Rajasthan JET Agriculture Sample Paper-5

Duration: 40 Minutes **Maximum Marks: 160**

Instructions

- This paper contains **40** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+4 marks**.
- Each incorrect answer carries: **−1 mark**.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. Which horizon of the soil profile is characterised by illuviation — the accumulation of clay, iron oxides, and organic matter leached down from above?

(A) A-horizon (topsoil)

(B) B-horizon (subsoil)

(C) C-horizon (weathered parent material)

(D) R-horizon (bedrock)

Q2. The nitrogenase enzyme complex responsible for biological nitrogen fixation is encoded by which gene?

(A) nodA

(B) fixA

(C) nifH

(D) nifK

Q3. Iron deficiency chlorosis in plants is best described as:

(A) Interveinal chlorosis appearing first on young (apical) leaves

(B) Interveinal chlorosis appearing first on old (basal) leaves

(C) Marginal leaf scorch on young leaves

(D) Uniform yellowing of all leaves simultaneously

Q4. Blocky soil structure is most commonly found in which horizon?

(A) A-horizon (topsoil)

(B) O-horizon (organic litter)

(C) C-horizon (parent material)

(D) B-horizon (subsoil)

Q5. Under waterlogged conditions, crop roots suffer damage primarily because:

(A) Excess water raises soil pH above 9

(B) O_2 depletion forces anaerobic respiration producing ethanol, which is toxic to root cells

(C) Waterlogging increases soil temperature beyond the crop's tolerance

(D) Excess water causes osmotic stress similar to drought

Q6. 2,4-D (2,4-dichlorophenoxyacetic acid) controls broadleaf weeds in wheat by acting as:

(A) An inhibitor of acetyl-CoA carboxylase (ACCase)

(B) A photosystem II electron transport blocker

(C) A synthetic auxin causing uncontrolled, disorganised growth in broadleaf weeds

(D) An inhibitor of amino acid synthesis (ALS inhibitor)

Q7. Compared to flood (surface) irrigation, drip irrigation typically saves approximately how much water?

(A) 40–50%

(B) 10–15%

(C) 60–70%

(D) 25–30%

Q8. In watershed management, check dams and percolation ponds are components of:

(A) Catchment-area treatment

(B) Afforestation programme

(C) Contour bunding

(D) Drainage line treatment

Q9. The bread-making quality of wheat grain is primarily determined by:

(A) Starch amylose:amylopectin ratio

(B) Gluten proteins (gliadin + glutenin) that form a viscoelastic dough network

(C) Grain ash content

(D) Total carbohydrate content

Q10. Pusa Basmati-1 is best described as:

(A) A long-duration, tall, traditional Basmati variety

(B) A high-yielding, short-duration non-aromatic variety

(C) A semi-dwarf, aromatic Basmati variety with lodging resistance

(D) A waxy-endosperm rice suited to glutinous products

Q11. The opaque-2 (o2) mutation in maize endosperm results in:

(A) Elevated lysine and tryptophan content, improving nutritional quality

(B) High sugar content due to blocked starch conversion

(C) Waxy starch with high amylopectin percentage

(D) Increased oil content in the germ

Q12. Pearl millet (Bajra) is nutritionally important in Rajasthan primarily because it is rich in:

(A) Vitamin A and beta-carotene

(B) Omega-3 fatty acids

(C) Vitamin C and folate

(D) Iron (8–10 mg/100 g) and calcium, helping prevent anaemia

Q13. The approximate protein content of chickpea (gram) seed on a dry-weight basis is:

(A) 10–12%

(B) 20–22%

(C) 30–32%

(D) 40–42%

Q14. Canola-quality mustard/rapeseed is defined as having:

(A) High erucic acid and high glucosinolate content

(B) High erucic acid and low glucosinolate content

(C) Less than 2% erucic acid in oil and less than 30 μmol glucosinolates per gram in meal

(D) Zero glucosinolate but standard erucic acid levels

Q15. The Cry1Ac protein in Bt cotton kills bollworm larvae by:

(A) Binding to specific receptors in the midgut epithelium of Lepidoptera, forming pores that cause cell lysis

(B) Inhibiting the juvenile hormone of insects

(C) Disrupting the moulting process by blocking ecdysone receptors

(D) Acting as a contact nerve poison on the insect cuticle

Q16. How many cuts (harvests) can be taken from a well-managed berseem (Trifolium alexandrinum) crop in a single winter season?

(A) 1–2 cuts

(B) 2–3 cuts

(C) 6–7 cuts

(D) 3–5 cuts

Q17. Mango malformation disease is caused by:

(A) Xanthomonas campestris pv. mangiferaeindicae

(B) Fusarium mangiferae (fungus)

(C) Colletotrichum gloeosporioides (fungus)

(D) Mango malformation virus (MMV)

Q18. The recommended bactericide for management of citrus canker (Xanthomonas axonopodis pv. citri) is:

(A) Streptomycin sulphate alone

(B) Carbendazim (systemic fungicide)

(C) Bordeaux mixture (copper sulphate + lime)

(D) Mancozeb (contact fungicide)

Q19. Karonda (Carissa carandas) is valued as an arid-zone minor fruit of Rajasthan because:

(A) It is drought-tolerant, rich in Vitamin C, and used for pickles and jam

(B) It is a major table fruit exported from Rajasthan

(C) Its fruits contain very high sugar and are eaten fresh

(D) It requires high rainfall ($>$1000 mm) and cannot survive dry spells

Q20. The most serious insect pest of brinjal (eggplant) that bores into shoots and fruits, causing wilting of young shoots and rotting of fruits, is:

(A) Helicoverpa armigera (gram pod borer)

(B) Bemisia tabaci (whitefly)

(C) Aphis gossypii (cotton aphid)

(D) Leucinodes orbonalis (brinjal shoot and fruit borer)

Q21. In air layering (gooti/marcotting) of guava, which growth regulator is applied to the ring-barked wound to stimulate adventitious root formation?

(A) Gibberellic acid (GA_3)

(B) Indole butyric acid (IBA)

(C) Cytokinin (BAP)

(D) Ethephon

Q22. Which of the following districts of Rajasthan are the major cumin (jeera, Cuminum cyminum) producing areas?

(A) Kota, Bundi, Jhalawar

(B) Alwar, Bharatpur, Dholpur

(C) Barmer, Jodhpur, Jalore

(D) Chittorgarh, Bhilwara, Rajsamand

Q23. Pure line selection differs from mass selection in that pure line selection:

(A) Is based on a single self-fertilised plant and exploits additive gene effects in self-pollinated crops

(B) Is applied to cross-pollinated crops to improve the general population mean

(C) Selects for heterozygous individuals to maintain variability

(D) Is used exclusively for vegetatively propagated crops

Q24. In sporophytic self-incompatibility (SSI), the incompatibility reaction is determined by the S-allele expressed in the:

(A) Pollen tube cytoplasm after germination

(B) Style transmitting tissue

(C) Ovule integuments

(D) Pollen grain coat (tapetum/sporophytic tissue)

Q25. Carboxin is used as a seed treatment fungicide primarily to control:

(A) Externally seed-borne pathogens (contact action)

(B) Internally seed-borne pathogens such as loose smut of wheat (systemic action)

(C) Soil-borne root-knot nematodes

(D) Stored-grain insects such as weevils

Q26. Roundup Ready (RR) soybean tolerates glyphosate herbicide because it contains a modified gene encoding:

(A) Acetolactate synthase (ALS) resistant to glyphosate

(B) Acetyl-CoA carboxylase (ACCase) that binds glyphosate weakly

(C) 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) insensitive to glyphosate, derived from Agrobacterium sp.

