

PREVIOUS YEARS' PAPER (SOLVED)
Common University Entrance Test for UG Programmes

CUET-UG—AGRICULTURE

Entrance Exam, 2023

(Online exam held on 26-05-2023)

Subject Code: 302

1. Match List-I with List-II.

List-I	List-II
(a) Radish	I. Tuber
(b) Potato	II. Root
(c) Onion	III. Stem
(d) Cauliflower	IV. Bulb

Choose the correct answer from the options given below:

(a)	(b)	(c)	(d)
A. I	II	III	IV
B. IV	I	III	II
C. II	I	IV	III
D. II	I	III	IV

2. In a dihybrid cross, if an individual heterozygous for both the characters is crossed with double recessive, which phenotype ratio would be expected?

- A. 1 : 2 : 2 : 1 B. 1 : 2 : 1 : 1
C. 1 : 1 : 1 : 1 D. 9 : 3 : 3 : 1

3. Match List-I with List-II.

List-I (Weather element)	List-II (Instruments)
(a) Light	I. Hygrometer
(b) Wind Velocity	II. Thermometer
(c) Humidity	III. Sunshine recorder
(d) Temperature	IV. Anemometer

Choose the correct answer from the options given below:

(a)	(b)	(c)	(d)
A. I	II	III	IV
B. III	IV	I	II
C. II	I	IV	III
D. IV	III	II	I

4. What are those fungi called which live in symbiotic association with roots of higher plants?

- A. Saprophytes B. Parasites
C. Lichens D. Mycorrhiza

5. During collection of semen from a bull, the artificial vagina should be held at angle to the ground.

- A. 90° B. 0°
C. 45° D. 60°

6. What is the water use efficiency, if grain yield of a crop is 6 ton/he and water requirement for growing the crop is 2000 mm?

- A. 3 kg/he-mm B. 0.003 kg/he-mm
C. 3 t/he-mm D. 0.3 kg/he-mm

7. Which of the following fruits is not indigenous to India?

- A. Mango B. Guava
C. Banana D. Jackfruit

8. 'Totapuri' is a variety of:

- A. Litchi B. Banana
C. Papaya D. Mango

9. ICAR-Indian Veterinary Research Institute is situated at:

- A. Karnal B. Izatnagar
C. Malegaon D. Kolkata

10. Which of the following crop requires 'puddling' operation?

- A. Transplanted rice B. Direct seeded rice
C. Transplanted wheat D. Direct seeded wheat

11. Growing potato in the interspaces of apple trees in the first few years is an example of:

- A. Crop rotation B. Inter cropping
C. Mixed cropping D. Mono cropping

12. Which country is the second largest producer of fruits and vegetables in the world?

- A. India
B. China
C. United States of America
D. Brazil

13. Which of the following is an example of buffer solution?

- A. A mixture of nitric acid and sodium nitrate
- B. A mixture of sodium hydroxide and nitric acid
- C. A mixture of acetic acid and sodium hydroxide
- D. A mixture of acetic acid and sodium acetate

14. Which of the following are pressurized irrigation systems?

- (a) Furrow irrigation (b) Flood irrigation
- (c) Drip (d) Rainguns
- (e) Micro-sprinklers

Choose the **correct** answer from the options given below:

- A. (a) and (b) only
- B. (a), (b) and (c) only
- C. (c), (d) and (e) only
- D. (c) and (e) only

15. Which of the following is known as 'power house' of the cell?

- A. Mitochondrion B. Plastid
- C. Lysosome D. Vacuole

16. Which is fat rich milk product?

- A. Paneer B. Ghee
- C. Dahi D. Kulfi

17. Which is the most cultivated species of wheat in India?

- A. *Triticum aestivum*
- B. *Triticum durum*
- C. *Triticum dicoccum*
- D. *Triticum sphaerococcum*

