Rajasthan JET Agriculture Sample Paper-12

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. When a well-drained soil is submerged for rice cultivation, the soil redox potential (Eh) progressively falls. The electron acceptors are reduced in which thermodynamic sequence?

(A) Mn^{4+} is reduced first, followed by O_2, then NO_3^-, and finally SO_4^{2-}

(B) SO_4^{2-} is reduced before NO_3^- because sulphur is more abundant in soil

(C) $O_2 \rightarrow NO_3^- \rightarrow Mn^{4+} \rightarrow Fe^{3+} \rightarrow SO_4^{2-} \rightarrow CO_2$, in order of decreasing redox potential

(D) All electron acceptors are reduced simultaneously the moment flooding begins

Q2. Magnesium (Mg) deficiency in crops first appears as interveinal chlorosis of the older (lower) leaves. The correct reason is:

(A) Mg is a fixed component of the cytochrome chain and is completely immobile in the plant

(B) Mg is the central atom of the chlorophyll molecule and is phloem-mobile, so it is retranslocated from old leaves to young growing leaves under deficiency

(C) Mg deficiency affects only leaves exposed to direct sunlight, regardless of leaf age

(D) Mg is needed for nitrate reduction and therefore accumulates only in the youngest tissue

Q3. Saturated hydraulic conductivity of a soil is best defined as:

(A) The rate of water movement through a saturated soil per unit hydraulic gradient (Darcy's law); highest in sandy soils and lowest in compacted clays

(B) The maximum amount of water a soil can retain against the force of gravity

(C) The upward movement of water by capillary rise above the water table

(D) The volume of macropores expressed as a percentage of total porosity

Q4. The central principle of Integrated Nutrient Management (INM) is:

(A) Complete replacement of all chemical fertilizers with farmyard manure

(B) Applying only the single most limiting nutrient identified by soil testing

(C) Using the maximum possible dose of NPK to guarantee the highest yield

(D) Combining chemical fertilizers, organic manures, and biofertilizers in a balanced, need-based way to sustain soil health and improve nutrient-use efficiency

Q5. Di-ammonium phosphate (DAP) carries the fertilizer grade 18-46-0. If a farmer applies 100 kg of DAP per hectare, the nutrients supplied are:

(A) 46 kg N and 18 kg P_2O_5

(B) 18 kg N and 46 kg P_2O_5

(C) 18 kg N and 46 kg of elemental phosphorus (P)

(D) 100 kg N and 0 kg P_2O_5

Q6. In fertigation, soluble fertilizers are delivered through a drip irrigation network. The device most commonly used to introduce the fertilizer stock solution into the pressurised line is:

(A) A cyclone sand separator installed after the emitters

(B) A pressure-compensating dripper fixed at each plant

(C) A venturi injector (or a fertilizer injection pump) that draws/forces the stock solution into the pressurised line

(D) A gravity-fed overhead sprinkler nozzle

Q7. In a dryland tract of Rajasthan where the onset of the monsoon is delayed by 4–5 weeks, the most appropriate contingency crop-planning strategy is to:

(A) Continue sowing the originally planned long-duration crop at the full seed rate

(B) Leave the land completely fallow for the whole kharif season

(C) Increase the depth of irrigation to compensate for the delayed rainfall

(D) Switch to short-duration, drought-escaping crops such as moth bean, cluster bean, or short-duration bajra, and adjust the agronomy to the shortened season

Q8. Potassium-mobilizing bacteria (e.g., *Frateuria aurantia*, *Bacillus mucilaginosus*) used as biofertilizers benefit crops by:

(A) Releasing potassium from insoluble soil minerals such as mica and feldspar into plant-available form through secretion of organic acids

(B) Fixing atmospheric potassium gas directly into the soil

(C) Converting ammonium to nitrate in the rhizosphere

(D) Decomposing cellulose to release carbon dioxide for photosynthesis

Q9. Durum wheat (*Triticum durum*) differs from common bread wheat (*T. aestivum*) in that it is:

(A) A hexaploid wheat used chiefly for making soft chapatis

(B) A tetraploid wheat with hard, amber grain rich in gluten, used for semolina (suji), pasta, and macaroni

(C) A diploid einkorn wheat grown only as a fodder crop

(D) A wheat species that cannot be grown in Rajasthan owing to heat sensitivity

Q10. The high sugar content and delayed conversion of sugar to starch in sweet corn is controlled by:

(A) The opaque-2 gene, which governs lysine content

(B) Triploidy induced by colchicine treatment of the seed

(C) The recessive sugary (*su*) / shrunken (*sh2*) genes, which block or slow starch synthesis in the endosperm

(D) A dominant gene producing waxy (amylopectin-only) starch

Q11. Lentil (Masoor, *Lens culinaris*) is correctly described as:

(A) A self-pollinated rabi pulse rich in protein, having microsperma (small-seeded) and macrosperma (bold-seeded) types

(B) A kharif legume grown mainly for green fodder

(C) A cross-pollinated oilseed belonging to the Brassica family

(D) A tuber crop propagated only by vegetative means

Q12. Safflower (*Carthamus tinctorius*) is valued as a rabi oilseed in dryland areas mainly because it:

(A) Is a short-duration kharif crop highly tolerant of waterlogging

(B) Produces the alkaloid ricin in its seed for industrial use

(C) Needs heavy irrigation and only deep black-cotton soil

(D) Is highly drought-hardy with a deep taproot, thrives on residual soil moisture, and yields oil rich in polyunsaturated (linoleic) fatty acid

Q13. The Bajra–Napier hybrid (e.g., CO-4, APBN-1) is a popular fodder crop because it is:

(A) An annual legume that fixes atmospheric nitrogen in root nodules

(B) A fast-growing, high-biomass perennial grass giving multiple cuts per year with very high green-fodder yield

(C) A grain crop grown only for human food, not for fodder

(D) A grass containing very high HCN, making it toxic at every growth stage

Q14. The High Density Planting System (HDPS) in cotton aims to:

(A) Use widely spaced, long-duration hybrids with very heavy fertilization

(B) Grow cotton exclusively under protected polyhouse conditions

(C) Use short-duration compact varieties at close spacing with a high plant population to raise per-hectare yield, especially in rainfed tracts

(D) Reduce the plant population to one-tenth of normal to economise on seed

Q15. The edible "fruit" of fig (*Ficus carica*) is botanically a:

(A) Syconium — a fleshy, hollow receptacle bearing numerous tiny flowers/achenes on its inner wall

(B) Pome, like the apple

(C) Drupe, like the mango

(D) True berry, like the grape

Q16. For potato planting, freshly harvested seed tubers must first break their dormancy and well-sprouted tubers are preferred because:

(A) Potato is normally propagated through true botanical seed, not tubers

(B) Cut tubers must never be treated and should be planted whole irrespective of size

(C) Tuber dormancy in potato normally lasts for 2–3 years

(D) Freshly harvested tubers possess an innate dormancy of 6–10 weeks that must end before sprouting; using well-sprouted seed tubers ensures rapid, uniform field emergence

Q17. Garlic (*Allium sativum*) is commercially propagated by:

(A) True seeds, which it produces abundantly after flowering

(B) Stem cuttings rooted in coarse sand

(C) Cloves — the individual segments of the bulb planted as vegetative propagules

(D) Tissue-cultured plantlets only, as garlic never forms cloves

Q18. Successful cultivation of ginger (*Zingiber officinale*) requires:

(A) Full open sunlight, sandy desert soil, and minimum organic matter

(B) A warm, humid climate with partial shade, well-drained soil rich in organic matter, propagated by rhizome bits (setts)

(C) Saline, waterlogged soils for maximum rhizome yield

(D) Propagation strictly through seed sown in raised nursery beds

Q19. Standard practices in commercial rose cultivation are:

(A) Annual pruning to remove old/weak wood and encourage new flowering shoots, with improved varieties budded onto a hardy rootstock such as *Rosa indica*

(B) No pruning at all, since roses flower best on their oldest wood

(C) Propagation only through true seed to ensure uniformity

(D) Grafting the rose scion onto a citrus rootstock for extra vigour

Q20. Auxins such as IBA and NAA are applied to the basal cut end of stem cuttings primarily to:

(A) Prevent the mother plant from flowering prematurely

(B) Increase the sugar (carbohydrate) content of the cutting

(C) Sterilise the soil and kill pathogens around the cutting

(D) Stimulate adventitious root initiation, thereby improving rooting percentage and the number of roots

Q21. Which statement about climacteric and non-climacteric fruits is correct?