(D) Glutamine synthetase that detoxifies glyphosate

Q27. The characteristic damage symptom caused by jassid (Amrasca biguttula biguttula) on cotton leaves is called:

(A) Hopper burn — upward curling and bronzing/reddening of leaf margins due to toxin injection

(B) Leaf mining — silvery streaks inside the leaf lamina

(C) Sooty mould — black fungal growth on honeydew

(D) Shot-hole — small circular holes in leaves

Q28. The Hessian fly (Mayetiola destructor) damages wheat by:

(A) Feeding on grain at the dough stage, reducing grain weight

(B) Mining the leaf blade, reducing photosynthetic area

(C) Transmitting barley yellow dwarf virus through its feeding

(D) Larvae feeding at the base of tillers, causing dead heart (withering of central shoot)

Q29. The primary chemical control measure employed against desert locust (Schistocerca gregaria) hopper bands and adult swarms in Rajasthan is:

(A) Ground dusting with carbaryl (Sevin dust)

(B) Aerial ultra-low volume (ULV) spraying with malathion or chlorpyrifos

(C) Broadcast application of bait containing metarhizium

(D) Release of Nosema locustae (microsporidian) biocontrol

Q30. The disease commonly called “green ear” of pearl millet, in which floral parts are converted into leaf-like structures, is caused by:

(A) Ustilago cynodontis (smut)

(B) Pyricularia grisea (blast)

(C) Sclerospora graminicola (downy mildew)

(D) Puccinia substriata (rust)

Q31. Tomato leaf curl virus (ToLCV) is transmitted from plant to plant by:

(A) Bemisia tabaci (silverleaf whitefly) in a persistent circulative manner

(B) Aphis gossypii (cotton aphid) in a non-persistent manner

(C) Thrips palmi (melon thrips) by feeding puncture

(D) Soil through root exudates

Q32. Which of the following correctly distinguishes a systemic insecticide from a contact insecticide?

(A) Systemic insecticides kill only on direct body contact and have no residual action

(B) Contact insecticides are absorbed by the plant and translocated in the phloem

(C) Systemic insecticides work only against sucking pests; contact insecticides work only against chewing pests

(D) Systemic insecticides (e.g., imidacloprid) are absorbed and translocated within the plant, killing pests that feed on plant sap; contact insecticides (e.g., malathion) kill only insects they directly touch

Q33. The Rathi cattle breed of Rajasthan is primarily reared in which districts, and for what attribute?

(A) Udaipur and Chittorgarh; known for heavy draft power

(B) Bikaner and Sri Ganganagar; valued for relatively good milk yield under desert conditions

(C) Jaipur and Ajmer; known for high-quality beef production

(D) Kota and Baran; suited to high-rainfall black cotton soil areas

Q34. Kankrej cattle are recognised by their distinctive lyre-shaped horns and are known primarily as:

(A) A pure dairy breed with milk fat exceeding 6%

(B) A beef breed developed by crossing Brahman and Hereford

(C) A heavy dual-purpose (draft + dairy) breed of the Gujarat–Rajasthan border region, also called Wagad

(D) A small hill breed suited to the Aravalli terrain

Q35. The Chokla sheep breed, found in Sikar, Churu, and Jhunjhunu districts of Rajasthan, is primarily valued for:

(A) Fine, white wool used in making blankets (kamblis) and woollen products

(B) Meat production with very low wool yield

(C) Carpet-quality coarse wool used in Rajasthani dhurries

(D) High milk production used for traditional cheese

Q36. Kadaknath is an indigenous poultry breed of India known for which distinguishing characteristic?

(A) Highest egg production among desi breeds (300+ eggs/year)

(B) White plumage and high broiler growth rate

(C) Production of green-shell eggs

(D) Black-pigmented (melanised) meat, feathers, and internal organs; high in protein and low in fat

Q37. Which of the following is a variable cost in crop production?

(A) Depreciation on farm machinery

(B) Cost of seeds, fertilisers, and hired labour that change with the level of crop output

(C) Land rent paid as a fixed annual lease

(D) Interest on fixed capital investment in irrigation infrastructure

Q38. "Apni Mandi" in Rajasthan is a direct marketing initiative that:

(A) Allows only government-licensed traders to purchase produce from farmers

(B) Is an online e-NAM platform for commodity futures trading

(C) Enables farmers to sell directly to consumers without middlemen, started in Rajasthan in 1987

(D) Provides minimum support price procurement for all horticultural crops

Q39. Rashtriya Krishi Vikas Yojana (RKVY) was launched in which year, and what is its primary objective?

(A) 2007; to incentivise states to increase public investment in agriculture and allied sectors above the baseline

(B) 2000; to provide crop insurance to all farmers at subsidised premium

(C) 2012; to distribute free seeds and fertilisers to marginal farmers

(D) 1995; to regulate APMC markets across states

Q40. A "result demonstration" in agricultural extension differs from a "method demonstration" in that:

(A) Result demonstration teaches a single skill step-by-step in a short session; method demonstration runs over an entire crop season

(B) Result demonstration is conducted in the extension office; method demonstration is always done on the farmer's field

(C) Both demonstrations are identical in purpose and execution

(D) Result demonstration compares a new practice against the farmer's traditional practice over a full season on the farmer's own field; method demonstration teaches how to perform a specific operation step-by-step

Detailed Solutions

Q1.

Solution

The soil profile consists of distinct layers called horizons:

- **O-horizon:** Organic litter layer; undecomposed and partially decomposed plant material.
- **A-horizon (topsoil):** Rich in humus and biological activity; nutrients are leached downward from this zone (eluviation).
- **B-horizon (subsoil):** This is the zone of *illuviation* — the accumulation of materials (clay particles, iron and aluminium oxides, calcium carbonate, humic compounds) that have been leached down from the A-horizon. It is denser, less porous, and often reddish or brownish due to iron oxide accumulation.
- **C-horizon:** Weathered parent material; partially broken-down rock with little biological activity.
- **R-horizon:** Consolidated bedrock.

Since illuviation (accumulation of leached materials) defines the B-horizon, option (B) is correct. **Final Answer:** The B-horizon (subsoil) is the zone of illuviation where clay, Fe/Al oxides, and organic matter leached from the A-horizon accumulate.

Answer: (B) Go Back to Q1

Q2.