18. Cow and buffaloes come into heat, after a period of days.

- A. 15-17 B. 19-21
- C. 25-27 D. 30-31

19. Amoeba belongs to the kingdom:

- A. Fungi B. Plantae
- C. Protista D. Animalia

20. Which of the following has African and French varieties?

- A. Marigold B. Chrysanthemum
- C. Gladiolus D. Rose

21. When is medical examination needed, if heifer is not showing heat symptoms for breeding?

- (a) After 3-years age
- (b) After 300 kg body weight
- (c) After 5-years age
- (d) At 2-years age

Choose the correct answer from the options given below:

- A. (a) only B. (c) and (d) only
- C. (a) and (b) only D. (a), (b) and (c) only

22. Which of the following is known as a secondary nutrient element for plants?

- A. N B. P
- C. Fe D. S

23. How much single super phosphate (SSP) is needed to supply 80 kg P_2O_5 to 1 hectare area?

- A. 160 kg B. 320 kg
- C. 500 kg D. 80 kg

24. Arrange the soils of the following textural classes according to descending order of their clay percentage.

- (a) Sandy clay (b) Clay
- (c) Sandy loam (d) Sandy clay loam
- (e) Sand

Choose the **correct** answer from the options given below:

- A. (b), (a), (d), (c), (e) B. (b), (c), (a), (d), (e)
- C. (c), (a), (b), (e), (d) D. (b), (a), (c), (d), (e)

25. Di-ammonium phosphate is a complex fertilizer and contains:

- A. Nitrogen only
- B. Phosphorus only
- C. Nitrogen and phosphorus
- D. Nitrogen, phosphorus and potash

26. A chromosome with the centromere situated close to its end forming one extremely short and one very long arm is called:

- A. Telocentric B. Metacentric
- C. Acrocentric D. Sub-metacentric

27. Operation Flood is associated with:

- A. River protection B. Ganga basin protection
- C. Milk production D. Fish production

28. Except for raspberry and strawberry jams, what should be the minimum percentage of fruit pulp in a jam?

- A. 10% (w/w) B. 25% (w/w)
- C. 45% (w/w) D. 60% (w/w)

29. In Artificial Insemination semen from single bull can be used for inseminating more than cows per year.

- A. 10,000 B. 20,000
- C. 30,000 D. 50,000

30. Match List-I with List-II.

List-I (Flower Crop)	List-II (Commercial method of propagation)
(a) Gladiolus	I. Seed
(b) Rose	II. Corm
(c) Marigold	III. T-Budding
(d) Chrysanthemum	IV. Suckers

Choose the correct answer from the options given below:

- | | (a) | (b) | (c) | (d) |
|----|-----|-----|-----|-----|
| A. | I | II | III | IV |
| B. | I | IV | III | II |
| C. | II | III | I | IV |
| D. | II | I | IV | III |

31. The institute in India responsible for collection and conservation of plant germplasm is:

- National Bureau of Animal Genetic Resources, Karnal
- Indian Agricultural Statistics Research Institute, New Delhi
- National Bureau of Plant Genetic Resources, New Delhi
- National Bureau of Fish Genetic Resources, Lucknow

32. What is the name of the phenomenon where one plant exerts adverse effects on neighbouring plants through production and release of toxic chemicals?

- Symbiosis
- Allelopathy
- Parasitism
- Mutualism

33. Arrange the following phenological stages of wheat in correct order:

- | | |
|---------------|---------------------------|
| (a) Tillering | (b) Crown root initiation |
| (c) Jointing | (d) Dough |
| (e) Milk | |

Choose the **correct** answer from the options given below:

- | | |
|----------------------------|----------------------------|
| A. (a), (b), (c), (e), (d) | B. (b), (a), (c), (e), (d) |
| C. (a), (b), (c), (d), (e) | D. (e), (a), (c), (b), (d) |

34. Deep litter and cage systems of poultry can be categorized as system.

- Free range
- Semi intensive
- Intensive
- Easy management

35. Pure line selection is an effective method of crop improvement in which of the following crops?

- Often cross-pollinated crops
- Self- and cross-pollinated crops
- Self-pollinated crops
- Cross-pollinated crops

36. If c is the speed of light; λ and ν wavelength and frequency, respectively, of an electromagnetic radiation, then which of the following is true?

