**, **Rabi**, and **Commercial/Horticultural** crops respectively?
(A) 1.5%, 2.0%, and 5.0%
(B) 2.0%, 1.5%, and 5.0%
(C) 2.5%, 1.5%, and 4.0%
(D) 1.0%, 2.0%, and 3.5%
Answer: (B) | **Explanation:** Under PMFBY, farmers pay a uniform flat premium of 2.0\% of Sum Insured for all Kharif foodgrain and oilseed crops, 1.5\% for all Rabi foodgrain and oilseed crops, and 5.0\% for annual commercial and horticultural crops.

Practice Question #33 Solved Exam MCQ

Q33. Under the **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), 2005**, what is the minimum statutory percentage of women beneficiaries and the mandatory Wage-to-Material ratio?
(A) Minimum 33.33% (1/3rd) women beneficiaries; 60:40 Wage-to-Material ratio
(B) Minimum 50% women beneficiaries; 50:50 Wage-to-Material ratio
(C) Minimum 25% women beneficiaries; 75:25 Wage-to-Material ratio
(D) Minimum 33.33% women beneficiaries; 70:30 Wage-to-Material ratio
Answer: (A) | **Explanation:** Schedule II of MGNREGA mandates that at least one-third (33.33\%) of the beneficiaries who have registered and requested work shall be women, and the ratio of wage costs to material costs must be maintained at not less than 60:40.

Practice Question #34 Solved Exam MCQ

Q34. Where and when was the **PM-KISAN (Pradhan Mantri Kisan Samman Nidhi)** scheme officially launched, and what is its annual financial benefit structure?
(A) Launched on 24 February 2019 at Gorakhpur (UP); ₹6,000/year in 3 installments of ₹2,000 each
(B) Launched on 19 February 2015 at Suratgarh (Rajasthan); ₹6,000/year in 2 installments of ₹3,000 each
(C) Launched on 20 November 2016 at Agra (UP); ₹12,000/year in 4 installments of ₹3,000 each
(D) Launched on 15 August 2019 at New Delhi; ₹4,000/year in 2 installments of ₹2,000 each
Answer: (A) | **Explanation:** Prime Minister Narendra Modi formally launched PM-KISAN on 24 February 2019 at Gorakhpur, Uttar Pradesh (effective retrospectively from 1 December 2018), providing ₹6,000 per year in three equal 4-monthly installments of ₹2,000 via Direct Benefit Transfer.

Practice Question #35 Solved Exam MCQ

Q35. Which instrument operates on the optical principle of **double reflection** using two horizon mirrors fixed at an angle of **45°** to set out right angles (90°) to the main chain line during a revenue survey?
(A) Planimeter
(B) Prismatic Compass
(C) Optical Square
(D) Dumpy Level
Answer: (C) | **Explanation:** An Optical Square sets out perpendicular offsets (90°) from a chain line using two mirrors placed at an angle of 45° to each other, because by the law of double reflection, the angle of deviation between the incident ray and the doubly reflected ray is twice the angle between the mirrors (2 × 45° = 90°).

Extended Comparative & Analytical Practice Set (Questions *36* to *75*)

Practice Question #36 High-Yield Comparative MCQ

Q36. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Paddy / Rice (*Oryza sativa*)"?

(A) Poaceae (2n = 24)
(B) Poaceae (2n = 42, Hexaploid)
(C) Poaceae (2n = 20)
(D) Fabaceae (2n = 16)

Correct Answer: (A) | **Explanation:** For **Paddy / Rice (*Oryza sativa*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Poaceae (2n = 24)**. Furthermore, Transplanted: **20–25 kg/ha** (Fine), **30–35 kg/ha** (Coarse); SRI: **5–7.5 kg/ha**; Dapog: **1.5–3 kg/sq.m** (**20 × 10 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #37 High-Yield Comparative MCQ

Q37. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Wheat (*Triticum aestivum*)"?

(A) Poaceae (2n = 20)

(B) Poaceae (2n = 42, Hexaploid)

(C) Fabaceae (2n = 16)

(D) Fabaceae (2n = 22)

Correct Answer: (B) | **Explanation:** For **Wheat (*Triticum aestivum*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Poaceae (2n = 42, Hexaploid)**. Furthermore, Timely Normal: **100 kg/ha**; Late/Broadcast: **125 kg/ha**; Dibbling: **25–30 kg/ha** (**22.5 × 10 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #38 High-Yield Comparative MCQ

Q38. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Maize (*Zea mays*)"?

(A) Fabaceae (2n = 16)

(B) Fabaceae (2n = 22)

(C) Poaceae (2n = 20)

(D) Brassicaceae (2n = 36)

Correct Answer: (C) | **Explanation:** For **Maize (*Zea mays*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Poaceae (2n = 20)**. Furthermore, Kharif Hybrid: **20–25 kg/ha**; Composite: **15–20 kg/ha**; Fodder: **40–50 kg/ha** (**60 × 20 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #39 High-Yield Comparative MCQ

Q39. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Chickpea / Gram (*Cicer arietinum*)"?

(A) Fabaceae (2n = 22)

(B) Brassicaceae (2n = 36)

(C) Poaceae (2n = 80)

(D) Fabaceae (2n = 16)

Correct Answer: (D) | **Explanation:** For **Chickpea / Gram (*Cicer arietinum*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Fabaceae (2n = 16)**. Furthermore, Desi Small: **60–80 kg/ha**; Kabuli Large: **80–100 kg/ha** (**30 × 10 cm**, depth **8–10 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #40 High-Yield Comparative MCQ

Q40. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Pigeon Pea / Arhar (*Cajanus cajan*)"?

(A) Fabaceae (2n = 22)

(B) Brassicaceae (2n = 36)

(C) Poaceae (2n = 80)

(D) Carbamide (NH_2CONH_2, Organic amide fertilizer)

Correct Answer: (A) | **Explanation:** For **Pigeon Pea / Arhar (*Cajanus cajan*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Fabaceae (2n = 22)**. Furthermore, Early Maturing: **15–18 kg/ha**; Long Duration: **12–15 kg/ha** (**60 × 15 cm** or **75 × 20 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #41 High-Yield Comparative MCQ

Q41. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Indian Mustard (*Brassica juncea*)"?