(A) Non-climacteric fruits such as banana and mango show a sharp respiratory peak and ripen fully after harvest

(B) Climacteric fruits (banana, mango, papaya) show a respiratory burst and a surge of ethylene and can ripen after harvest, whereas non-climacteric fruits (citrus, grape) do not ripen further once detached

(C) Both groups ripen identically and neither responds to ethylene

(D) Ethylene plays no role in the ripening of any fruit

Q22. Raising vegetable seedlings in pro-trays (plug trays) filled with coco-peat and then "hardening" them before transplanting achieves:

(A) Permanent dwarfing of the resulting crop

(B) Conversion of an annual crop into a perennial one

(C) Healthy, uniform, disease-free seedlings with an intact root ball that are gradually acclimatised to field conditions, reducing transplant shock

(D) Complete elimination of the need for any irrigation after transplanting

Q23. Clonal selection is the method of choice for the improvement of:

(A) Self-pollinated seed crops such as wheat and rice

(B) Cross-pollinated grain crops through repeated selfing

(C) Crops that reproduce exclusively through true seed

(D) Vegetatively (asexually) propagated crops such as sugarcane, potato, and banana, where a superior clone is selected and multiplied while keeping the genotype intact

Q24. Which statement about induced mutation breeding is correct?

(A) Gamma rays and X-rays are physical mutagens, while EMS (ethyl methane sulphonate) is a chemical mutagen; Sharbati Sonora wheat was developed by gamma irradiation of Sonora-64

(B) EMS is a physical mutagen, whereas gamma rays act as chemical mutagens

(C) Mutation breeding can only reduce, and never increase, the available genetic variability

(D) Mutagens are effective only on cross-pollinated crops

Q25. Somaclonal variation refers to:

(A) Variation that can be created only through conventional cross-hybridisation

(B) The encapsulation of somatic embryos in calcium alginate to form synthetic seed, involving no genetic change

(C) The genetic/epigenetic variation arising among plants regenerated from cell or callus culture, sometimes exploited to select novel useful variants

(D) Seasonal differences within a single clone caused only by weather

Q26. The Seed Replacement Rate (SRR) is:

(A) The rate at which one variety is replaced by a newer variety in research trials

(B) The percentage of total cropped area sown with certified/quality seed instead of farm-saved seed; it is raised through schemes such as the Seed Village Programme

(C) The germination percentage recorded for a given seed lot

(D) The number of irrigations a seed crop receives before sowing

Q27. The mango hopper (*Idioscopus/Amritodus* spp.) is a serious pest of mango because:

(A) Nymphs and adults suck sap from the inflorescence, causing flower and fruit drop, and excrete honeydew that promotes sooty mould, reducing photosynthesis

(B) Its larvae bore into the mango trunk and kill the tree

(C) It is a soil grub that feeds on the mango root system

(D) It defoliates the tree by chewing the leaves like a caterpillar

Q28. Damage to stored gram and other pulses by the pulse beetle (*Callosobruchus chinensis*) is characterised by:

(A) Damage strictly confined to the standing field crop and never in storage

(B) Adults boring deep tunnels through wooden grain bins

(C) Being a pest of cereals only, never attacking pulses

(D) Grubs developing inside the seed and adults emerging through characteristic round "window" exit holes, rendering pulses unfit for use

Q29. Black (stem) rust of wheat, caused by *Puccinia graminis* tritici, is notable for:

(A) Producing yellow stripes of uredia arranged in neat lines on the leaves only

(B) Forming dark reddish-brown to black pustules (uredia and telia) chiefly on the stem and leaf sheath, with barberry as its alternate (aecial) host

(C) Being a soil-borne vascular wilt fungus

(D) Being a seed-borne loose smut that destroys the ear head

Q30. Red rot of sugarcane, caused by *Colletotrichum falcatum*, is diagnosed by:

(A) A white powdery fungal growth coating the upper leaf surface

(B) A black smut whip emerging from the growing point of the cane

(C) Reddened internal tissue of the split cane interrupted by crosswise white patches, accompanied by a sour, alcoholic smell

(D) Water-soaked angular leaf spots typical of a bacterial disease

Q31. Gummosis (foot rot) of citrus, caused by *Phytophthora* spp., is best managed by:

(A) Planting deeply so that the bud union lies well below the soil surface

(B) Giving frequent flood irrigation right up to the trunk

(C) Using only susceptible sweet-orange seedling rootstock

(D) Using resistant rootstocks (e.g., rough lemon, Rangpur lime), avoiding water stagnation near the collar, and treating lesions with Bordeaux paste or metalaxyl

Q32. Root-knot nematode (*Meloidogyne* spp.) infestation, which produces characteristic galls/knots on roots, is best managed by:

(A) Crop rotation with non-host crops, resistant varieties, soil solarisation, and antagonistic plants such as marigold

(B) Spraying systemic fungicides repeatedly on the foliage

(C) Heavily increasing nitrogen fertilisation so the crop outgrows the damage

(D) Keeping the field permanently flooded to drown the larvae

Q33. The Hariana breed is best described as:

(A) A pure exotic dairy breed imported from the Netherlands

(B) An important indigenous dual-purpose (milch and draught) zebu cattle breed of the Haryana region; white-grey in colour, with bullocks prized for fast road work

(C) A buffalo breed native to coastal Gujarat

(D) A fine-wool sheep breed of arid Rajasthan

Q34. Among Indian buffalo breeds, the Jaffarabadi is noted for being:

(A) The smallest and lowest-yielding buffalo breed of India

(B) A riverine breed of Punjab with tightly curled horns

(C) One of the heaviest and largest buffalo breeds, native to the Gir/Saurashtra region of Gujarat, with massive drooping horns

(D) A swamp buffalo of the north-east used only for draught

Q35. Vanaraja is:

(A) A high-yielding exotic White Leghorn layer strain

(B) A pure broiler breed reared only in environment-controlled sheds

(C) A breed of turkey developed for the festive meat market

(D) A dual-purpose, multi-coloured chicken variety developed for backyard/free-range rural rearing, hardy and yielding both eggs and meat

Q36. Haemorrhagic Septicaemia (HS) in cattle and buffalo is:

(A) An acute bacterial disease caused by *Pasteurella multocida*, common in the monsoon, with high fever, swelling of the throat and brisket, and respiratory distress; prevented by annual pre-monsoon vaccination

(B) A viral disease producing blisters in the mouth and on the feet

(C) A tick-borne protozoan disease causing red-coloured urine

(D) A nutritional disorder arising from calcium deficiency at calving

Q37. In agricultural marketing, the term “price spread” refers to:

(A) The difference between the Minimum Support Price and the open-market price

(B) The variation in a commodity's price from one year to the next

(C) The difference between the price paid by the consumer and the price received by the farmer — that is, the total marketing margin taken by intermediaries

(D) The premium paid for graded produce over ungraded produce

Q38. The Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) primarily aims to:

(A) Provide crop insurance cover against natural calamities

(B) Expand assured irrigation ("Har Khet Ko Pani") and improve on-farm water-use efficiency through micro-irrigation under its "Per Drop More Crop" component

(C) Give direct income support of Rs. 6000 per year to farmer families

(D) Create a single unified national online market for agricultural produce

Q39. Under the interest subvention scheme, short-term crop loans up to Rs. 3 lakh are available to farmers at an effective concessional interest rate of about:

(A) 0% irrespective of the borrower's repayment behaviour

(B) 12% with no rebate of any kind

(C) 9% along with a penalty for early repayment

(D) 4% per annum for farmers who repay promptly (7% base rate, 2% subvention, plus a 3% prompt-repayment incentive), since agriculture is a priority sector for bank lending

Q40. The Farmers' Field School (FFS) approach to agricultural extension is characterised by:

(A) Season-long, hands-on group learning in the field, where farmers observe, experiment (e.g., agro-ecosystem analysis), and make their own crop-management decisions — an approach widely used for IPM

(B) One-way lecturing broadcast to farmers from a central studio

(C) Free distribution of inputs to farmers without any associated training

(D) A single demonstration plot managed entirely by scientists with no farmer participation

Detailed Solutions

Q1.

Solution

When a soil is flooded, oxygen diffusion virtually stops (diffusion of O_2 in water is about 10,000 times slower than in air). Facultative and obligate anaerobic microbes then use other oxidised compounds as terminal electron acceptors for respiration, and they do so in a strict thermodynamic order — the acceptor giving the most energy (highest redox potential) is used first.

Sequence of reduction as Eh falls:

(a) **O_2** disappears first (Eh about +330 mV)

(b) **NO_3^-** $\rightarrow N_2/N_2O$ (denitrification, Eh about +220 mV)

(c) **Mn^{4+}** $\rightarrow Mn^{2+}$ (Eh about +200 mV)

(d) **Fe^{3+}** $\rightarrow Fe^{2+}$ (Eh about +120 mV) — gives the grey, gleyed colour

(e) **SO_4^{2-}** $\rightarrow S^{2-}/H_2S$ (Eh about -150 mV) — rotten-egg smell

(f) **CO_2** $\rightarrow CH_4$ (methanogenesis, Eh below -200 mV)

Why the other options are wrong:

- (A) places Mn^{4+} before O_2, which is thermodynamically impossible — O_2 is always reduced first
- (B) sulphate is reduced much later than nitrate; abundance does not decide the order, redox potential does
- (D) the reductions are sequential, not simultaneous; each begins only after the previous acceptor is largely exhausted

Final Answer: As Eh falls in a submerged soil, electron acceptors are reduced in the order $O_2 \rightarrow NO_3^- \rightarrow Mn^{4+} \rightarrow Fe^{3+} \rightarrow SO_4^{2-} \rightarrow CO_2$, i.e., in order of decreasing redox potential.

Answer: (C) Go Back to Q1

Q2.

Solution

Magnesium is the **central metal atom of the chlorophyll molecule** (one Mg^{2+} ion sits at the centre of the porphyrin ring of every chlorophyll a and b molecule). It is also a cofactor for many enzymes (e.g., RuBisCO activation, ATP-utilising reactions).

Why the symptom shows on OLD leaves first:

- Mg is a **phloem-mobile** nutrient
- Under deficiency, the plant retranslocates Mg from older, mature leaves to the young, actively growing leaves and meristems
- The old leaves are therefore depleted first, losing chlorophyll between the veins while the veins stay green — classic **interveinal chlorosis** of lower leaves, sometimes followed by reddish-purple tints

Mobile vs immobile nutrients (deficiency location):

- **Mobile** (N, P, K, Mg) — deficiency appears on *older* leaves
- **Immobile** (Ca, S, Fe, B, Zn, Mn, Cu) — deficiency appears on *young* leaves

Why the other options are wrong:

- (A) Mg is not a part of cytochrome (that contains Fe), and it is mobile, not immobile
- (C) the symptom depends on leaf age and Mg redistribution, not on sun exposure
- (D) nitrate reduction needs molybdenum; Mg does not preferentially accumulate in young tissue under deficiency — the opposite happens

Final Answer: Mg deficiency shows first on older leaves because Mg is the central atom of chlorophyll and is phloem-mobile, so the plant moves it out of old leaves to supply young growing leaves.

Answer: (B) Go Back to Q2

Q3.

Solution

Saturated hydraulic conductivity (K_{sat}) quantifies how readily water moves through a soil that is fully saturated, and it is the proportionality constant in **Darcy's law**:

$$q = -K_{sat}\frac{dH}{dx}$$

where q is the flux (flow per unit area) and dH/dx is the hydraulic gradient.

Key points:

- It is a *rate* (e.g., cm/hr), describing water flow per unit hydraulic gradient
- Depends mainly on pore size and continuity: large, continuous macropores conduct water fast
- **Sandy soils** (large pores) have high K_{sat}; **compacted clays** (fine, discontinuous pores) have very low K_{sat}
- Governs internal drainage, leaching, and the risk of waterlogging

Why the other options are wrong:

- (B) describes **field capacity** / water-holding capacity, not conductivity
- (C) describes **capillary rise**, an unsaturated upward movement
- (D) describes the relative macroporosity, a structural property, not the flow rate

Final Answer: Saturated hydraulic conductivity is the rate of water movement through saturated soil per unit hydraulic gradient (Darcy's law) — high in sands and low in compacted clays.

Answer: (A) Go Back to Q3

Q4.

Solution

Integrated Nutrient Management (INM) is the judicious, balanced, and need-based use of **all available sources of plant nutrients** so that crop productivity is sustained without degrading the soil.

The three pillars of INM:

- **Chemical fertilizers:** supply concentrated, readily available N, P, K and mi-

cronutrients

- **Organic manures:** FYM, compost, vermicompost, green manure — improve soil structure, supply micronutrients, feed soil microbes
- **Biofertilizers:** *Rhizobium*, *Azotobacter*, PSB, mycorrhiza — biologically add/mobilise nutrients

Objectives:

- Maintain soil fertility and a positive nutrient balance
- Improve fertilizer-use efficiency and reduce losses (leaching, volatilisation)
- Cut input cost and reduce environmental pollution

Why the other options are wrong:

- (A) INM does not eliminate chemical fertilizers; it integrates them with organics
- (B) that describes a single-nutrient corrective approach, not integration
- (C) using maximum NPK is wasteful, pollutes, and damages soil — the opposite of INM

Final Answer: INM means combining chemical fertilizers, organic manures, and biofertilizers in a balanced, need-based manner to sustain soil health and raise nutrient-use efficiency.

Answer: (D) Go Back to Q4

Q5.

Solution

A fertilizer **grade** states the guaranteed percentage of N : P_2O_5 : K_2O by weight, in that fixed order.

For DAP, grade = 18-46-0:

- 18% N
- 46% P_2O_5
- 0% K_2O

Calculation for 100 kg DAP:

$$\text{N} = 100 \times \frac{18}{100} = 18 \text{ kg}$$

$$\text{P}_2\text{O}_5 = 100 \times \frac{46}{100} = 46 \text{ kg}$$

So 100 kg of DAP supplies **18 kg N and 46 kg P_2O_5**.

Why the other options are wrong:

- (A) reverses the two figures — it ignores the fixed N-P-K order of the grade
- (C) the second figure is always expressed as P_2O_5, not elemental P (46 kg $P_2O_5 \approx$ 20 kg elemental P)
- (D) DAP is not a straight nitrogen fertilizer; it is the most concentrated common phosphatic fertilizer

Final Answer: Reading the grade 18-46-0 directly, 100 kg DAP supplies 18 kg N and 46 kg P_2O_5.