Solution

Biological nitrogen fixation (BNF) is carried out by the nitrogenase enzyme complex, which converts atmospheric N_2 to NH_3:

$$\mathbf{N_2 + 8H^+ + 8e^- + 16\ ATP \rightarrow 2NH_3 + H_2 + 16\ ADP + 16\ P_i}$$

The nitrogenase complex has two components:

- **Fe protein (dinitrogenase reductase):** Encoded by **nifH**; smaller component, transfers electrons.
- **MoFe protein (dinitrogenase):** Encoded by *nifD* and *nifK*; larger component, contains the active FeMo-co site where N_2 is reduced.

The *nifH* gene is the most conserved nitrogen fixation gene and is widely used as a molecular marker for diazotrophs. It encodes the Fe protein (the reductase component). Free-living organisms (Azotobacter, Azospirillum) and symbiotic organisms (Rhizobium) all carry the nifH gene.

Options (A) nodA and (B) fixA are involved in nod-factor biosynthesis and electron transfer respectively, but neither encodes the nitrogenase Fe protein directly. **Final Answer:** The nifH gene encodes the Fe protein (dinitrogenase reductase), the most conserved component of the nitrogenase complex responsible for biological nitrogen fixation.

Answer: (C) Go Back to Q2

Q3.

Solution

Iron (Fe) is a relatively immobile element in the phloem of most plants. When Fe is deficient:

- The plant cannot redistribute Fe from older leaves to younger growing tissues.
- Therefore, deficiency symptoms appear **first on young (apical/terminal) leaves**.
- The symptom is **interveinal chlorosis** — the leaf veins remain green while the tissue between veins turns yellow or white, because Fe is needed for chlorophyll synthesis.

This contrasts with mobile nutrients like nitrogen and magnesium, whose deficiency symptoms appear first on *older* leaves.

Iron deficiency is common in **alkaline soils (pH $>$ 7.5)** of Rajasthan, where Fe^{3+} forms insoluble hydroxides unavailable to plants. Correction: foliar spray of $FeSO_4$ (0.5%) or chelated iron (FeEDTA) applied as foliar or soil treatment. **Final Answer:** Iron is phloem-immobile, so Fe deficiency causes interveinal chlorosis that appears first on young apical leaves where Fe cannot be redistributed.

Answer: (A) Go Back to Q3

Q4.

Solution

Soil structure refers to the arrangement of soil particles into aggregates (peds). Different horizons develop characteristic structural types:

- **A-horizon:** Granular or crumb structure — ideal for aeration and root growth; associated with high organic matter.
- **B-horizon: Blocky** (angular or subangular) or **prismatic/columnar** structure — common in clay-rich subsoils where shrink-swell cycles create angular blocks. Blocky structure is the most diagnostic of the B-horizon.
- **C-horizon:** Massive or platy structure.

Blocky peds have flat to slightly rounded faces and form in clay-accumulation zones (argillic horizons), which are a subset of the B-horizon. They restrict root penetration more than granular structures. Hence option (D) is correct. **Final Answer:** Blocky soil structure is most diagnostic of the B-horizon, where clay accumulation and shrink-swell cycles create angular or subangular peds.

Answer: (D) Go Back to Q4

Q5.

Solution

Sequence of events under waterlogging:

(a) Soil pores fill with water $\rightarrow$ O_2 rapidly consumed by soil microbes within 24–48 hours.

(b) Root cells switch from aerobic to **anaerobic (fermentative) respiration**.

(c) Pyruvate $\rightarrow$ acetaldehyde $\rightarrow$ **ethanol** (via alcohol dehydrogenase, ADH).

(d) Ethanol accumulates in root tissue $\rightarrow$ membrane disruption and cell death.

(e) Additionally, Mn^{2+}, Fe^{2+}, and H_2S produced under anaerobic conditions are phytotoxic.

Sensitive crops include wheat, mustard, and chickpea; relatively tolerant crops include paddy (rice) which has aerenchyma tissue to transport O_2 to roots.

Options (A), (C), and (D) are incorrect descriptions of the waterlogging mechanism. **Final Answer:** Waterlogging depletes O_2, forcing root cells into anaerobic respiration that produces toxic ethanol via the alcohol dehydrogenase pathway.

Answer: (B) Go Back to Q5

Q6.

Solution

2,4-D (2,4-dichlorophenoxyacetic acid) belongs to the **phenoxy acid** group of herbicides:

- It mimics the natural auxin indole-3-acetic acid (IAA) but is not metabolised at the same rate.
- In susceptible **broadleaf (dicot) weeds**, it causes abnormal, uncontrolled cell elongation and division, epinasty (downward bending of leaves), and vascular proliferation.
- Death results from exhaustion of resources and physical disruption of vascular tissue.
- **Selectivity:** Narrow-leaved cereals (wheat, maize) tolerate 2,4-D because they metabolise it rapidly and their growing points are protected by leaf sheaths.

Mode of action classification: **Group O** herbicide (Synthetic Auxins).

Application in wheat: 0.5–1.0 kg a.i./ha at 30–35 days after sowing (tillering stage); spray when weeds are young. **Final Answer:** 2,4-D acts as a synthetic auxin (Group O herbicide) that causes uncontrolled, disorganised growth leading to death of susceptible broadleaf weeds while leaving narrow-leaved cereals unharmed.

Answer: (C) Go Back to Q6

Q7.

Solution

Comparative water use efficiency (WUE) across irrigation methods:

- **Flood (surface) irrigation:** Efficiency 40–60%; large losses to deep percolation, surface runoff, and evaporation.
- **Sprinkler irrigation:** Efficiency 70–80%; losses mainly to wind drift and evaporation from wetted canopy.
- **Drip (trickle) irrigation:** Efficiency 85–95%; water is delivered directly to the root zone with minimal losses.

Thus, compared to flood irrigation, drip irrigation saves approximately **40–50%** water. This makes it especially valuable in arid Rajasthan where water is scarce.

Sprinkler irrigation is suitable for undulating terrain (no levelling needed) and crops like wheat, vegetables. Drip is most suitable for horticultural crops (fruits, vegetables, sugarcane, cotton). **Final Answer:** Drip irrigation achieves 85–95% efficiency compared to 40–60% for flood irrigation, saving approximately 40–50% of water by delivering it directly to the root zone.

Answer: (A) Go Back to Q7

Q8.

Solution

Watershed management involves two broad sets of interventions:

1. **Catchment-area treatment (land treatment):**
   - Contour bunding, terracing, afforestation, vegetative barriers, check-contour trenches.
   - Purpose: reduce runoff velocity and soil erosion on slopes.
2. **Drainage line treatment (gully/stream treatment):**
   - **Check dams** (loose boulder, gabion, cement): constructed across seasonal streams to slow water flow, trap sediment, and raise water table.
   - **Percolation ponds**: large earthen structures that store runoff and allow it to percolate into groundwater.
   - Nala bunds, gully plugs.

In arid Rajasthan, johads (traditional earthen check dams) and modern percolation ponds play a critical role in groundwater recharge. Since check dams and percolation ponds work along drainage lines (nalas, gullies), they are classified as drainage line treatment. **Final Answer:** Check dams and percolation ponds are drainage line treatment structures that slow runoff along nalas and gullies to recharge groundwater.