(A) Poaceae (2n = 80)

(B) Brassicaceae (2n = 36)

(C) Carbamide (NH_2CONH_2, Organic amide fertilizer)

(D) (NH_4)_2HPO_4

Correct Answer: (B) | **Explanation:** For **Indian Mustard (*Brassica juncea*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Brassicaceae (2n = 36)**. Furthermore, Pure Crop: **4–5 kg/ha**; Mixed/Intercrop: **1.5–2 kg/ha** (**45 × 15 cm**, depth **3–4 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #42 High-Yield Comparative MCQ

Q42. With reference to Crop Name (Botanical Name) and Family & Chromosome (2n), which of the following is accurately matched with "Sugarcane (*Saccharum officinarum*)"?

(A) Carbamide (NH_2CONH_2, Organic amide fertilizer)

(B) (NH_4)_2HPO_4

(C) Poaceae (2n = 80)

(D) Ca(H_2PO_4)_2 + CaSO_4· 2H_2O

Correct Answer: (C) | **Explanation:** For **Sugarcane (*Saccharum officinarum*)** (Crop Name (Botanical Name)), the verified Family & Chromosome (2n) is **Poaceae (2n = 80)**. Furthermore, 3-budded setts: **35,000–40,000 setts/ha** (**60–75 quintals/ha**, row spacing **75–90 cm**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #43 High-Yield Comparative MCQ

Q43. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Neem Coated Urea (NCU)"?

(A) (NH_4)_2HPO_4

(B) Ca(H_2PO_4)_2 + CaSO_4· 2H_2O

(C) Potassium Chloride (KCl)

(D) Carbamide (NH_2CONH_2, Organic amide fertilizer)

Correct Answer: (D) | **Explanation:** For **Neem Coated Urea (NCU)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is **Carbamide (NH_2CONH_2, Organic amide fertilizer)**. Furthermore, **46% N**. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #44 High-Yield Comparative MCQ

Q44. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Diammonium Phosphate (DAP)"?

(A) (NH_4)_2HPO_4

(B) Ca(H_2PO_4)_2 + CaSO_4· 2H_2O

(C) Potassium Chloride (KCl)

(D) Potassium Sulphate (K_2SO_4)

Correct Answer: (A) | **Explanation:** For **Diammonium Phosphate (DAP)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is **(NH_4)_2HPO_4**. Furthermore, **18% N**, **46%** P_2O_5 (**0% K**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #45 High-Yield Comparative MCQ

Q45. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Single Super Phosphate (SSP)"?

(A) Potassium Chloride (KCl)

(B) Ca(H_2PO_4)_2 + CaSO_4· 2H_2O

(C) Potassium Sulphate (K_2SO_4)

(D) CaCO_3·NH_4NO_3 (*Kisan Khad*)

Correct Answer: (B) | **Explanation:** For **Single Super Phosphate (SSP)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is **Ca(H_2PO_4)_2 + CaSO_4· 2H_2O**. Furthermore, **16%** P_2O_5, **11–12% S**, **19–21% Ca**. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #46 High-Yield Comparative MCQ

Q46. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Muriate of Potash (MOP)"?

(A) Potassium Sulphate (K_2SO_4)

(B) CaCO_3·NH_4NO_3 (*Kisan Khad*)

(C) Potassium Chloride (KCl)

(D) *Rhizobium*, *Azotobacter*, *Azospirillum*, *Azolla* (*Anabaena azollae*), PSB (*Bacillus polymyxa*), VAM (*Glomus*)

Correct Answer: (C) | **Explanation:** For **Muriate of Potash (MOP)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is **Potassium Chloride (KCl)**. Furthermore, **60%** K_2O. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #47 High-Yield Comparative MCQ

Q47. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Sulphate of Potash (SOP)"?

(A) CaCO_3·NH_4NO_3 (*Kisan Khad*)

(B) *Rhizobium*, *Azotobacter*, *Azospirillum*, *Azolla* (*Anabaena azollae*), PSB (*Bacillus polymyxa*), VAM (*Glomus*)

(C) Aphthovirus (Smallest Picornavirus; Serotypes O, A, C, Asia-1 in India)

(D) Potassium Sulphate (K_2SO_4)

Correct Answer: (D) | **Explanation:** For **Sulphate of Potash (SOP)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is **Potassium Sulphate (K_2SO_4)**. Furthermore, **48–50%** K_2O, **17.5% S**. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #48 High-Yield Comparative MCQ

Q48. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Calcium Ammonium Nitrate (CAN)"?

(A) CaCO_3·NH_4NO_3 (*Kisan Khad*)

(B) *Rhizobium*, *Azotobacter*, *Azospirillum*, *Azolla* (*Anabaena azollae*), PSB (*Bacillus polymyxa*), VAM (*Glomus*)

(C) Aphthovirus (Smallest Picornavirus; Serotypes O, A, C, Asia-1 in India)

(D) Bacteria: *Pasteurella multocida*

Correct Answer: (A) | **Explanation:** For **Calcium Ammonium Nitrate (CAN)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is **CaCO_3·NH_4NO_3 (*Kisan Khad*)**. Furthermore, **25–26% N** (**12.5%** NH_4^+ + **12.5%** NO_3^-). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #49 High-Yield Comparative MCQ

Q49. With reference to Fertilizer / Biofertilizer and Chemical Composition / Active Organism, which of the following is accurately matched with "Biofertilizers (N & P Fixers)"?