Answer: (B) Go Back to Q5

Q6.

Solution

Fertigation = irrigation + fertilisation, i.e., applying water-soluble fertilizers along with irrigation water, almost always through a **drip** system. It allows precise, frequent "spoon-feeding" of nutrients in the root zone.

The venturi injector:

- Works on the **Venturi principle** — water forced through a narrow constriction speeds up and its pressure drops, creating a suction that draws the fertilizer stock solution from an open tank into the main line
- Cheap, has no moving parts, needs no external power
- Alternatives: fertilizer (bypass) tank and the more precise fertilizer injection pump/dosing pump

Advantages of fertigation:

- 25–50% saving of fertilizer through high use-efficiency
- Nutrients placed directly in the active root zone, in step with crop demand

- Less leaching loss and labour

Why the other options are wrong:

- (A) a sand separator is a *filter* that removes sand; it does not inject fertilizer, and it is placed before the emitters
- (B) a dripper only discharges water at the plant; it cannot inject fertilizer into the line
- (D) sprinklers are a different irrigation method; the question specifies a drip system

Final Answer: A venturi injector (or fertilizer injection pump) is the device that introduces the soluble-fertilizer stock solution into a pressurised drip line during fertigation.

Answer: (C) Go Back to Q6

Q7.

Solution

Contingency crop planning is the set of alternative agronomic decisions taken when the season deviates from normal — here, a 4–5 week delay in monsoon onset, common in arid Rajasthan.

Correct response to a delayed monsoon:

- Replace long-duration crops with **short-duration, drought-escaping crops** that mature within the shortened effective rainy season:
  - Moth bean, cluster bean (guar), cowpea, short-duration bajra hybrids
- Adjust agronomy: lower plant population if moisture is scarce, increase seed rate for quick ground cover, reduce the N dose, prefer in-situ moisture conservation
- Keep contingency seed of alternative crops ready in advance

Why the other options are wrong:

- (A) a long-duration crop sown late will not complete its life cycle before soil moisture runs out — high failure risk
- (B) leaving land fallow wastes the residual rains and a whole season's income

- (C) most dryland farms have no assured irrigation; "increasing irrigation" is not an option, and the strategy must escape the shortened season, not extend the crop

Final Answer: For a delayed monsoon in dryland Rajasthan, the right contingency is to switch to short-duration, drought-escaping crops (moth bean, guar, short-duration bajra) and adapt the agronomy to the shortened season.

Answer: (D) Go Back to Q7

Q8.

Solution

Potassium-mobilizing/solubilizing bacteria (KMB/KSB) — such as *Frateuria aurantia*, *Bacillus mucilaginosus*, and *B. edaphicus* — are biofertilizers used to improve potassium nutrition.

Mechanism:

- Most soil K is locked in insoluble silicate minerals (mica, feldspar, illite) and is unavailable to plants
- These bacteria secrete **organic acids** (e.g., citric, oxalic, tartaric acid) and protons that weather the mineral lattice
- This releases K^+ into the soil solution and onto exchange sites, making it available for uptake
- They also produce some growth-promoting substances

Why the other options are wrong:

- (B) there is no "atmospheric potassium gas"; potassium has no gaseous form to fix (unlike nitrogen)
- (C) that describes **nitrifying** bacteria (*Nitrosomonas/Nitrobacter*)
- (D) cellulose decomposition releasing CO_2 is the role of decomposer microbes, not K mobilisation

Final Answer: KMB benefit crops by releasing potassium from insoluble minerals such as mica and feldspar into a plant-available form, mainly through secretion of organic acids.

Answer: (A) Go Back to Q8

Q9.

Solution

Durum wheat (*Triticum durum*) is the second most cultivated wheat species after bread wheat.

Key features:

- **Tetraploid** (2n = 4x = 28; genome AABB), unlike hexaploid bread wheat (2n = 6x = 42; AABBDD)
- Very hard, translucent **amber** grain with high protein and strong gluten
- Milled into coarse **semolina (suji/rava)**, used for pasta, macaroni, spaghetti, and dalia
- Drought-tolerant; suited to the hot, dry conditions of central and western India, including parts of Rajasthan and Madhya Pradesh

The wheat ploidy series:

- Diploid (2n = 14): einkorn, *T. monococcum*
- Tetraploid (2n = 28): durum/emmer
- Hexaploid (2n = 42): bread wheat, *T. aestivum*

Why the other options are wrong:

- (A) hexaploid bread wheat (not durum) is used for chapati
- (C) einkorn is the diploid wheat; durum is not a fodder crop
- (D) durum is in fact well suited to hot, dry tracts and is grown in central/western India

Final Answer: Durum is a tetraploid wheat with hard amber grain and strong gluten, milled into semolina for pasta and macaroni.

Answer: (B) Go Back to Q9

Q10.

Solution

Sweet corn is a special type of maize harvested at the milk stage for its sweet, tender kernels.

Genetic basis of sweetness:

- Normal field corn rapidly converts sugar to starch in the endosperm
- In sweet corn, recessive endosperm mutations block or slow this conversion:
  - **sugary (*su*)** — the traditional sweet corn gene
  - **shrunken-2 (*sh2*)** — "super-sweet" types with very high sugar and slow conversion
  - **sugary-enhancer (*se*)**
- Because the genes are recessive, sweet corn must be **isolated** from field corn to prevent xenia (cross-pollination restoring starchiness)

Why the other options are wrong:

- (A) **opaque-2** raises lysine (Quality Protein Maize), not sugar
- (B) sweet corn is not a colchicine-induced triploid
- (D) the **waxy** gene gives amylopectin-only starch (industrial use), not sweetness

Final Answer: The sweetness of sweet corn is due to the recessive sugary (*su*) / shrunken (*sh2*) genes that block starch synthesis in the endosperm.

Answer: (C) Go Back to Q10

Q11.

Solution

Lentil (Masoor, *Lens culinaris*) is an important **rabi** pulse of northern India.

Key facts:

- **Self-pollinated** crop (cleistogamous flowers)
- High-quality protein (about 24–26%), easily digestible; a key dal
- Two seed types:
  - **Microsperma** — small-seeded, used for whole/split dal

  - **Macrosperma** — bold, large flat seeds, often for export

- Cool-season legume; fixes atmospheric N via *Rhizobium*; fits well in rice-fallow and dryland rabi systems

Why the other options are wrong:

- (B) lentil is a rabi grain legume, not a kharif fodder crop
- (C) it is a legume (Fabaceae), not a cross-pollinated Brassica oilseed
- (D) it is propagated by seed, not vegetatively

Final Answer: Lentil is a self-pollinated, protein-rich rabi pulse with microsperma (small) and macrosperma (bold) seed types.

Answer: (A) Go Back to Q11

Q12.

Solution

Safflower (*Carthamus tinctorius*) is a hardy rabi oilseed of the Asteraceae family, well-suited to dryland farming.

Why it suits dryland/rabi conditions:

- A **deep taproot** extracts moisture from lower soil layers, so it thrives on **residual/conserved soil moisture** after the monsoon
- Highly **drought-hardy** and tolerant of moderate salinity; the spiny types also resist grazing
- Seed oil (about 28–32%) is rich in **linoleic acid** (a polyunsaturated, heart-friendly fatty acid)
- Florets also yield carthamin dye (traditional colourant)

Why the other options are wrong:

- (A) it is a rabi (not kharif) crop and is intolerant of waterlogging
- (B) ricin is from **castor**, not safflower
- (C) safflower is grown precisely because it does *not* need heavy irrigation; it performs on light to medium soils with residual moisture

Final Answer: Safflower suits dryland rabi cultivation because it is drought-hardy with a deep taproot that uses residual soil moisture, and yields linoleic-acid-rich oil.