Answer: (D) Go Back to Q8

Q9.

Solution

Wheat endosperm contains two storage protein groups that together form **gluten**:

- **Gliadin** (α, β, γ, ω): monomeric; provides *extensibility* (dough stretches without breaking).
- **Glutenin** (HMW and LMW subunits): polymeric; linked by disulphide bonds; provides *elasticity* (dough springs back).

The ratio and composition of these proteins determine:

- **Hard wheat (high protein, 12–14%):** Strong gluten network; suited for bread, pasta.
- **Soft wheat (low protein, 8–10%):** Weak gluten; suited for biscuits, cakes, chapati.

The HMW glutenin subunit composition (Glu-D1 locus) is the primary genetic determinant of bread-making quality in wheat. Option (B) is correct. **Final Answer:** Gluten proteins—gliadin (extensibility) and glutenin (elasticity)—form the viscoelastic dough network that determines bread-making quality in wheat.

Answer: (B) Go Back to Q9

Q10.

Solution

Important Basmati and HYV rice varieties:

- **Basmati-370:** Traditional tall variety; long, slender, highly aromatic grain; low yield (2.5–3 t/ha); susceptible to lodging.
- **IR-36:** High-yielding variety (IRRI); short duration (105 days); non-aromatic; widely grown for food security.
- **Pusa Basmati-1 (PB-1):** Released by IARI in 1989; **semi-dwarf** (lodging-resistant); **aromatic** with long slender grain; higher yield (4–5 t/ha) than traditional Basmati; duration 135–140 days. It combines the aroma of traditional Basmati with the yield potential of HYVs.

Option (C) correctly describes Pusa Basmati-1 as semi-dwarf and aromatic. **Final Answer:** Pusa Basmati-1 is a semi-dwarf, lodging-resistant, aromatic Basmati variety released by IARI that combines traditional Basmati aroma with higher yield

potential.

Answer: (C) Go Back to Q10

Q11.

Solution

Normal maize endosperm proteins are predominantly **zeins**, which are deficient in the essential amino acids lysine and tryptophan.

The **opaque-2 (o2)** mutation:

- Discovered at Purdue University in the 1960s.
- The o2 gene encodes a transcription factor that activates zein synthesis.
- When mutated, zein production decreases and non-zein proteins (richer in lysine and tryptophan) increase.
- Result: **lysine content doubles** (from ∼2% to ∼4% of protein) and tryptophan increases substantially.
- This opaque-2 (QPM — quality protein maize) is important for nutrition in communities dependent on maize.

Note: The *su* (sugary) gene gives sweet corn; the *wx* (waxy) gene gives waxy starch — these are separate from opaque-2. **Final Answer:** The opaque-2 mutation reduces zein synthesis and doubles the lysine content of maize endosperm protein, significantly improving its nutritional quality.

Answer: (A) Go Back to Q11

Q12.

Solution

Nutritional composition of pearl millet (bajra) per 100 g:

- Protein: 11–12 g
- Fat: 5 g
- Carbohydrate: 67 g
- **Iron: 8–10 mg** (compared to wheat 4 mg, rice 2 mg)
- Calcium: 42 mg

- Phosphorus: 296 mg

Bajra is a **staple food in Rajasthan** (roti, khichdi). Its high iron content makes it important for preventing iron-deficiency anaemia, which is prevalent in rural Rajasthan. It also contains no anti-nutritional tannins that block iron absorption (unlike sorghum), making its iron more bioavailable.

Options (A), (B), and (C) are incorrect; bajra is not particularly rich in beta-carotene, omega-3, or folate. **Final Answer:** Pearl millet contains 8–10 mg iron per 100 g—far higher than wheat or rice—making it critical for preventing iron-deficiency anaemia in Rajasthan.

Answer: (D) Go Back to Q12

Q13.

Solution

Protein content of important pulses (approximate, dry weight basis):

- **Chickpea (gram, Cicer arietinum): 20–22%** protein
- Pigeon pea (tur/arhar): 22–24%
- Lentil (masur): 24–26%
- Cowpea (lobia): 22–24%
- Soybean: 38–42% (an oilseed, not a pulse)

Chickpea is the **most important pulse crop of Rajasthan** and a critical vegetarian protein source. The protein is rich in lysine but relatively low in methionine and cysteine. Chickpea protein combined with cereal protein provides a complementary amino acid profile.

Option (A) 10–12% is too low; options (C) and (D) are values for soybean or unprocessed soybean concentrates. **Final Answer:** Chickpea seed contains approximately 20–22% protein on a dry-weight basis, making it the most important pulse protein source in Rajasthan.

Answer: (B) Go Back to Q13

Q14.

Solution

Traditional rapeseed/mustard oil contains:

- **Erucic acid** (22-carbon monounsaturated fatty acid): 20–50% of total fatty acids; associated with cardiac lipidosis in animal studies.
- **Glucosinolates** in meal: cause goitre and depress growth in livestock.

Canola (coined in Canada) is defined as rapeseed/mustard with:

- $<$**2% erucic acid** in the oil ("00" = double zero designation for erucic acid).
- $<$**30 μmol/g glucosinolates** in air-dried, oil-free meal.

This "double-zero" (00) quality makes canola oil heart-healthy (high in oleic acid, low in erucic acid) and the meal suitable for livestock feed without glucosinolate toxicity. Indian canola varieties: Pusa Mustard-25, Pusa Double Zero Mustard-31.
Final Answer: Canola-quality rapeseed is defined as having less than 2% erucic acid in the oil and less than 30 μmol glucosinolates per gram in the meal, making both oil and meal safe for human and livestock use.

Answer: (C) Go Back to Q14

Q15.

Solution

Mechanism of Cry1Ac (Bt toxin) action:

(a) Bollworm larva ingests Bt cotton leaf containing Cry1Ac protoxin.

(b) Alkaline midgut (pH 9–10) of Lepidoptera activates and solubilises the protoxin.

(c) Gut proteases cleave the protoxin to active toxin fragment.

(d) Active toxin binds to **specific receptor proteins** (cadherin, aminopeptidase N, alkaline phosphatase) on the brush border membrane of midgut epithelial cells.

(e) Toxin monomers oligomerise and insert into the membrane, forming **ion channels (pores)**.

(f) Pore formation disrupts osmotic balance $\rightarrow$ cell swelling $\rightarrow$ lysis.

(g) Gut epithelium breaks down → larva stops feeding and dies within 24–48 hours.

Specificity: Cry1Ac is specific to Lepidoptera because (a) their gut pH is alkaline (needed for toxin activation), and (b) they express the specific receptor proteins. Mammals have acidic stomachs and lack these receptors. **Final Answer:** Cry1Ac binds specific receptors on the midgut epithelium of Lepidoptera, inserts into the membrane to form ion-channel pores, and causes cell lysis that kills the larva.

Answer: (A) Go Back to Q15

Q16.