(A) Aphthovirus (Smallest Picornavirus; Serotypes O, A, C, Asia-1 in India)

(B) *Rhizobium*, *Azotobacter*, *Azospirillum*, *Azolla* (*Anabaena azollae*), PSB (*Bacillus polymyxa*), VAM (*Glomus*)

(C) Bacteria: *Pasteurella multocida*

(D) Bacteria: *Clostridium chauvoei* (Spore-forming anaerobe)

Correct Answer: (B) | **Explanation:** For **Biofertilizers (N & P Fixers)** (Fertilizer / Biofertilizer), the verified Chemical Composition / Active Organism is ***Rhizobium*, *Azotobacter*, *Azospirillum*, *Azolla* (*Anabaena azollae*), PSB (*Bacillus polymyxa*), VAM (*Glomus*)**. Furthermore, Fixes **20–200 kg N/ha** or solubilizes **30–50 kg** P_2O_5/ha. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #50 High-Yield Comparative MCQ

Q50. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Foot and Mouth Disease (FMD / Khurpaka-Muhpaka)"?

(A) Bacteria: *Pasteurella multocida*

(B) Bacteria: *Clostridium chauvoei* (Spore-forming anaerobe)

(C) Aphthovirus (Smallest Picornavirus; Serotypes O, A, C, Asia-1 in India)

(D) Bacteria: *Bacillus anthracis* (Zoonotic spore-forming rod)

Correct Answer: (C) | **Explanation:** For **Foot and Mouth Disease (FMD / Khurpaka-Muhpaka)** (Disease Name), the verified Causal Organism is **Aphthovirus (Smallest Picornavirus; Serotypes O, A, C, Asia-1 in India)**. Furthermore, Cloven-footed animals (Cattle, Buffalo, Sheep, Goat, Pig); high fever (104–106^°F), ropy salivation, vesicles on tongue and interdigital cleft, smacking of lips. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #51 High-Yield Comparative MCQ

Q51. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Haemorrhagic Septicaemia (HS / Galghotu)"?

(A) Bacteria: *Clostridium chauvoei* (Spore-forming anaerobe)

(B) Bacteria: *Bacillus anthracis* (Zoonotic spore-forming rod)

(C) Bacteria: *Brucella abortus* (Zoonotic — causes Undulant/Malta fever in humans)

(D) Bacteria: *Pasteurella multocida*

Correct Answer: (D) | **Explanation:** For **Haemorrhagic Septicaemia (HS / Galghotu)** (Disease Name), the verified Causal Organism is **Bacteria: *Pasteurella multocida***. Furthermore, Cattle and Buffaloes (Buffaloes most susceptible during monsoon); acute high fever (105–107^°F), painful hot oedematous swelling under throat/brisket, roaring dyspnea ("Ghurkba"). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #52 High-Yield Comparative MCQ

Q52. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Black Quarter (BQ / Langdi Bukhar)"?

(A) Bacteria: *Clostridium chauvoei* (Spore-forming anaerobe)

(B) Bacteria: *Bacillus anthracis* (Zoonotic spore-forming rod)

(C) Bacteria: *Brucella abortus* (Zoonotic — causes Undulant/Malta fever in humans)

(D) Metabolic Disorder: Acute Calcium (Ca) deficiency in blood (**< 5 mg/100 ml** vs normal **9–12 mg/100 ml**)

Correct Answer: (A) | **Explanation:** For **Black Quarter (BQ / Langdi Bukhar)** (Disease Name), the verified Causal Organism is **Bacteria: *Clostridium chauvoei* (Spore-forming anaerobe)**. Furthermore, Young healthy cattle (**6 months to 3 years**); crepitating gaseous swelling in heavy gluteal/thigh muscles making a crackling sound on palpation, acute lameness. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #53 High-Yield Comparative MCQ

Q53. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Anthrax (Splenic Fever / Wool Sorter's Disease)"?

(A) Bacteria: *Brucella abortus* (Zoonotic — causes Undulant/Malta fever in humans)

(B) Bacteria: *Bacillus anthracis* (Zoonotic spore-forming rod)

(C) Metabolic Disorder: Acute Calcium (Ca) deficiency in blood (**< 5 mg/100 ml** vs normal **9–12 mg/100 ml**)

(D) Paramyxovirus Type-1 (Ranikhet) & Herpesvirus (Marek's)

Correct Answer: (B) | **Explanation:** For **Anthrax (Splenic Fever / Wool Sorter's Disease)** (Disease Name), the verified Causal Organism is **Bacteria: *Bacillus anthracis* (Zoonotic spore-forming rod)**. Furthermore, Cattle, Sheep, Goats, Humans; sudden peracute death with unclotted tarry blood oozing from natural orifices (nose, mouth, anus), rigor mortis absent, enlarged spleen. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #54 High-Yield Comparative MCQ

Q54. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Brucellosis (Bang's Disease / Contagious Abortion)"?

(A) Metabolic Disorder: Acute Calcium (Ca) deficiency in blood (**< 5 mg/100 ml** vs normal **9–12 mg/100 ml**)

(B) Paramyxovirus Type-1 (Ranikhet) & Herpesvirus (Marek's)

(C) Bacteria: *Brucella abortus* (Zoonotic — causes Undulant/Malta fever in humans)

(D) Disputes regarding boundaries (*Medhbandi / Patthargadi*)

Correct Answer: (C) | **Explanation:** For **Brucellosis (Bang's Disease / Contagious Abortion)** (Disease Name), the verified Causal Organism is **Bacteria: *Brucella abortus* (Zoonotic — causes Undulant/Malta fever in humans)**. Furthermore, Cattle & Buffalo; abortion in the last trimester of pregnancy (6th to 9th month), retained placenta, orchitis in bulls; diagnosed by Milk Ring Test (MRT). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #55 High-Yield Comparative MCQ

Q55. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Milk Fever (Parturient Paresis)"?