Answer: (D) Go Back to Q12

Q13.

Solution

Bajra–Napier hybrid (pearl millet × Napier grass; e.g., CO-4, APBN-1, PBN-83) is among the most productive perennial green-fodder grasses.

Key features:

- A **fast-growing perennial grass** that combines the high tillering of bajra with the thick, succulent stems and high biomass of Napier
- Gives **multiple cuts** (6–8 cuts/year) over 2–3 years, with very high green-fodder yields (200–300 t/ha/year under good management)
- Cut at 45–60 day intervals; relished by cattle when chaffed
- Low oxalate content compared with pure Napier, so safer as fodder

Why the other options are wrong:

- (A) it is a grass (Poaceae), not a legume, and it does not fix nitrogen
- (C) it is grown for fodder, not for grain
- (D) it is a safe fodder; the toxic-at-all-stages HCN claim applies to young sorghum, not to the Bajra–Napier hybrid

Final Answer: The Bajra–Napier hybrid is a fast-growing, high-biomass perennial fodder grass giving many cuts a year with very high green-fodder yield.

Answer: (B) Go Back to Q13

Q14.

Solution

High Density Planting System (HDPS) in cotton is a yield-raising strategy, especially valuable in rainfed cotton tracts.

Core idea:

- Use **short-duration, compact, early-maturing varieties** (not sprawling long-duration hybrids)
- Plant at **close spacing** (e.g., 60 $\times$ 10 cm), raising plant population to about 1.5–2.5 lakh plants/ha (far above the normal 15,000–20,000)
- Each plant bears fewer bolls, but the very high population maximises bolls per unit area and total yield
- Suits rainfed, shallow soils; allows mechanisation and earlier crop closure that smothers weeds

Why the other options are wrong:

- (A) HDPS uses compact short-duration types, not widely spaced long-duration hybrids
- (B) it is a field/open-cultivation system, not a polyhouse technique
- (D) it *increases*, not reduces, the plant population — that is the whole point

Final Answer: HDPS uses short-duration compact cotton varieties at close spacing and high plant population to raise per-hectare yield, particularly in rainfed areas.

Answer: (C) Go Back to Q14

Q15.

Solution

Fig (*Ficus carica*) is a hardy, drought-tolerant fruit grown in arid and semi-arid regions.

The fig "fruit" — a syconium:

- Botanically a **syconium**: a fleshy, hollow, urn-shaped receptacle with a small opening (the ostiole) at the top
- Hundreds of tiny unisexual flowers line the **inner wall**; after fertilisation each forms a tiny true fruit (achene/drupelet), giving figs their gritty texture

- It is therefore a **composite/multiple fruit** formed from a whole inflorescence enclosed within the receptacle
- In many commercial figs, fruit set is parthenocarpic; some types need the fig wasp *Blastophaga* for pollination

Why the other options are wrong:

- (B) a pome (apple) develops from the thalamus around a true ovary — a different structure
- (C) a drupe (mango) is a single-seeded fleshy fruit with a stony endocarp
- (D) a berry (grape) is a simple fleshy fruit from one ovary

Final Answer: The edible part of fig is a syconium — a fleshy hollow receptacle bearing many tiny flowers/achenes on its inner wall.

Answer: (A) Go Back to Q15

Q16.

Solution

Potato is propagated by **seed tubers** (whole or cut pieces, each carrying "eyes"/buds), not by true seed for commercial cultivation.

Tuber dormancy:

- A freshly harvested tuber has an **innate (rest) dormancy** of about 6–10 weeks, during which it will not sprout even under favourable conditions
- This dormancy must **end** before the tuber can sprout and be planted
- Using **well-sprouted** seed tubers (short, green, sturdy sprouts) ensures rapid and uniform field emergence and a good plant stand
- Dormancy can be artificially broken (e.g., GA_3 dip, thiourea) when an early second crop is needed

Cut-tuber practice: Large tubers are cut so each piece has 1–2 eyes; cut surfaces are treated (curing / fungicide) before planting to prevent rotting.

Why the other options are wrong:

- (A) commercial potato is grown from tubers, not from true botanical seed
- (B) cut tubers are routinely planted, but their cut surfaces *should* be treated/cured

- (C) potato dormancy lasts weeks, not years

Final Answer: Freshly harvested potato tubers have a 6–10 week innate dormancy that must end before sprouting; well-sprouted seed tubers give rapid, uniform emergence.

Answer: (D) Go Back to Q16

Q17.

Solution

Garlic (*Allium sativum*) is propagated **vegetatively by cloves**.

Why cloves:

- A garlic bulb is made up of several **cloves**, each a small storage bud capable of growing into a new plant
- Cloves are separated at planting and sown 5–7 cm apart; larger cloves give bolder bulbs
- Garlic rarely sets viable true seed under field conditions; flowering is often sterile or produces only **bulbils** on the scape (topsets)
- This vegetative habit keeps the variety true-to-type

Why the other options are wrong:

- (A) garlic generally does not set abundant viable true seed
- (B) garlic is not propagated by stem cuttings
- (D) garlic does form cloves and is multiplied by them, not exclusively by tissue culture

Final Answer: Garlic is commercially propagated by planting individual cloves, the vegetative segments of the bulb.

Answer: (C) Go Back to Q17

Q18.

Solution

Ginger (*Zingiber officinale*) is a tropical rhizomatous spice.

Cultivation requirements:

- **Climate:** warm and humid; thrives with moderate rainfall and benefits from **partial shade** (often intercropped under trees or with light shade)
- **Soil:** well-drained, friable loam **rich in organic matter**; waterlogging causes rhizome rot
- **Propagation:** by small **rhizome bits (setts)** of about 20–25 g, each with at least one healthy bud
- Heavy mulching conserves moisture and suppresses weeds

Why the other options are wrong:

- (A) full open sun on poor sandy soil with no organic matter is unsuitable; ginger likes shade and humus-rich soil
- (C) saline, waterlogged soils cause rhizome rot and are the worst choice
- (D) ginger is propagated by rhizome setts, not by seed

Final Answer: Ginger needs a warm, humid climate with partial shade and well-drained organic-rich soil, and is propagated by rhizome bits (setts).

Answer: (B) Go Back to Q18

Q19.

Solution

Rose is the most important commercial cut-flower and loose-flower crop.

Standard cultural practices:

- **Pruning:** done annually (in north India, around October) to remove old, weak, criss-crossing, and diseased wood; this forces vigorous new shoots that bear the best flowers, because roses flower on **current-season growth**
- **Propagation/budding:** superior commercial varieties (Hybrid Teas, Floribundas) are usually **T-budded** onto a hardy rootstock such as *Rosa indica* (or *R. multiflora*/'Edward'), which imparts vigour, disease tolerance, and adaptability

- Disbudding and pinching regulate flower size and timing

Why the other options are wrong:

- (B) roses must be pruned; they flower on new wood, not the oldest wood
- (C) commercial roses are propagated vegetatively (budding/cutting) to stay true-to-type, not by seed
- (D) roses are budded onto rose rootstocks, never onto citrus

Final Answer: Commercial roses are pruned annually to promote fresh flowering shoots and are budded onto a hardy rootstock such as *Rosa indica*.

Answer: (A) Go Back to Q19

Q20.

Solution

Auxins (IBA — indole-3-butyric acid; NAA — naphthalene acetic acid) are the standard **rooting hormones** used in vegetative propagation by cuttings.