- | | |
|------------------------------|------------------------------|
| A. $\lambda = c^2$ | B. $\nu = c^2$ |
| C. $\lambda = \frac{\nu}{c}$ | D. $\lambda = \frac{c}{\nu}$ |

37. Removal of weeds through hand pulling, hoeing, mowing is considered as method.

- Physical
- Cultural
- Biological
- Chemical

38. Which is **not** a polysaccharide?

- | | |
|------------------|------------|
| A. Pectin | B. Lignin |
| C. Hemicellulose | D. Glucose |

39. Which of the following is **not** a bacterial disease?

- Haemorrhagic septicaemia
- Rinderpest
- Black quarter
- Mastitis

40. In which crop, 'crown-root initiation' is considered as the most moisture sensitive stage for irrigation?

- | | |
|----------|-----------------|
| A. Rice | B. Wheat |
| C. Maize | D. Pearl millet |

Directions (Qs. No. 41-45): Attempt items based, on the passage given below:

In RNA, every nucleotide residue has an additional -OH group present at 2' position in the ribose. Also, in RNA the uracil is found at the place of thymine (5-methyl uracil, another chemical name for thymine).

DNA as an acidic substance present in nucleus was first identified by Friedrich Meischer in 1869. He named it as 'Nuclein'. However, due to technical limitation in isolating such a long polymer intact, the elucidation of structure of DNA remained elusive for a very long period of time. It was only in 1953 that James Watson and Francis Crick, based on the X-ray diffraction data produced by Maurice Wilkins and Rosalind Franklin, proposed a very simple but famous Double Helix model for the structure of DNA. One of the hallmarks of their proposition was base pairing between the two strands of polynucleotide chains. However, this proposition was also based on the observation of Erwin Chargaff that for a double stranded DNA, the ratios between Adenine and Thymine and Guanine and Cytosine are constant and equals one.

41. What is the common name of 5-methyl uracil?

- | | |
|------------|-------------|
| A. Adenine | B. Thymine |
| C. Guanine | D. Cytosine |

42. Which base is present in RNA, but not in DNA?

- | | |
|------------|------------|
| A. Adenine | B. Thymine |
| C. Uracil | D. Guanine |

43. What is the ratio between Guanine and Cytosine in DNA?

- | | |
|----------|---------------|
| A. > 1 | B. < 1 |
| C. $= 1$ | D. $= \alpha$ |

44. Initial name of DNA was:

- | | |
|---------------|------------|
| A. Nucleotide | B. Nucleon |
| C. Nuclein | D. Nucloid |

45. Who proposed 'Double Helix' structure of DNA?

- Wilkins and Franklin
- Watson and Crick
- Wilkins and Watson
- Watson and Franklin

Directions (Qs. No. 46-50): Attempt items based on the passage given below:

Types of compound soil structure and their characteristics

Type	Shape and Characteristics
Blocky 	All the three dimensions of peds are of about same size providing a shape of block having flat or rounded faces. These peds are further subdivided into <i>angular blocky</i> and <i>sub-angular blocky</i>. In the former, faces are flat, and edges and corners are sharp while in the latter, face and edges are mainly rounded. The blocky structure is usually found in B-horizon and promotes good drainage, aeration and root penetration.
Prismatic 	The peds are elongated more in vertical than in horizontal direction giving a column like shape. Vertical cleavage planes are predominant. When the tops of peds are relatively angular and flat, it is called <i>prismatic</i> and when rounded, it is called <i>columnar</i>. Prismatic structure commonly occurs in subsurface horizons in arid and semiarid regions.
Platy 	Horizontal axis is longer than vertical axis resulting in a plate like appearance. Horizontal cleavage planes are predominant. When peds are thick, they are called <i>platy</i>, and when thin, are called <i>laminar</i>. Platy structure is often inherited from parent material and may also be formed due to compaction of clayey soils by heavy machinery.
Spherical 	Peds are roughly spherical or granular and sub-divided into <i>granular</i> and <i>crumb</i>. Granular structure is less porous than the crumb due to low organic matter content. Spherical structure is formed by biotic activities in surface horizon and promotes infiltration, percolation, aeration and root penetration in soils.