(A) Paramyxovirus Type-1 (Ranikhet) & Herpesvirus (Marek's)

(B) Disputes regarding boundaries (*Medhbandi* / *Patthargadi*)

(C) Maintenance of Village Map (*Shajra*) & Field Book (*Khasra*) and physical partition of *Minjumla* numbers

(D) Metabolic Disorder: Acute Calcium (Ca) deficiency in blood (**< 5 mg/100 ml** vs normal **9–12 mg/100 ml**)

Correct Answer: (D) | **Explanation:** For **Milk Fever (Parturient Paresis)** (Disease Name), the verified Causal Organism is **Metabolic Disorder: Acute Calcium (Ca) deficiency in blood (< 5 mg/100 ml vs normal 9–12 mg/100 ml)**. Furthermore, High-yielding crossbred cows within **72 hours** after calving; sub-normal body temperature (**< 98–100°F**), S-shaped neck curve, sternal recumbency with head turned to flank. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #56 High-Yield Comparative MCQ

Q56. With reference to Disease Name and Causal Organism, which of the following is accurately matched with "Ranikhet Disease (Newcastle Disease) & Marek's Disease"?

(A) Paramyxovirus Type-1 (Ranikhet) & Herpesvirus (Marek's)

(B) Disputes regarding boundaries (*Medhbandi* / *Patthargadi*)

(C) Maintenance of Village Map (*Shajra*) & Field Book (*Khasra*) and physical partition of *Minjumla* numbers

(D) Record of Rights (*Khatauni*) & Correction of Clerical Errors

Correct Answer: (A) | **Explanation:** For **Ranikhet Disease (Newcastle Disease) & Marek's Disease** (Disease Name), the verified Causal Organism is **Paramyxovirus Type-1 (Ranikhet) & Herpesvirus (Marek's)**. Furthermore, Poultry; greenish foul-smelling diarrhea, twisted neck (*Torticollis*), respiratory gasping (**90–100%** mortality); Marek's causes sciatic nerve paralysis. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #57 High-Yield Comparative MCQ

Q57. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 24"?

(A) Maintenance of Village Map (*Shajra*) & Field Book (*Khasra*) and physical partition of *Minjumla* numbers

(B) Disputes regarding boundaries (*Medhbandi* / *Patthargadi*)

(C) Record of Rights (*Khatauni*) & Correction of Clerical Errors

(D) Mutation (*Dakhil-Kharij*) on Succession (Sec 33) or Transfer/Sale (Sec 34/35)

Correct Answer: (B) | **Explanation:** For **Section 24** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Disputes regarding boundaries (*Medhbandi* / *Patthargadi*)**. Furthermore, Sub-Divisional Officer (SDO / SDM). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #58 High-Yield Comparative MCQ

Q58. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 30 & 30(2)"?

(A) Record of Rights (*Khatauni*) & Correction of Clerical Errors

(B) Mutation (*Dakhil-Kharij*) on Succession (Sec 33) or Transfer/Sale (Sec 34/35)

(C) Maintenance of Village Map (*Shajra*) & Field Book (*Khasra*) and physical partition of *Minjumla* numbers

(D) Entrustment of Land/Property to Gram Panchayat & Bhumi Prabandhak Samiti (BPS)

Correct Answer: (C) | **Explanation:** For **Section 30 & 30(2)** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Maintenance of Village Map (*Shajra*) & Field Book (*Khasra*) and physical partition of *Minjumla* numbers**. Furthermore, Collector (DM). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #59 High-Yield Comparative MCQ

Q59. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 31 & 32"?

(A) Mutation (*Dakhil-Kharij*) on Succession (Sec 33) or Transfer/Sale (Sec 34/35)

(B) Entrustment of Land/Property to Gram Panchayat & Bhumi Prabandhak Samiti (BPS)

(C) Prevention of Damage, Misappropriation & Wrongful Occupation of Gram Panchayat Property

(D) Record of Rights (*Khatauni*) & Correction of Clerical Errors

Correct Answer: (D) | **Explanation:** For **Section 31 & 32** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Record of Rights (*Khatauni*) & Correction of Clerical Errors**. Furthermore, Collector / SDO / Tahsildar. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #60 High-Yield Comparative MCQ

Q60. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 33, 34 & 35"?

(A) Mutation (*Dakhil-Kharij*) on Succession (Sec 33) or Transfer/Sale (Sec 34/35)

(B) Entrustment of Land/Property to Gram Panchayat & Bhumi Prabandhak Samiti (BPS)

(C) Prevention of Damage, Misappropriation & Wrongful Occupation of Gram Panchayat Property

(D) Declaration of Agricultural Holding for Non-Agricultural Use (*Abadi* / *Industrial* / *Commercial*)

Correct Answer: (A) | **Explanation:** For **Section 33, 34 & 35** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Mutation (*Dakhil-Kharij*) on Succession (Sec 33) or Transfer/Sale (Sec 34/35)**. Furthermore, Revenue Inspector (Kanungo) for undisputed succession; Tahsildar for transfer/disputed cases. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #61 High-Yield Comparative MCQ

Q61. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 59 & 60"?

(A) Prevention of Damage, Misappropriation & Wrongful Occupation of Gram Panchayat Property

(B) Entrustment of Land/Property to Gram Panchayat & Bhumi Prabandhak Samiti (BPS)

(C) Declaration of Agricultural Holding for Non-Agricultural Use (*Abadi* / *Industrial* / *Commercial*)

(D) Ceiling Restriction (**12.5 Acres**) on Acquisition & SC Land Transfer Permission

Correct Answer: (B) | **Explanation:** For **Section 59 & 60** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Entrustment of Land/Property to Gram Panchayat & Bhumi Prabandhak Samiti (BPS)**. Furthermore, State Government / Gram Pradhan (Chairperson) & Lekhpal (Secretary). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #62 High-Yield Comparative MCQ

Q62. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 67 & 67A"?

(A) Declaration of Agricultural Holding for Non-Agricultural Use (*Abadi / Industrial / Commercial*)
(B) Ceiling Restriction (**12.5 Acres**) on Acquisition & SC Land Transfer Permission
(C) Prevention of Damage, Misappropriation & Wrongful Occupation of Gram Panchayat Property
(D) Suit for Division of Holding (*Batwara / Partition of Jot*)

Correct Answer: (C) | **Explanation:** For **Section 67 & 67A** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Prevention of Damage, Misappropriation & Wrongful Occupation of Gram Panchayat Property**. Furthermore, Assistant Collector / Tahsildar. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #63 High-Yield Comparative MCQ

Q63. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 80 & 82"?