Mechanism:

- Applied to the **basal cut end** (as a quick-dip solution or talc powder), auxin accumulates there and triggers **adventitious root primordia** from cambial/pericycle cells
- This raises the **rooting percentage**, the number and quality of roots, and the speed and uniformity of rooting
- IBA is the most widely used because it is stable, non-toxic at effective doses, and stays localised at the base
- Hardwood cuttings need higher concentrations; soft/herbaceous cuttings need lower doses

Why the other options are wrong:

- (A) preventing flowering is unrelated to rooting auxin treatment
- (B) auxin does not raise the sugar content of the cutting
- (C) auxins are growth regulators, not fungicides/soil sterilants

Final Answer: IBA and NAA are applied to the base of stem cuttings to stimulate adventitious root initiation, improving rooting percentage and root number.

Answer: (D) Go Back to Q20

Q21.

Solution

Fruits are classified by their respiratory and ethylene behaviour during ripening.

Climacteric fruits:

- Show a sharp **rise in respiration (the climacteric peak)** and a **burst of ethylene** at the onset of ripening
- **Can ripen after harvest** (picked mature-green and ripened later) — this allows distant marketing and artificial ripening with ethylene/ethephon
- Examples: **banana, mango, papaya, tomato, apple, sapota**

Non-climacteric fruits:

- No respiratory burst and no autocatalytic ethylene surge; ripen **only on the plant**
- Once harvested they will not sweeten/ripen further
- Examples: **citrus (orange, lemon), grape, litchi, pomegranate, pineapple**

Why the other options are wrong:

- (A) banana and mango are climacteric, not non-climacteric
- (C) the two groups differ markedly, and climacteric fruits respond strongly to ethylene
- (D) ethylene is the central ripening hormone in climacteric fruits

Final Answer: Climacteric fruits (banana, mango, papaya) show a respiratory burst and ethylene surge and can ripen after harvest, whereas non-climacteric fruits (citrus, grape) do not.

Answer: (B) Go Back to Q21

Q22.

Solution

Pro-tray (plug-tray) nursery is the modern way to raise vegetable transplants under protected conditions.

What it achieves:

- Each seed is sown in an individual cell filled with sterile **coco-peat** (often with vermiculite/perlite), giving a clean, soil-borne-disease-free root environment
- Produces **uniform, healthy seedlings** with an **intact root ball/plug**, so there is minimal root damage and almost no transplanting shock
- High and uniform germination; easy handling and transport

Hardening (acclimatisation):

- Before transplanting, seedlings are gradually exposed to outdoor sun, lower humidity, and slightly reduced watering
- This toughens the cuticle and tissues so the plant establishes quickly in the field

Why the other options are wrong:

- (A) pro-tray raising does not permanently dwarf the crop
- (B) it does not change the crop's annual/perennial habit
- (D) the crop still requires normal field irrigation after transplanting

Final Answer: Pro-tray raising with hardening gives healthy, uniform, disease-free seedlings with an intact root ball, acclimatised to field conditions, reducing transplant shock.

Answer: (C) Go Back to Q22

Q23.

Solution

Clonal selection is the selection and multiplication of superior **clones** (genetically identical individuals derived asexually from one mother plant).

Where it applies:

- In **vegetatively (asexually) propagated crops** — sugarcane, potato, banana, many fruit trees, tuber and ornamental crops
- A single outstanding plant (a desirable mutation or recombinant) is identified and multiplied by cuttings, tubers, suckers, grafts, etc.
- Because reproduction is asexual, the **entire genotype — including heterozygosity and hybrid vigour — is preserved** unchanged in the progeny
- Hence even a single superior plant can directly become a new variety

Why the other options are wrong:

- (A) self-pollinated seed crops are improved by pure-line selection/pedigree methods
- (B) cross-pollinated crops are improved by mass selection, recurrent selection, and hybridisation
- (C) clonal selection applies to asexually propagated crops, the opposite of seed-only crops

Final Answer: Clonal selection is used in vegetatively propagated crops, where a superior clone is selected and multiplied asexually, keeping the whole genotype intact.

Answer: (D) Go Back to Q23

Q24.

Solution

Induced mutation breeding deliberately raises genetic variability by treating seeds/propagules with mutagens.

Two classes of mutagens:

- **Physical mutagens:** gamma rays, X-rays, fast/thermal neutrons, beta particles, UV — mainly cause chromosomal breaks and point changes

- **Chemical mutagens: EMS (ethyl methane sulphonate)** — the most widely used; also MMS, nitrous acid, sodium azide — these are alkylating/base-modifying agents that cause point mutations

Indian example: Sharbati Sonora wheat was developed by Dr. M.S. Swaminathan through **gamma irradiation of Sonora-64**, giving amber, bolder grain with better quality. Other examples: **Atomita** rice, mutant groundnut and mung-bean varieties.

Why the other options are wrong:

- (B) it reverses the categories — EMS is chemical, gamma rays are physical
- (C) mutation breeding *increases* variability; that is its very purpose
- (D) mutagens act on both self- and cross-pollinated crops

Final Answer: Gamma/X-rays are physical mutagens and EMS is a chemical mutagen; Sharbati Sonora wheat arose from gamma irradiation of Sonora-64.

Answer: (A) Go Back to Q24

Q25.

Solution

Somaclonal variation is the heritable **genetic and epigenetic variation** that appears among plants (somaclones) regenerated through cell, tissue, or callus culture.

Key points:

- Arises during the culture process from chromosomal changes, point mutations, transposon activation, and DNA-methylation changes
- Increases with longer callus phase and certain hormone regimes
- Can be a **nuisance** (loss of clonal uniformity in micropropagation) but also a **useful source of new variability** — novel disease resistance, salt tolerance, or quality traits can be selected (e.g., in sugarcane, potato, tomato)

Why the other options are wrong:

- (A) it arises in culture, not from conventional hybridisation
- (B) that describes **synthetic seed** (encapsulated somatic embryos) — a different concept, and somaclonal variation does involve genetic change

- (D) it is genuine heritable variation, not mere weather-induced phenotypic variation

Final Answer: Somaclonal variation is the genetic/epigenetic variation among tissue-culture-derived plants, sometimes exploited to select novel useful variants.

Answer: (C) Go Back to Q25

Q26.

Solution

Seed Replacement Rate (SRR) measures how much of the area sown to a crop uses fresh quality (certified/foundation) seed rather than seed the farmer saved from the previous harvest.

Definition and importance:

$$\text{SRR (\%)} = \frac{\text{Area sown with certified/quality seed}}{\text{Total area under the crop}} \times 100$$

- A higher SRR means more farmers use genetically pure, high-vigour seed — directly raising productivity
- Self-pollinated crops can keep seed a few years (so lower SRR is tolerable); hybrids need fresh seed every season (target SRR 100%)
- Raised through the **Seed Village Programme**, subsidised certified seed distribution, and farmer training

Why the other options are wrong:

- (A) that describes variety replacement in trials, not seed replacement on farms
- (C) germination percentage is a seed-quality test parameter, a different concept
- (D) it has nothing to do with the number of irrigations

Final Answer: SRR is the percentage of cropped area sown with certified/quality seed rather than farm-saved seed, and is promoted through the Seed Village Programme.

Answer: (B) Go Back to Q26

Q27.

Solution

Mango hopper (*Idioscopus* spp., *Amritodus atkinsoni*) is the most serious pest of mango at flowering.

Nature of damage:

- Both **nymphs and adults are sap-suckers**; they congregate on the **inflorescence (panicle)** and tender shoots and suck the cell sap
- This causes **flower drying and shedding**, leading to heavy flower and young-fruit drop and poor fruit set
- They excrete sugary **honeydew** on which black **sooty mould** grows, coating leaves and reducing photosynthesis and fruit quality
- A characteristic "hopping" movement when disturbed

Management: clean cultivation and pruning for aeration, spraying at panicle emergence and after fruit set with imidacloprid/thiamethoxam or carbaryl, and a fungicide to clear sooty mould.