Solution

Berseem (Trifolium alexandrinum), the Egyptian clover, is the **premier winter fodder crop** of India:

- Sowing: October–November.
- First cut: 45–50 days after sowing (when the crop is 25–30 cm tall).
- Subsequent cuts: every 25–30 days.
- Total cuts per season: **3–5 cuts** depending on irrigation, temperature, and management.
- Final cut: February–March before flowering.

Nutritional value: Crude protein 20–22%, highly palatable, improves milk production in dairy animals. Berseem also fixes atmospheric nitrogen (nodulation with Rhizobium trifolii), improving soil fertility. It is relatively free from bloat hazard compared to lucerne (alfalfa).

Option (C) 6–7 cuts is an overestimate for a single season. **Final Answer:** A well-managed berseem crop yields 3–5 cuts per winter season, with each cut taken every 25–30 days after an initial 45–50 day establishment period.

Answer: (D) Go Back to Q16

Q17.

Solution

Mango malformation is one of the most serious diseases of mango in India, first described in 1891 (Saharanpur):

- **Causal organism:** *Fusarium mangiferae* Britz, Wingfield & Marasas (teleomorph: *Gibberella mangiferae*).
- **Two forms:**
  - **Vegetative malformation (bunchy top):** Affects young seedlings; excessive proliferation of axillary buds → bunched, thick, shortened shoots with small, crowded leaves.
  - **Floral malformation:** More destructive; affected inflorescence becomes compact, malformed; flowers do not set fruit; inflorescence may remain greenish or become necrotic.
- **Spread:** Wind-borne conidia; infected planting material.
- **Management:** Pruning and burning infected parts; deblossoming young trees for 2–3 years; NAA (50 ppm) spray; fungicides (carbendazim).

Option (A) is the bacterium causing mango bacterial canker/spot, not malformation. **Final Answer:** Mango malformation disease is caused by the fungus *Fusarium mangiferae*, which converts inflorescence parts into sterile, compact malformed structures that bear no fruit.

Answer: (B) Go Back to Q17

Q18.

Solution

Citrus canker is a serious bacterial disease:

- **Pathogen:** *Xanthomonas axonopodis* pv. *citri* (syn. *X. citri* subsp. *citri*).
- **Symptoms:** Raised, corky, water-soaked lesions with yellow halo on leaves, twigs, and fruits; lesions are characteristically *crater-like* with a greasy margin.
- **Spread:** Wind-driven rain splash; contaminated tools; insects (citrus leafminer creates entry wounds).

Management:

- **Bordeaux mixture (1%)** — copper sulphate + calcium hydroxide (lime) in 1:1:100 ratio — is the standard copper bactericide; copper ions denature bacterial proteins.
- Copper oxychloride (0.3%) or fixed copper sprays are alternatives.
- Streptomycin sulphate alone has limited effect on *Xanthomonas* and is not the primary recommendation.
- Carbendazim and mancozeb are fungicides, not bactericides.

Final Answer: Bordeaux mixture (1% copper sulphate + lime) is the standard bactericide for citrus canker because copper ions denature the proteins of *Xanthomonas axonopodis* pv. *citri*.

Answer: (C) Go Back to Q18

Q19.

Solution

Karonda (*Carissa carandas* L.), family Apocynaceae:

- **Distribution:** Native to India; widely found in Rajasthan, especially arid and semi-arid zones (Barmer, Jaisalmer, Jodhpur belt).
- **Plant habit:** Thorny, evergreen shrub; excellent for live hedges and boundary planting.
- **Drought tolerance:** Extremely hardy; survives on minimal rainfall (200–300 mm); requires no irrigation once established.
- **Fruit nutrition:** Vitamin C content 9–10 mg/100 g (raw); significantly higher in immature fruits. Also contains iron.
- **Uses:** Immature fruits (sour, astringent) used for **pickles, chutney, jam, jelly, and syrup**; ripe fruits eaten fresh.

As a minor fruit crop native to the arid zone, karonda is promoted under wasteland horticulture programmes for Rajasthan. Options (B), (C), and (D) are factually incorrect. **Final Answer:** Karonda (*Carissa carandas*) is valued in Rajasthan's arid zone because it is extremely drought-tolerant, rich in Vitamin C, and its sour immature fruits are widely used for pickles and jam.

Answer: (A) Go Back to Q19

Q20.

Solution

Brinjal shoot and fruit borer (BSFB):

- **Scientific name:** *Leucinodes orbonalis* Guénée (Order: Lepidoptera, Family: Crambidae).
- **Damage:**
  - **On young plants:** Larvae bore into tender shoots; the shoot wilts and dries, forming a characteristic "dead heart" or withered shoot.
  - **On fruiting plants:** Larvae bore through calyx into fruit; the entry hole seals; fruit rots internally and becomes unmarketable.
- **Management (IPM):** Removal and destruction of infested shoots; pheromone traps; neem-based sprays; Bt (Bacillus thuringiensis) formulations; resistant varieties (including Bt brinjal, currently in trials in Bangladesh).

BSFB can cause 50–70% fruit damage if uncontrolled. Options (A), (B), and (C) are pests of other crops primarily, though some can occasionally attack brinjal. **Final Answer:** *Leucinodes orbonalis* (brinjal shoot and fruit borer) is the most serious pest of brinjal, boring into tender shoots to cause dead hearts and into fruits to cause internal rotting.

Answer: (D) Go Back to Q20

Q21.

Solution

Air layering (gooti/marcotting) procedure for guava, litchi, jackfruit:

(a) Select a healthy, semi-hardwood branch (pencil thickness).

(b) Make a **ring-bark incision**: remove a 2–3 cm ring of bark (phloem + cambium), exposing the wood.

(c) Allow drying for 24 hours to remove sap.

(d) Apply **IBA (Indole-3-butyric acid)** paste (3000–5000 ppm in lanolin or talc) to the ring-barked wound. IBA is the most effective auxin for adventitious root induction; it is more stable and less toxic than IAA.

(e) Wrap the wound tightly with moist **sphagnum moss** (or coir fibre), then cover with black polythene sheet tied at both ends to retain moisture.

(f) Roots develop in 4–8 weeks (visible through translucent polythene).

(g) Sever below the root ball; plant the new layer in a pot or nursery bed.

Gibberellic acid (GA_3) promotes stem elongation, not root initiation. Cytokinins and ethephon are not used for this purpose. **Final Answer:** Indole butyric acid (IBA) paste is applied to the ring-barked wound in air layering because it is the most stable and effective auxin for inducing adventitious root formation.

Answer: (B) Go Back to Q21

Q22.

Solution

Cumin (*Cuminum cyminum* L.) cultivation in Rajasthan:

- Rajasthan accounts for ∼80% of India's cumin area and production.
- **Major districts:** Barmer, Jodhpur, Jalore, Pali, Nagaur — all in the western arid zone.
- **Sowing time:** October–November (rabi crop); harvested March–April.
- **Climate requirement:** Cool dry weather; light sandy loam soil; cannot tolerate frost or heavy rains.
- **Disease:** Wilt (Fusarium oxysporum f.sp. cumini) and blight (Alternaria burnsii) are major constraints.
- **Varieties:** RZ-19, RZ-209, GC-4.