(A) Ceiling Restriction (**12.5 Acres**) on Acquisition & SC Land Transfer Permission
(B) Suit for Division of Holding (*Batwara / Partition of Jot*)
(C) Processes for Recovery of Arrears of Land Revenue (*Malguzari Vasuli*)
(D) Declaration of Agricultural Holding for Non-Agricultural Use (*Abadi / Industrial / Commercial*)

Correct Answer: (D) | **Explanation:** For **Section 80 & 82** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Declaration of Agricultural Holding for Non-Agricultural Use (*Abadi / Industrial / Commercial*)**. Furthermore, Sub-Divisional Officer (SDO / SDM). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #64 High-Yield Comparative MCQ

Q64. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 89 & 98"?

(A) Ceiling Restriction (**12.5 Acres**) on Acquisition & SC Land Transfer Permission
(B) Suit for Division of Holding (*Batwara / Partition of Jot*)
(C) Processes for Recovery of Arrears of Land Revenue (*Malguzari Vasuli*)
(D) **20 Biswa = 400 Biswansi = 3 Kachcha Bigha**

Correct Answer: (A) | **Explanation:** For **Section 89 & 98** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Ceiling Restriction (12.5 Acres) on Acquisition & SC Land Transfer Permission**. Furthermore, State Government / Collector (DM). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #65 High-Yield Comparative MCQ

Q65. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 116 & 117"?

(A) Processes for Recovery of Arrears of Land Revenue (*Malguzari Vasuli*)
(B) Suit for Division of Holding (*Batwara / Partition of Jot*)
(C) **20 Biswa = 400 Biswansi = 3 Kachcha Bigha**
(D) **4 Roods = 160 Square Poles = 10 Sq. Gunter Chains**

Correct Answer: (B) | **Explanation:** For **Section 116 & 117** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Suit for Division of Holding (*Batwara / Partition of Jot*)**.
Furthermore, Sub-Divisional Officer (SDO / SDM). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #66 High-Yield Comparative MCQ

Q66. With reference to Section Number and Statutory Provision Title in UP Revenue Code 2006, which of the following is accurately matched with "Section 170"?

(A) **20 Biswa = 400 Biswansi = 3 Kachcha Bigha**
(B) **4 Roods = 160 Square Poles = 10 Sq. Gunter Chains**
(C) Processes for Recovery of Arrears of Land Revenue (*Malguzari Vasuli*)
(D) **100 Ares = 10,000 Square Meters**

Correct Answer: (C) | **Explanation:** For **Section 170** (Section Number), the verified Statutory Provision Title in UP Revenue Code 2006 is **Processes for Recovery of Arrears of Land Revenue (*Malguzari Vasuli*)**. Furthermore, Collector / Tahsildar. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #67 High-Yield Comparative MCQ

Q67. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with "1 Pucca Bigha (Uttar Pradesh)"?

(A) **4 Roods = 160 Square Poles = 10 Sq. Gunter Chains**
(B) **100 Ares = 10,000 Square Meters**
(C) **200 Links** (**1 Link = 9.9 inches = 0.825 ft**)
(D) **20 Biswa = 400 Biswansi = 3 Kachcha Bigha**

Correct Answer: (D) | **Explanation:** For **1 Pucca Bigha (Uttar Pradesh)** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **20 Biswa = 400 Biswansi = 3 Kachcha Bigha**. Furthermore, **27,225 sq. ft** = **3,025 sq. yards** = **2,529.28 sq. m**. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #68 High-Yield Comparative MCQ

Q68. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with "1 Acre (Imperial Unit)"?

(A) **4 Roods = 160 Square Poles = 10 Sq. Gunter Chains**
(B) **100 Ares = 10,000 Square Meters**
(C) **200 Links** (**1 Link = 9.9 inches = 0.825 ft**)
(D) **100 Links** (**1 Link = 7.92 inches = 0.66 ft**)

Correct Answer: (A) | **Explanation:** For **1 Acre (Imperial Unit)** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **4 Roods = 160 Square Poles = 10 Sq. Gunter Chains**. Furthermore, **43,560 sq. ft** = **4,840 sq. yards** = **4,046.86 sq. m**. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #69 High-Yield Comparative MCQ

Q69. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with "1 Hectare (Metric Unit)"?

(A) **200 Links** (**1 Link = 9.9 inches = 0.825 ft**)
(B) **100 Ares = 10,000 Square Meters**
(C) **100 Links** (**1 Link = 7.92 inches = 0.66 ft**)
(D) **16 Links** (**1 Link = 2.0625 ft = 2 ft 0.75 in**)

Correct Answer: (B) | **Explanation:** For **1 Hectare (Metric Unit)** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **100 Ares = 10,000 Square Meters**. Furthermore, **107,639 sq. ft** = **11,959.9 sq. yards**. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #70 High-Yield Comparative MCQ

Q70. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with “Shahjahani Jarib”?

(A) **100 Links** (**1 Link = 7.92 inches = 0.66 ft**)
(B) **16 Links** (**1 Link = 2.0625 ft = 2 ft 0.75 in**)
(C) **200 Links** (**1 Link = 9.9 inches = 0.825 ft**)
(D) **100 Links** (**1 Link = 1 foot = 12 inches**)

Correct Answer: (C) | **Explanation:** For **Shahjahani Jarib** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **200 Links** (**1 Link = 9.9 inches = 0.825 ft**). Furthermore, Total Length: **165 feet** (**55 Yards**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #71 High-Yield Comparative MCQ

Q71. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with “Gunter's Chain (1620)”?

(A) **16 Links** (**1 Link = 2.0625 ft = 2 ft 0.75 in**)
(B) **100 Links** (**1 Link = 1 foot = 12 inches**)
(C) Definitions & Gram Sabha
(D) **100 Links** (**1 Link = 7.92 inches = 0.66 ft**)

Correct Answer: (D) | **Explanation:** For **Gunter's Chain (1620)** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **100 Links** (**1 Link = 7.92 inches = 0.66 ft**). Furthermore, Total Length: **66 feet** (**22 Yards**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #72 High-Yield Comparative MCQ

Q72. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with “Revenue Chain”?