Why the other options are wrong:

- (B) trunk boring is done by the mango stem borer, not the hopper
- (C) the hopper is not a soil root grub
- (D) it sucks sap; it does not chew leaves like a caterpillar

Final Answer: Mango hopper nymphs and adults suck sap from the inflorescence, causing flower/fruit drop, and excrete honeydew that fosters sooty mould.

Answer: (A) Go Back to Q27

Q28.

Solution

Pulse beetle (*Callosobruchus chinensis*, also *C. maculatus*) is the most destructive pest of stored pulses (gram, green gram, cowpea, pea).

Damage pattern:

- Infestation often begins in the **field** (eggs laid on maturing pods) and is carried into **storage**, where it multiplies rapidly
- The **grub bores into the seed** and feeds within, hollowing it out

- The adult emerges by cutting a neat **round "window" exit hole**, leaving a thin papery flap — the diagnostic sign
- Heavy infestation leaves seeds riddled with holes, reduces weight and germination, and makes the grain unfit for consumption or sowing

Management: sun drying, proper drying to safe moisture, airtight/hermetic storage, neem-leaf admixture, and fumigation (e.g., aluminium phosphide) of stored stock.

Why the other options are wrong:

- (A) it is primarily a **storage** pest (though it can start in the field)
- (B) it bores into seeds, not into wooden bins
- (C) it attacks pulses, not cereals

Final Answer: The pulse beetle's grub develops inside the seed and adults emerge through round "window" holes, ruining stored pulses.

Answer: (D) Go Back to Q28

Q29.

Solution

Black (stem) rust of wheat is caused by *Puccinia graminis* f. sp. *tritici*.

Identifying features:

- Produces **dark reddish-brown elongated pustules (uredia)** mainly on the **stem, leaf sheath, and leaf**; later black **telia** form
- The pustules rupture the epidermis, giving a rough, torn appearance; severe attack shrivels the grain
- It is a **macrocyclic, heteroecious** rust: the **barberry (*Berberis*)** is its **alternate (aecial) host**, where sexual recombination produces new races
- Favoured by warm temperatures (20–30°C) late in the season

The three wheat rusts:

- Black/stem rust — *P. graminis* — stem, dark brown
- Brown/leaf rust — *P. recondita* — leaves, orange-brown

- Yellow/stripe rust — *P. striiformis* — yellow stripes, cool climate

Why the other options are wrong:

- (A) yellow stripes in lines are the symptom of **stripe (yellow) rust**, a different species
- (C) it is a foliar/stem rust, not a soil-borne wilt
- (D) loose smut is a different, seed-borne disease of the ear

Final Answer: Black stem rust (*Puccinia graminis*) forms dark reddish-brown to black pustules chiefly on stems, with barberry as its alternate host.

Answer: (B) Go Back to Q29

Q30.

Solution

Red rot of sugarcane (*Colletotrichum falcatum*; perfect stage *Glomerella tucumanensis*) is the most destructive disease of sugarcane — it caused the historic collapse of the variety Co 213.

Diagnostic symptoms:

- Drooping and drying of the upper leaves (top sets) as the disease advances
- On **splitting the cane lengthwise**: the internal tissue is **reddened**, interrupted by **crosswise white patches/bands** (the classic diagnostic)
- A characteristic **sour, alcoholic (vinegar-like) smell** from the affected pith
- Reddening of the midrib on leaves with small dark lesions bearing acervuli

Management: grow resistant varieties, use disease-free three-budded setts, treat setts with carbendazim/hot water, rogue out affected clumps, and rotate crops.

Why the other options are wrong:

- (A) white powdery growth is powdery mildew — a different disease
- (B) a black smut whip is the symptom of **sugarcane smut** (*Sporisorium*), not red rot
- (D) angular water-soaked spots indicate a bacterial leaf disease

Final Answer: Red rot is diagnosed by reddened internal cane tissue crossed by white patches and a sour alcoholic smell on splitting the cane.

Answer: (C) Go Back to Q30

Q31.

Solution

Gummosis / foot rot / collar rot of citrus is caused by soil-borne ***Phytophthora*** spp. (*P. citrophthora*, *P. parasitica*). It is a major problem where drainage is poor or trees are planted/irrigated carelessly.

Symptoms: dark, water-soaked lesions on the bark near the collar/base, profuse **exudation of gum**, bark splitting and girdling, leading to decline.

Integrated management (the correct combination):

- Use **resistant/tolerant rootstocks** — rough lemon, Rangpur lime, Cleopatra mandarin, trifoliate orange — and bud at the right height
- **Avoid water stagnation** near the trunk: provide good drainage, irrigate by ring/basin keeping water away from the collar, and keep the bud union well above ground
- **Treat lesions**: scrape affected bark and apply **Bordeaux paste**, and spray/drench with **metalaxyl** or potassium phosphonate

Why the other options are wrong:

- (A) deep planting with the bud union below soil *promotes* foot rot
- (B) flooding up to the trunk creates exactly the wet collar that favours *Phytophthora*
- (C) susceptible seedling sweet-orange rootstock worsens the problem

Final Answer: Citrus gummosis is managed by using resistant rootstocks, avoiding water stagnation at the collar, and treating lesions with Bordeaux paste/metalaxyl.

Answer: (D) Go Back to Q31

Q32.

Solution

Root-knot nematode (*Meloidogyne* spp.) is a microscopic plant-parasitic worm and a serious pest of vegetables (tomato, brinjal, okra) and many other crops.

Diagnostic sign: the female induces **galls/knots** on the roots; affected plants show stunting, yellowing, wilting in patches, and poor yield.

Integrated management (the correct set):

- **Crop rotation** with non-host crops (e.g., cereals) to starve the nematode
- **Resistant varieties** carrying the *Mi* gene (e.g., in tomato)
- **Soil solarisation** — covering moist soil with transparent polythene in summer to kill nematodes by heat
- **Antagonistic plants** such as **marigold** (*Tagetes*, which releases nematicidal α-terthienyl), and bio-agents like *Paecilomyces lilacinus / Pochonia*
- Use of nematode-free nursery and organic amendments (neem cake)

Why the other options are wrong:

- (B) nematodes live in soil/roots; foliar fungicides do not control them
- (C) extra nitrogen does not cure nematode damage and may worsen it
- (D) permanent flooding is impractical for most crops and not a standard control

Final Answer: Root-knot nematode is managed integratedly — crop rotation with non-hosts, resistant varieties, soil solarisation, and antagonistic plants such as marigold.

Answer: (A) Go Back to Q32

Q33.

Solution

Hariana is one of the most important **indigenous (zebu) dual-purpose** cattle breeds of north India.

Breed profile:

- Home tract: Rohtak, Hisar, Jind and Gurgaon districts of **Haryana** (extends into western UP and Rajasthan)
- **White or light grey** colour, with a compact body and a short, lyre-shaped/horn
- **Dual-purpose:** cows give moderate milk (about 1000–1500 kg/lactation), while the **bullocks are powerful and fast**, valued for road and field work
- Hardy and well adapted to hot, dry north-Indian conditions

Why the other options are wrong:

- (A) Hariana is indigenous zebu cattle, not an exotic dairy breed (that would be Holstein Friesian)
- (C) it is cattle, not a buffalo breed
- (D) it is cattle, not a sheep breed

Final Answer: Hariana is an indigenous white-grey dual-purpose zebu breed of Haryana — cows give moderate milk and bullocks are prized for fast work.

Answer: (B) Go Back to Q33

Q34.

Solution

Jaffarabadi is a riverine buffalo breed renowned for its **massive size**.