Options (A) Kota-Bundi-Jhalawar are in the Hadoti (high-rainfall) zone, unsuitable for cumin. Options (B) and (D) are in eastern/southern Rajasthan, not major cumin areas. **Final Answer:** Barmer, Jodhpur, and Jalore in the western arid zone account for the bulk of Rajasthan's cumin production, which represents about 80% of India's total cumin area.

Answer: (C) Go Back to Q22

Q23.

Solution

Mass selection:

- Applied to **cross-pollinated (outbreeding) crops** (maize, bajra, onion).
- Many superior phenotypic individuals are selected from a population and their seeds are bulked together.
- Improves population mean; maintains genetic diversity.
- Does not isolate genotypes; selection is based on phenotype of the whole population.

Pure line selection:

- Applied to **self-pollinated (inbreeding) crops** (wheat, rice, chickpea).
- A **single outstanding plant** is self-fertilised; its progeny (all genetically identical = pure line) is evaluated over generations.
- Exploits additive gene action; all variation within the pure line is environmental.
- Developed by Wilhelm Johannsen in 1903 using Princess bean (*Phaseolus vulgaris*).

Option (B) describes mass selection; (C) and (D) are incorrect. **Final Answer:** Pure line selection starts from a single self-fertilised plant in self-pollinated crops and produces genetically uniform progeny that exploit additive gene effects, unlike mass selection which improves cross-pollinated population means.

Answer: (A) Go Back to Q23

Q24.

Solution

Self-incompatibility (SI) prevents self-fertilisation in flowering plants:

Gametophytic SI (GSI):

- S-allele expressed in the pollen *tube* (gametophyte) after germination.
- Rejection occurs in the style if pollen tube and pistil share the same S-allele.
- Examples: Petunia, Nicotiana, Lycopersicon, Prunus.

Sporophytic SI (SSI):

- S-allele is expressed in the **pollen coat** proteins, deposited by the *tapetum* (sporophytic tissue of the anther wall) during pollen maturation.
- Rejection occurs at the **stigma surface** (before pollen germination).
- Dominance relationships between S-alleles exist (S1 may dominate S2 in pollen).
- Examples: **Brassica** (cabbage, radish, mustard, turnip), Ipomoea, Parthenium.
- Used extensively in **hybrid seed production** of cabbage, cauliflower, radish.

The key distinction: in SSI, the pollen behaviour is determined by the diploid sporophytic genotype, not by the haploid pollen nucleus. **Final Answer:** In sporophytic self-incompatibility, the S-allele is expressed in the pollen coat proteins deposited by the tapetum, so rejection is determined by the diploid sporophytic genotype at the stigma surface.

Answer: (D) Go Back to Q24

Q25.

Solution

Seed treatment fungicides are classified by their mode of penetration:

Contact (protective) fungicides:

- Thiram, captan, mancozeb, ferbam.
- Coat the seed surface; kill externally seed-borne fungi.
- Cannot penetrate the seed to reach internally-borne pathogens.

Systemic fungicides:

- **Carboxin** (oxathiin group) and **oxycarboxin** penetrate the seed coat and translocate into the embryo.
- Specifically active against **Basidiomycetes** (smut and rust fungi) by inhibiting complex II (succinate dehydrogenase) of the fungal electron transport chain.
- **Loose smut of wheat** (*Ustilago tritici*): mycelium is dormant inside the embryo — only a systemic seed treatment reaches it; contact fungicides are

ineffective.

- Dose: Carboxin 37.5% + thiram 37.5% WP (Vitavax Power) at 2.5 g/kg seed.

Final Answer: Carboxin is a systemic oxathiin fungicide that penetrates the seed coat to kill internally seed-borne pathogens such as *Ustilago tritici* (loose smut of wheat), which contact fungicides cannot reach.

Answer: (B) Go Back to Q25

Q26.

Solution

Glyphosate (Roundup) herbicide mechanism and resistance:

- Glyphosate inhibits **EPSPS (5-enolpyruvylshikimate-3-phosphate synthase)**, a key enzyme in the **shikimate pathway** that plants and microbes use to synthesise aromatic amino acids (Phe, Tyr, Trp). Mammals lack this pathway.
- Without Phe/Tyr/Trp, plants cannot make proteins, growth factors, or secondary metabolites $\rightarrow$ death.

Roundup Ready (RR) technology (Monsanto):

- A modified *EPSPS* gene (CP4 EPSPS) was isolated from *Agrobacterium tumefaciens* strain CP4.
- This CP4 EPSPS has very low affinity for glyphosate (1000$\times$ less sensitive) but retains normal enzyme activity.
- Transformed into soybean (and later maize, canola, cotton) via Agrobacterium-mediated transformation.
- RR soybean (event GTS 40-3-2): first commercially approved in 1996.

Options (A), (B), (D) describe mechanisms of other herbicide-tolerance traits. **Final Answer:** Roundup Ready soybean contains the CP4 EPSPS gene from *Agrobacterium* sp., which encodes a glyphosate-insensitive form of EPSPS that keeps the shikimate pathway functional despite herbicide application.

Answer: (C) Go Back to Q26

Q27.

Solution

Jassid (*Amrasca biguttula biguttula* Ishida), family Cicadellidae (leafhoppers):

- **Hosts:** Cotton (primary), okra, brinjal, sunflower.
- **Feeding:** Both nymphs and adults use stylet to pierce leaf underside and inject **salivary toxins** while sucking sap.
- **Damage (hopper burn):**
  - Leaf margins curl **upward** (reflexed), unlike thrips which cause downward rolling.
  - Margins turn yellow, then bronze/reddish-brown.
  - Severe infestation: entire leaf dries, plant stunted.
- **Distinction from thrips:** Thrips cause silvering of leaf surface with black faecal spots; leaf rolls downward.
- **ETL (Economic Threshold Level):** 2 jassids per leaf.
- **Management:** Imidacloprid 70 WS seed treatment; dimethoate or acephate foliar spray.

Final Answer: Jassid (*Amrasca biguttula biguttula*) causes hopper burn—upward curling and bronzing of cotton leaf margins—by injecting salivary toxins while sucking sap from the leaf underside.

Answer: (A) Go Back to Q27

Q28.

Solution

Hessian fly (*Mayetiola destructor* Say), family Cecidomyiidae (gall midges):

- **Distribution:** North America, Europe, North Africa, Middle East; introduced to India occasionally. Also reported in Pakistan wheat belt (adjacent to Rajasthan).
- **Life cycle:** Females lay eggs on upper leaf surface; neonate larvae crawl to base of tiller and wedge between the leaf sheath and stem.
- **Damage:**
  - **Fall generation:** Larvae feed on the stem base of young tillers → the

central shoot wilts and dies (**dead heart**).

- **Spring generation:** Larvae feed on the stem below the flag leaf → lodging (stem breaks at the feeding site, called "flaxseed stage").

- **Control:** Planting after "fly-free date" (after adult flight ends); **resistant varieties** (multiple H-gene resistance genes, e.g., H13, H26); avoiding early sowing.