(A) **16 Links** (**1 Link = 2.0625 ft = 2 ft 0.75 in**)
(B) **100 Links** (**1 Link = 1 foot = 12 inches**)
(C) Definitions & Gram Sabha
(D) Constitution & Composition of Panchayats

Correct Answer: (A) | **Explanation:** For **Revenue Chain** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **16 Links** (**1 Link = 2.0625 ft = 2 ft 0.75 in**). Furthermore, Total Length: **33 feet** (**11 Yards**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #73 High-Yield Comparative MCQ

Q73. With reference to Measurement Unit / Survey Chain and Standard Dimensions & Sub-Divisions, which of the following is accurately matched with “Engineer's Chain”?

(A) Definitions & Gram Sabha
(B) **100 Links** (**1 Link = 1 foot = 12 inches**)
(C) Constitution & Composition of Panchayats
(D) Reservation of Seats (SC, ST, Women, OBC)

Correct Answer: (B) | **Explanation:** For **Engineer's Chain** (Measurement Unit / Survey Chain), the verified Standard Dimensions & Sub-Divisions is **100 Links** (**1 Link = 1 foot = 12 inches**). Furthermore, Total Length: **100 feet** (**33.33 Yards**). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #74 High-Yield Comparative MCQ

Q74. With reference to Constitutional Article and Subject Matter under Part IX (73rd Amendment, 1992), which of the following is accurately matched with "Article 243 & 243-A"?

(A) Constitution & Composition of Panchayats
(B) Reservation of Seats (SC, ST, Women, OBC)
(C) Definitions & Gram Sabha
(D) 5-Year Duration & Disqualifications (**21 Years** Age)

Correct Answer: (C) | **Explanation:** For **Article 243 & 243-A** (Constitutional Article), the verified Subject Matter under Part IX (73rd Amendment, 1992) is **Definitions & Gram Sabha**. Furthermore, Mandatory. (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Practice Question #75 High-Yield Comparative MCQ

Q75. With reference to Constitutional Article and Subject Matter under Part IX (73rd Amendment, 1992), which of the following is accurately matched with "Article 243-B & 243-C"?

(A) Reservation of Seats (SC, ST, Women, OBC)
(B) 5-Year Duration & Disqualifications (**21 Years** Age)
(C) Powers, Authority (29 Subjects) & Power to Impose Taxes
(D) Constitution & Composition of Panchayats

Correct Answer: (D) | **Explanation:** For **Article 243-B & 243-C** (Constitutional Article), the verified Subject Matter under Part IX (73rd Amendment, 1992) is **Constitution & Composition of Panchayats**. Furthermore, Mandatory (3 Tiers). (Source: Indian Council of Agricultural Research (ICAR) & IUC Academy).

Rapid-Fire Last-Minute One-Liner Revision Capsule

1. **ICAR Foundation Day & Headquarters:** Established on **16 July 1929** (on the recommendation of the Linlithgow Royal Commission on Agriculture, 1928) with headquarters at **Krishi Bhavan, New Delhi** (**ICAR Official Portal**).

2. **First Agricultural University of India: G.B. Pant University of Agriculture and Technology (GBPUAT), Pantnagar** (established on **17 November 1960**).

3. **Critical Irrigation Stage in Wheat: Crown Root Initiation (CRI)** at **21 Days After Sowing** (**20–25 DAS**), discovered by Dr. R.B.L. Bhardwaj.

4. **Dwarfing Gene in Wheat & Rice: Norin-10** (Rht-1 / Rht-2) in Wheat (isolated by Gonjiro Inazuka in Japan) and **Dee-geo-woo-gen** (sd-1) in Rice.

5. **Test Weight vs. Seed Index:** Weight of **1,000 seeds** is called **Test Weight** (small-seeded crops: Basmati Rice **= 21 g**, Normal Rice **= 25 g**, Wheat **= 40 g**, Phalaris minor **= 2 g**), whereas weight of **100 seeds** is called **Seed Index** (bold-seeded crops like Chickpea, Maize, Cotton).

6. **System of Rice Intensification (SRI):** Developed by **Father Henri de Laulanié in Madagascar (1983)**; requires only **5–7.5 kg/ha** seed rate, **8–12 days** old single seedlings planted at **25 × 25 cm** square spacing.

7. **Dapog Method of Rice Nursery:** Introduced from **IRRI, Philippines**; seedlings grown on concrete floor/polythene without soil become ready for transplanting in just **11–14 days**.

8. **17th Essential Plant Nutrient: Nickel (Ni)**, discovered by Brown et al. (1987), essential for the enzyme **Urease** in nitrogen metabolism.

9. **Khaira Disease of Paddy:** Caused by **Zinc (Zn) deficiency**, discovered by **Dr. Y.L. Nene (1966)** at Pantnagar; controlled by spraying **0.5%** Zinc Sulphate + **0.25%** Slaked Lime.

10. **First Fertilizer Produced in India: Single Super Phosphate (SSP — 16% P_2O_5, 12% S, 19.5% Ca)** manufactured at **Ranipet (Tamil Nadu) in 1906**.

11. **Soil Health Card (SHC) Scheme:** Launched on **19 February 2015** at **Suratgarh (Rajasthan)**; tests soil samples across **12 parameters** every 3 years.

12. **National Research Centre for Agroforestry (NRCAF):** Located at **Jhansi (Uttar Pradesh)**; **Indian Institute of Pulses Research (IIPR)** is located at **Kanpur (UP)**; **Indian Institute of Vegetable Research (IIVR)** is at **Varanasi (UP)**; **Central Institute for Subtropical Horticulture (CISH)** is at **Rehmankhera, Lucknow (UP)**; **Indian Institute of Sugarcane Research (IISR)** is at **Lucknow (UP)**; **Indian Veterinary Research Institute (IVRI)** is at **Izatnagar, Bareilly (UP)**.