Breed profile:

- Home tract: the **Gir forest and Saurashtra/Kutch region of Gujarat** (Jafrabad in Amreli district)
- **One of the heaviest and largest** Indian buffalo breeds; adults can weigh 700–800 kg or more
- Distinctive **massive, drooping horns** that curve down and back, and a heavy forehead

- Good milk yield (about 1800–2700 kg/lactation) with high fat; also used for heavy draught

Comparison: Murrah (Haryana) is the top milk buffalo with tightly curled horns; Mehsana and Surti are other Gujarat breeds; Jaffarabadi stands out for sheer body size and drooping horns.

Why the other options are wrong:

- (A) it is among the largest, not the smallest/lowest-yielding
- (B) the tightly curled-horn riverine breed of Haryana/Punjab is Murrah, not Jaffarabadi
- (D) it is a riverine (not swamp) buffalo and is not confined to draught

Final Answer: Jaffarabadi is one of the heaviest buffalo breeds, native to the Gir/Saurashtra region of Gujarat, with massive drooping horns.

Answer: (C) Go Back to Q34

Q35.

Solution

Vanaraja is a **dual-purpose backyard poultry** variety developed by the ICAR — Directorate of Poultry Research, Hyderabad, for rural and tribal free-range rearing.

Key features:

- **Multi-coloured** plumage that camouflages birds against predators in open backyards
- **Dual-purpose:** reasonable egg production (about 100–160 eggs/year) and good body weight for meat
- **Hardy and disease-resistant**, able to thrive on kitchen waste, grains, and scavenged feed with minimal inputs
- Improves rural nutrition and supplementary income for small/landless families

Other ICAR backyard birds: Gramapriya (layer-type), Krishna-J, Kadaknath (black-meat indigenous).

Why the other options are wrong:

- (A) White Leghorn is an exotic commercial layer, not Vanaraja

- (B) commercial broilers reared in controlled sheds are a different category; Vanaraja is for free-range
- (C) Vanaraja is a chicken variety, not a turkey

Final Answer: Vanaraja is a hardy, multi-coloured, dual-purpose chicken variety developed for backyard/free-range rearing, giving both eggs and meat.

Answer: (D) Go Back to Q35

Q36.

Solution

Haemorrhagic Septicaemia (HS) — locally "Galghotu" — is an acute, often fatal bacterial disease of cattle and buffalo (buffaloes are most susceptible).

Cause and epidemiology:

- Caused by the bacterium ***Pasteurella multocida*** (serotypes B:2 and E:2)
- Outbreaks peak in the **monsoon/rainy season**, when humidity, stress, and crowding are high
- Spread by ingestion/inhalation; healthy carriers harbour the organism in the tonsils

Clinical signs: sudden **high fever**, profuse salivation, **hot painful swelling (oedema) of the throat, neck, and brisket**, laboured breathing with a snoring sound, and rapid death within 1–3 days.

Prevention: annual vaccination before the monsoon (HS oil-adjuvant/alum-precipitated vaccine); prompt antibiotic treatment (sulphonamides, oxytetracycline) in the very early stage.

Why the other options are wrong:

- (B) mouth and foot blisters describe **Foot-and-Mouth Disease** (a virus)
- (C) red urine and tick transmission describe **babesiosis** (a protozoan disease)
- (D) calcium deficiency at calving causes **milk fever**, a metabolic disorder, not HS

Final Answer: HS is an acute monsoon-season bacterial disease caused by *Pasteurella multocida*, with fever and throat/brisket swelling, prevented by annual pre-monsoon vaccination.

Answer: (A) Go Back to Q36

Q37.

Solution

Price spread is a central concept in agricultural marketing efficiency.

Definition:

$$\text{Price spread} = \text{Price paid by consumer} - \text{Price received by farmer}$$

- It equals the **total marketing margin** — all the costs and profits of intermediaries (village trader, commission agent, wholesaler, retailer) plus marketing costs (transport, grading, storage, losses)
- A **wide price spread** means the farmer gets a small share of the consumer's rupee and the marketing system is inefficient
- Reducing the price spread (e.g., through cooperatives, FPOs, direct marketing, e-NAM) raises the **producer's share in the consumer rupee**

Why the other options are wrong:

- (A) the MSP-vs-market gap is a policy comparison, not the price spread
- (B) year-to-year price change is **price variation/seasonality**, a different idea
- (D) the grading premium is only one small element, not the whole farmer-to-consumer margin

Final Answer: Price spread is the difference between the consumer's price and the farmer's price — the total marketing margin taken by intermediaries.

Answer: (C) Go Back to Q37

Q38.

Solution

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), launched in 2015, is the flagship irrigation mission with the motto **"Har Khet Ko Pani"** (water to every field) and **"Per Drop More Crop"**.

Main components:

- **Accelerated Irrigation Benefit Programme (AIBP):** complete ma-

jor/medium irrigation projects faster

- **Har Khet Ko Pani:** create new assured-irrigation sources (minor irrigation, water bodies)
- **Per Drop More Crop:** promote **micro-irrigation** (drip and sprinkler) and on-farm water-use efficiency — the best-known component
- **Watershed development:** rainwater harvesting and soil-moisture conservation in rainfed areas

Aim: expand the assured-irrigation area, improve water-use efficiency, and reduce dependence on the monsoon — highly relevant for water-scarce Rajasthan.

Why the other options are wrong:

- (A) crop insurance is **PMFBY**
- (C) Rs. 6000/year direct income support is **PM-KISAN**
- (D) a unified national online market is **e-NAM**

Final Answer: PMKSY aims to expand assured irrigation ("Har Khet Ko Pani") and improve water-use efficiency through micro-irrigation under its "Per Drop More Crop" component.

Answer: (B) Go Back to Q38

Q39.

Solution

Agriculture is a **priority sector** for bank lending in India, so short-term crop loans are made cheap through an **interest subvention** scheme (now the Modified Interest Subvention Scheme, linked with the Kisan Credit Card).

How the effective 4% rate is built up (for loans up to Rs. 3 lakh):

- Banks lend short-term crop loans at a base rate of about **7% per annum**
- The government gives a **2% interest subvention** to the bank, so a borrower pays 7%
- Farmers who **repay promptly/on time** get an additional **3% prompt-repayment incentive**
- Net effective interest to a prompt-paying farmer $= 7\% - 3\% =$ **about 4% per annum**

This keeps institutional credit affordable and discourages dependence on moneylenders.

Why the other options are wrong:

- (A) it is concessional but not zero, and depends on prompt repayment
- (B) 12% with no rebate defeats the purpose of priority-sector lending
- (C) prompt repayment is rewarded, not penalised, and the effective rate is about 4%, not 9%

Final Answer: A prompt-repaying farmer pays an effective rate of about 4% on short-term crop loans up to Rs. 3 lakh (7% rate, 2% subvention, 3% prompt-repayment incentive).

Answer: (D) Go Back to Q39

Q40.

Solution

Farmers' Field School (FFS) is a participatory, learning-by-doing extension approach, originally developed by FAO for rice IPM in Asia.

Key characteristics:

- A group of 25–30 farmers meets **regularly through the whole crop season** in a real field
- Learning is **hands-on and discovery-based** — the central activity is **Agro-Ecosystem Analysis (AESA)**, where farmers observe the crop, pests, natural enemies, and weather, then **decide management actions themselves**
- The extension worker is a **facilitator**, not a lecturer; farmers become experts and decision-makers
- Widely used to spread **Integrated Pest Management (IPM)** and sustainable practices

Why the other options are wrong:

- (B) one-way broadcasting is a mass-media method, the opposite of FFS's participatory learning
- (C) FFS is about training and empowerment, not free input distribution

- (D) FFS is built on full farmer participation, not a scientist-only demonstration

Final Answer: FFS is a season-long, hands-on, group learning approach where farmers observe and experiment (agro-ecosystem analysis) and make their own decisions, widely used for IPM.

Answer: (A) Go Back to Q40

Answer Key

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