Final Answer: Hessian fly larvae wedge at the base of wheat tillers and feed on stem tissue, cutting off the water supply to the central shoot and causing the characteristic dead-heart symptom.

Answer: (D) Go Back to Q28

Q29.

Solution

Desert locust (*Schistocerca gregaria* Forskål):

- **Distribution:** Africa, Middle East, South Asia; enters Rajasthan via Pakistan (Thar Desert).
- **Biology:** Solitary phase (harmless) and **gregarious phase** (swarming, highly destructive). Gregarisation triggered by high population density and crowding; physical contact with other locusts increases serotonin, causing behavioural and morphological changes.
- **Damage:** Adult swarm can eat its own weight in one day; one km^2 swarm (40 million locusts) consumes ~35 tonnes of food/day.

Control in Rajasthan (NMLD — National Locust Warning Organisation, Jodhpur):

- **Aerial ULV (ultra-low volume) spraying** with **malathion** (85% technical grade) or chlorpyrifos from aircraft/helicopters for large swarms.
- Ground ULV spraying with vehicle-mounted sprayers for hopper bands.
- Malathion is preferred because it is broad-spectrum, relatively short residual, and approved by FAO.

Final Answer: Aerial ULV spraying with malathion or chlorpyrifos is the primary chemical control measure against desert locust swarms and hopper bands in Rajasthan, coordinated by the National Locust Warning Organisation.

Answer: (B) Go Back to Q29

Q30.

Solution

Green ear disease (downy mildew) of pearl millet:

- **Causal organism:** *Sclerospora graminicola* (Sacc.) Schroet.; obligate biotrophic oomycete.
- **Symptoms:**
  - **Green ear (phyllody):** The most characteristic symptom; floral parts (glumes, stamens, pistils) of the panicle are converted into **leaf-like (phylloid) structures** — hence "green ear." No grain forms.
  - **Downy mildew on leaves:** White to purple downy sporulation (sporangiophores + sporangia) on the lower leaf surface.
  - Infected plants may be stunted (tillering upsurge — "crazy tillers").
- **Disease cycle:** Oospores persist in soil for years; systemic infection via seedling roots; conidial spread during the season.
- **Management:** Metalaxyl (Apron 35 SD) seed treatment; resistant hybrid HHB-67 improved.

Final Answer: *Sclerospora graminicola* (downy mildew) causes green ear disease of pearl millet by systemically infecting the plant and converting floral parts into leaf-like phylloid structures that produce no grain.

Answer: (C) Go Back to Q30

Q31.

Solution

Tomato leaf curl virus (ToLCV), family Geminiviridae, genus Begomovirus:

- **Symptoms:** Severe upward curling and distortion of leaves; yellowing; stunted growth; flower and fruit drop; total crop loss possible.
- **Vector:** ***Bemisia tabaci*** (Gennadius) biotype B/Q — the silverleaf or tobacco whitefly.
  - Transmission type: **Persistent circulative** (also called propagative for some strains); the virus circulates through the vector's haemolymph and salivary glands.
  - Acquisition access period: 15–30 minutes; latent period: 8–24 hours; inoculation access period: 30 minutes.

  - Single viruliferous whitefly can infect a plant; once acquired, vector remains viruliferous for life.

- **Management:** Yellow sticky traps; reflective silver mulch; neem-based sprays; systemic insecticides (imidacloprid, thiamethoxam) for vector control; resistant variety TH-1 (ToLCV tolerant).

Final Answer: *Bemisia tabaci* transmits Tomato leaf curl virus in a persistent circulative manner, remaining viruliferous for life after acquiring the begomovirus through phloem feeding.

Answer: (A) Go Back to Q31

Q32.

Solution

Contact insecticides:

- Kill insects by direct physical contact with the insecticide film on the plant surface or insect body.
- Not absorbed into plant tissue.
- Examples: Malathion, chlorpyrifos, endosulfan, pyrethroids.
- Effective against surface-feeding insects; ineffective against hidden feeders (borers) or sap-suckers feeding via stylets.

Systemic insecticides:

- Absorbed through roots, stems, or leaves; translocated via xylem (acropetal) or phloem (basipetal).
- Examples: **Imidacloprid** (neonicotinoid), dimethoate, acephate, thiamethoxam.
- Effective against **sucking insects** (aphids, jassids, whiteflies, thrips) and insects feeding on internal plant tissue.
- Imidacloprid: nicotinic acetylcholine receptor agonist; applied as seed treatment (0.3 ml/kg) or soil drench.

Option (C) is partially incorrect — some systemics are also effective against chewing pests. **Final Answer:** Systemic insecticides such as imidacloprid are absorbed and translocated inside the plant to kill sap-feeding pests, whereas contact insecticides such as malathion kill only insects that directly touch the treated surface.

Answer: (D) Go Back to Q32

Q33.

Solution

Rathi cattle (also spelled Rathi):

- **Origin/distribution: Bikaner, Sri Ganganagar, Hanumangarh** districts of northern Rajasthan; named after the Rath area.
- **Type:** Dual-purpose (milk + moderate draft); considered one of the best **dairy breeds** of the desert.
- **Appearance:** Brown or grey coat, sometimes with white patches; medium-sized.
- **Genetic background:** Believed to be a crossbreed of **Sahiwal** (from Punjab) and **local Thar desert cattle**; this gives it both heat tolerance and reasonable milk production.
- **Milk yield:** 1200–1800 litres per lactation under village conditions; up to 3000 litres under improved management.
- **Adaptability:** Highly adapted to hot, arid conditions; can thrive on sparse desert vegetation.

Options (A), (C), (D) give incorrect locations and attributes for Rathi. **Final Answer:** The Rathi breed, centred in Bikaner and Sri Ganganagar, is Rajasthan's premier desert dairy cattle breed, yielding 1200–1800 litres per lactation while thriving in hot, arid conditions.

Answer: (B) Go Back to Q33

Q34.

Solution

Kankrej cattle:

- **Origin:** Kankrej taluka of Banaskantha district, Gujarat; extends into the Barmer–Jalore belt of southwest Rajasthan.
- **Synonyms:** Wagad (in some parts of Gujarat), Waged, Nagar, Talabda.
- **Type:** Heavy dual-purpose breed — **excellent draft animal** (used for heavy cart work, deep tillage) and moderate dairy.

- **Physical features:**
  - **Horns:** Large, **lyre-shaped**, curving outward, upward, and inward — very distinctive.
  - Silver-grey to iron-grey coat; large pendulous dewlap; massive hindquarters.
- **Milk yield:** 1300–2000 litres/lactation; fat 3.5–4%.
- **Bulls:** Highly prized as draft animals; can pull heavy loads over long distances.
- Famous exported to Brazil as the Guzerat breed.

Final Answer: Kankrej (also called Wagad) is a heavy dual-purpose breed from the Gujarat–Rajasthan border, prized for exceptional draft power and identified by its distinctive large lyre-shaped horns.

Answer: (C) Go Back to Q34

Q35.