13. **Pungency and Red Color in Chilli:** Pungency is caused by **Capsaicin** and red color by **Capsanthin**.

14. **Pungency in Onion and Garlic:** Onion pungency is due to **Allyl propyl disulphide** (yellow color: **Quercetin**); Garlic pungency is due to **Allicin / Diallyl disulphide**.

15. **Spongy Tissue in Mango:** Physiological disorder affecting **Alphonso** mango due to convective heat; resistant varieties are **Ratna, Arka Puneet, and Arka Anmol**.

16. **Black Tip of Mango:** Caused by **Brick Kiln Fumes (SO_2, CO, C_2H_4)** within a **1–2 km** radius; controlled by spraying **0.6%** **Borax** (**6 g/litre**).

17. **Mango Malformation Control:** Controlled by spraying **NAA (Planofix) @ 200 ppm** in the first week of October followed by deblossoming at bud-burst in January.

18. **Meadow Orcharding in Guava:** Ultra-high-density planting system developed by CISH Lucknow at **2.0 m × 1.0 m spacing (5,000 plants/ha)**.

19. **Minimum Total Soluble Solids (TSS) in Jam and Jelly: Jam** = **68.5%** **TSS** (best fruit: Apple); **Jelly** = **65.0%** **TSS** (best fruit: Guava, rich in pectin).

20. **Karnal Bunt of Wheat:** Caused by fungus *Neovossia indica* (*Tilletia indica*), discovered by **Mitra (1931)** at Karnal; emits a foul rotten-fish odor due to **Trimethylamine**.

21. **Highest Milk-Yielding Indigenous & Exotic Cattle Breeds: Sahiwal** (**2,200–3,000 kg/lactation**, sweetest milk due to high lactose) is first among Indian cattle; **Holstein Friesian (HF)** (Holland) is first globally.

22. **Highest Milk Fat Buffalo Breed: Bhadawari** (native to Agra/Etawah, UP) with **12.5% to 14.0%** **milk fat** and copper-colored body.

23. **Highest Milk-Yielding Buffalo Breed: Murrah** ("Black Gold of India", jet black coat with tightly curled horns).

24. **Tallest & Highest Milk-Yielding Indian Goat Breed: Jamunapari** (native to Chakarnagar, Etawah, UP; Roman nose).

25. **Merino of Rajasthan (Sheep Breed): Chokla (Shekhawati)** breed yielding superior fine carpet/apparel wool; **Nellore** is the tallest sheep breed of India.

26. **Cryopreservation of Bull Semen for AI:** Preserved in **Liquid Nitrogen (LN_2) at -196^°C** using Egg Yolk Citrate or Tris extender.

27. **Operation Flood (White Revolution):** Launched on **13 January 1970** by **NDDB (established 1965 at Anand)** under **Dr. Verghese Kurien** (National Milk Day: **26 November**).

28. **Castrated Male Livestock Terms:** Cattle: **Steer / Bullock**; Sheep: **Wedder**; Pig: **Barrow / Stag**; Horse: **Gelding**; Poultry: **Capon** (process called **Caponization**).

29. **Act of Parturition Terms:** Cow/Buffalo: **Calving**; Sheep: **Lambing**; Goat: **Kidding**; Pig: **Farrowing**; Horse: **Foaling**.

30. **Milk Fever (Parturient Paresis):** Metabolic disease of high-yielding cows within **72 hours** of calving caused by acute **Calcium (Ca) deficiency** with **sub-normal body temperature (< 98–100°F)**.

31. **Board of Revenue, Uttar Pradesh:** Established in **1831 at Prayagraj**; since 1947–48, its **Administrative Headquarter is at Lucknow** and its **Judicial Headquarter is at Prayagraj** (UP Board of Revenue Portal).

32. **UP Revenue Code, 2006 Structure & Enforcement:** Contains **16 Chapters, 234 Sections, and 4 Schedules**; came into complete force on **11 February 2016**, repealing 39 old laws including UPZALR Act, 1950.

33. **Agricultural Year (Fasli Year) in Uttar Pradesh:** Commences on **1st July and ends on 30th June** of the next year (Section 4(11) of UP Revenue Code, 2006).

34. **Conversion of Gregorian Year to Fasli Year:** Subtract **593** (from Jan to June) or **592** (from 1st July to Dec) from the Gregorian Calendar Year.

35. **Four Classes of Tenure Holders in UP (Section 74):** (1) Bhumidhar with Transferable Rights, (2) Bhumidhar with Non-Transferable Rights (becomes Transferable after **5 years** under Sec 76(2)), (3) Asami, and (4) Government Lessee.

36. **Public Utility Land Section in UP Revenue Code: Section** 77 (replacing old Sec 132) lists lands (*Khalihan*, pasture, cremation sites, ponds, roads) over which **no Bhumidhari rights can ever accrue**.

37. **Boundary Dispute Resolution (Medhbandi - Section 24):** Decided by the **Sub-Divisional Officer (SDO/SDM)** within **3 months (90 days)**.

38. **Mutation (Dakhil-Kharij - Sections 33–35):** Undisputed succession recorded by **Revenue Inspector (Kanungo)**; transfer/disputed mutation decided by **Tahsildar** (within **45 days** if undisputed, **90 days** if disputed).

39. **Non-Agricultural Declaration (Section 80) & Partition Suit (Section 116):** Both are adjudicated by the **Sub-Divisional Officer (SDO/SDM)**.

40. **SC & ST Land Transfer Restrictions (Sections 98 & 99):** An SC Bhumidhar requires prior written permission of the **Collector (DM)** under **Section 98** to sell land to a non-SC person; an ST Bhumidhar cannot transfer to a non-ST person under **Section 99**.

41. **Three Seasonal Partal Dates of Lekhpal: Kharif Partal** starts on **10 August**, **Rabi Partal** starts on **1 January**, and **Zaid Partal** starts on **1 May**.

42. **Khasra vs. Khatauni Renewal & Columns: Khasra (21 Columns** traditional / **46 Columns** digital e-Khasra) is renewed **every 1 year**; **Khatauni (13 Columns** traditional / **19 Columns** Real-Time Khatauni) is revised **every 6 years**.

43. **1 Pucca Bigha in Uttar Pradesh:** Equals **20 Biswa = 3,025 sq. yards = 27,225 sq. feet = 2,529.28 sq. meters = 3 Kachcha Bighas**.

44. **1 Hectare Standard Equivalents:** Equals **10,000 sq. meters = 2.47105 Acres = 3.9537 Pucca Bighas = 11,959.9 sq. yards = 107,639 sq. feet**.

45. **Lengths of Standard Survey Chains (Jaribs): Shahjahani Jarib = 165 ft (200 links); Engineer's Chain = 100 ft (100 links); Gunter's Chain = 66 ft (100 links); Revenue Chain = 33 ft (16 links).**

46. **Father of Local Self-Government in India: Lord Ripon (1882 Resolution)**; Constitutional Directive for Village Panchayats is in **Article 40**.

47. **Inauguration of Panchayati Raj in India: 2 October 1959 at Bagdari village, Nagaur district (Rajasthan)** by PM Jawaharlal Nehru on the recommendation of the **Balwant Rai Mehta Committee (1957)**.

48. **73rd Constitutional Amendment Act, 1992:** Came into force on **24 April 1993** (National Panchayati Raj Day); inserted **Part IX (Articles 243 to 243-O)** and the **11th Schedule (29 Subjects)**.

49. **Minimum Age to Contest Panchayat Elections (Article 243-F): 21 Years** (minimum voting age in Gram Sabha: **18 Years**).

50. **State Finance Commission & State Election Commission: Article 243-I** (State Finance Commission every 5 years) and **Article 243-K** (State Election Commission).

51. **Gram Sabha & Gram Panchayat Quorum in UP: Gram Sabha Quorum** = **1/5th** (**20%**) (mandatory 2 meetings/year: Kharif & Rabi); **Gram Panchayat Quorum** = **1/3rd** (**33.33%**) (mandatory 1 meeting/month).

52. **Gram Panchayat Ward Members by Population in UP:** Up to **1,000** pop. = **9 members**; **1,001–2,000** = **11 members**; **2,001–3,000** = **13 members**; **> 3,000** = **15 members**.

53. **No-Confidence Motion against Gram Pradhan in UP:** Cannot be brought within the **first 2 years**; requires **15 days' notice** to **DPRO** signed by **1/2** **of Gram Sabha members** and passage by **2/3rd** **of members present and voting**.

54. **SVAMITVA Scheme & e-GramSwaraj Portal:** Launched on **24 April 2020**; SVAMITVA distributes rural residential property cards (**Gharauni** in UP) via drone mapping.

55. **CACP & Minimum Support Price (MSP):** CACP (established **1 Jan 1965**) recommends MSP for **22 crops** (plus **FRP for Sugarcane**), approved by **CCEA** at minimum **1.5 times** **Cost A_2 + FL**.

56. **NABARD & First RRB of India: NABARD** was established on **12 July 1982** (Sivaraman Committee); India's first Regional Rural Bank was **Prathama Grameen Bank (Moradabad, UP, 2 Oct 1975)** on the Narasimham Committee recommendation.

57. **Kisan Credit Card (KCC):** Launched in **August 1998** (R.V. Gupta Committee); provides short-term crop loans up to **₹3 Lakh** **at** **4%** **effective interest rate** (after **3%** prompt repayment subvention) and collateral-free loan up to **₹1.60 Lakh**.

58. **MGNREGA (Act 2005):** Launched **2 Feb 2006**; guarantees **100 days of unskilled wage employment** with minimum **1/3** (**33.33%**) **women participation** and **60:40 wage-to-material ratio**.

59. **Jal Jeevan Mission (Har Ghar Jal):** Launched **15 August 2019**; provides **55 Litres Per Capita Per Day (55 lpcd)** through Functional Household Tap Connections (FHTC).

60. **PMAY-Gramin Unit Assistance:** Launched **20 November 2016 at Agra (UP)**; provides **₹1.20 Lakh** **in Plain areas** and **₹1.30 Lakh** **in Hilly/Difficult areas** for a minimum **25 sq. meter** pucca house.

IUC Academy *1-3-7-21* Day Spaced-Revision & Self-Assessment Tracker (www.iucacademy.com)

Chapter / Study Section	Day 1 (First Read)	Day 3 (Active Recall)	Day 7 (MCQ Drill)	Day 21 (Exam Ready)
1. Chapter 1: Principles of Agronomy, Agro-Climatic Zones & Cropping Systems in India	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
2. Chapter 2: Soil Science, Indian Soil Taxonomy, Plant Nutrients & Fertilizers	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
3. Chapter 3: Horticulture, Pomology, Olericulture, Post-Harvest Technology & Plant Pathology	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
4. Chapter 4: Animal Husbandry, Indigenous & Exotic Livestock Breeds, Dairy Science & Poultry	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
5. Chapter 5: Uttar Pradesh Revenue Code 2006 (Amended 2015 & 2019) & Revenue Administration	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
6. Chapter 6: Land Measurement Units, Chains (Jarib), Surveying Instruments & Village Records	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
7. Chapter 7: Panchayati Raj System in India & Uttar Pradesh, 73rd Constitutional Amendment & PESA	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
8. Chapter 8: Agricultural Economics, MSP, Rural Credit Institutions & Flagship Rural Schemes	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
9. Solved Exam Practice Questions (MCQs)	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
10. Extended Comparative & Analytical Practice Set (Questions 36–75)	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**
11. Rapid-Fire Last-Minute One-Liner Revision Capsule	☐ Completed (100% Concept Clarity)	☐ Flowchart & Tables Revised	☐ 75+ MCQs Solved (>85% Accuracy)	☐ **Final Rapid Recall Ready**