Solution

Chokla sheep (also called Shekhawati or Rajasthan Merino):

- **Distribution:** Sikar, Churu, Jhunjhunu, Nagaur districts of Shekhawati region, Rajasthan.
- **Wool type: Fine apparel wool**; staple length 6–9 cm; fleece weight 1.0–1.5 kg; crimped fibres.
- **Uses:** Wool is woven into **kamblis** (woollen blankets), shawls, and warm clothing — traditional craft of the Shekhawati region.
- **Comparison with other Rajasthan sheep breeds:**
  - **Nali:** Carpet-quality coarse wool (Ganganagar area).
  - **Marwari:** Coarse wool + meat; extremely hardy desert breed.
  - **Malpura:** Medium wool + meat; Tonk, Jaipur area.

The Chokla breed is closest to Indian Merino in fibre fineness and is considered the finest wool breed of Rajasthan. Option (C) describes Nali sheep; option (B) is incorrect for Chokla. **Final Answer:** Chokla sheep produce fine, crimped apparel wool that is woven into traditional kambli blankets and woollen products in the Shekhawati region of Rajasthan.

Answer: (A) Go Back to Q35

Q36.

Solution

Kadaknath (also Kali Masi):

- **Origin:** Jhabua and Dhar districts of Madhya Pradesh; also found in Chhattisgarh and adjacent tribal areas.
- **Unique characteristic:** The breed exhibits **fibromelanosis** — extensive black pigmentation (eumelanin) of feathers, skin, beak, toes, internal organs, and **meat**. This is due to dermal hyperpigmentation.
- **Nutritional value of meat:** Protein content 25–27% (higher than commercial broilers at 18–20%); fat content very low (0.73–1.05%); ash content higher; iron-rich.
- **Egg production:** 80–100 eggs/year (low, like most desi breeds); eggs with light brown/cream shell.
- **Cultural significance:** Used in tribal rituals; meat believed to have medicinal properties in traditional medicine; commands very high market price (Rs.800–1500/kg).
- Other important desi breeds: Aseel (fighting breed, Punjab/UP/AP), Ghagus (Andhra Pradesh).

Final Answer: Kadaknath (Kali Masi) is uniquely characterised by fibromelanosis—extensive black pigmentation of its feathers, skin, internal organs, and meat—combined with high protein and very low fat content.

Answer: (D) Go Back to Q36

Q37.

Solution

In agricultural economics, costs of production are classified as:

Fixed costs (overhead costs):

- Do not change with level of output in the short run.
- Examples: Land rent, depreciation on machinery, interest on fixed capital, permanent labour wages, irrigation infrastructure.

- Incurred even if no crop is grown.

Variable costs (paid-out costs / operating costs):

- **Change with the level of production** — if more area is cultivated or more input is applied, these costs increase.
- Examples: **Seed, fertilisers (chemical and organic), pesticides, hired labour (seasonal), irrigation water charges (per application), fuel and oil for machinery use.**
- These are the "cash costs" a farmer must pay out each season.

Option (A) — depreciation is a fixed cost. Option (C) — fixed annual land rent is a fixed cost. Option (D) — interest on fixed investment is a fixed cost. Only option (B) lists genuinely variable cost components. **Final Answer:** Costs of seeds, fertilisers, and hired seasonal labour are variable costs because they increase directly with the level of crop production, unlike fixed costs such as land rent or machinery depreciation.

Answer: (B) Go Back to Q37

Q38.

Solution

Apni Mandi (Rajasthan):

- **Concept:** A **direct marketing** initiative where farmers bring their fresh produce (fruits, vegetables, cereals, pulses) to designated weekly market sites in urban/semi-urban areas and sell **directly to consumers**.
- **Benefits:**
  - Farmers receive higher prices by eliminating multiple layers of middlemen (commission agents, wholesalers, retailers).
  - Consumers get fresh produce at lower prices than retail markets.
- **Rajasthan's pioneering role:** Rajasthan launched this scheme in **1987**, making it one of the earliest direct-marketing initiatives in India. It inspired similar schemes in other states (Punjab's Apni Mandi, Haryana's Apni Mandi).
- Farmers are allotted stalls/spaces and are exempt from APMC mandi fees for produce sold through Apni Mandi.

Options (A), (B), and (D) are incorrect descriptions of Apni Mandi. **Final Answer:** Apni Mandi, launched in Rajasthan in 1987, is a direct marketing scheme that allows farmers to sell fresh produce directly to consumers at designated weekly market sites, eliminating middlemen.

Answer: (C) Go Back to Q38

Q39.

Solution

Rashtriya Krishi Vikas Yojana (RKVY):

- **Launched:** 2007-08 (during the 11th Five Year Plan) by the Government of India.
- **Ministry:** Ministry of Agriculture & Farmers Welfare.
- **Rationale:** The share of agriculture in state plans had been declining. RKVY incentivised states to **increase their own plan expenditure on agriculture** beyond the baseline (average of previous 3 years) by providing 100% central grants.
- **Key features:**
  - Centrally Sponsored Scheme (CSS) with 60:40 central:state sharing (100% central for NE states).
  - States have flexibility to plan based on their own Agricultural Plans (District Agriculture Plans aggregated into State Agriculture Plans).
  - Covers agriculture, horticulture, animal husbandry, fisheries, dairy, and allied sectors.
- **Revised as RKVY-RAFTAAR** (Remunerative Approaches for Agriculture and Allied sector Rejuvenation) in 2017-18, adding agri-entrepreneurship and FPO promotion.

Final Answer: RKVY, launched in 2007-08 during the 11th Plan, provides 100% central grants to incentivise states to raise their own plan expenditure on agriculture and allied sectors above the preceding baseline.

Answer: (A) Go Back to Q39

Q40.

Solution

Method Demonstration:

- Shows farmers **how to do something** — a specific operation or skill (e.g., how to apply fertiliser, how to prepare Bordeaux mixture, how to graft a plant).
- Short duration (a few hours); done at a convenient location.
- Teaches a **technique or procedure**, step by step.
- Audience: a group of farmers.

Result Demonstration:

- Shows farmers **what a new practice or technology achieves** — compares a **new/recommended practice** (treatment plot) side-by-side with the farmer's **traditional practice** (check plot) on the farmer's own field.
- Duration: **entire crop season**.
- The farmer sees the actual yield difference at harvest; this is the most convincing way to overcome resistance to change.
- Types: Individual farmer's field (most effective), group demonstration, block/village-level demonstration.
- Considered the most important single-contact method in agricultural extension.

Option (A) reverses the definitions. Options (B) and (C) are incorrect. **Final Answer:** A result demonstration compares a new recommended practice against the farmer's traditional practice over a full crop season on the farmer's own field, while a method demonstration teaches how to perform a specific operation step-by-step in a short session.

Answer: (D) Go Back to Q40

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	A	4	D	5	B
6	C	7	A	8	D	9	B	10	C
11	A	12	D	13	B	14	C	15	A
16	D	17	B	18	C	19	A	20	D
21	B	22	C	23	A	24	D	25	B
26	C	27	A	28	D	29	B	30	C
31	A	32	D	33	B	34	C	35	A
36	D	37	B	38	C	39	A	40	D