46. When the peds, are elongated more in vertical than in horizontal direction and tops of peds are rounded, the structure is called:
 A. Sub-angular blocky B. Crumb
 C. Prismatic D. Columnar
47. When all the three dimensions of peds are of about the same size and, faces and edges are mainly rounded, the soil structure is called:
 A. Angular blocky B. Sub-angular blocky
 C. Laminar D. Columnar
48. When the peds are longer in horizontal axis than in vertical axis the soil structure is called:

- A. Prismatic B. Angular blocky
 C. Platy D. Granular

49. Which of the following soil structure is roughly spherical and is formed by biotic activities in surface horizon and promotes aeration and infiltration?
 A. Crumb B. Laminar
 C. Columnar D. Prismatic
50. Which of the following soil structure is generally found in B-horizon, promotes aeration, good drainage and penetration?
 A. Platy B. Laminar
 C. Crumb D. Blocky

ANSWERS

1. (C): Radish is a root vegetable, so it's a part of the root system of the plant. Therefore, it matches with II. Root. Potato, on the other hand, is a tuber, which is a modified part of the stem that grows underground. Hence, it pairs with I. Tuber. Onion is a bulb, which is a modified, underground stem surrounded by fleshy modified leaves that store food. It correlates with IV. Bulb. Cauliflower is actually part of the plant's flower system. While it's not specifically mentioned in the options, III. Stem is the closest match given the options.
2. (C): When a heterozygous dihybrid organism (AaBb) is crossed with a double recessive (aabb), the

phenotype ratio expected is 1:1:1:1. This is because the heterozygous dihybrid will produce four types of gametes in equal frequency (AB, Ab, aB, and ab) and when crossed with the double recessive which produces only one kind of gamete (ab), we get four different phenotypic combinations in equal proportions.

3. (B): For weather elements and their respective instruments:
- Light is measured by a Sunshine recorder, so (a) matches with III.
 - Wind Velocity is measured using an Anemometer, hence (b) correlates with IV.

- Humidity indicates the amount of moisture present in the air. It is quantified using a Hygrometer. Therefore, (c) pairs with I.
 - Temperature, which is the degree of hotness or coldness measured in terms of any of several arbitrary scales like Celsius or Fahrenheit, is measured using a Thermometer. Thus, (d) matches with II.
4. (D): Mycorrhiza refers to the symbiotic association between certain fungi and the roots of most plants. In this association, the fungi assist the plant by extending its root's nutrient absorption capability, especially for phosphorus. In return, the plant provides the fungi with carbohydrates. This relationship is vital for many plants to thrive in their respective environments. Notably, the association is so crucial that some plants can't survive without their mycorrhizal partners.
 5. (C): During the collection of semen from a bull using an artificial vagina, the angle of the artificial vagina is crucial to mimic the natural process as closely as possible and ensure that the semen is collected safely and efficiently. It is generally held at a 45° angle to the ground. This angle ensures that the semen flows down into the collection container without any obstruction or spillage. Proper technique ensures the health and safety of both the bull and the individual collecting the semen, and also ensures the viability of the collected sample.
 6. (A)
 7. (B): While mango, banana, and jackfruit are all indigenous to India and have a long history in its culture and cuisine, guava is not. Guava is believed to have originated in Central America and was brought to India by Portuguese traders in the 17th century. Since its introduction, it has become a staple in many Indian fruit salads and dishes, highlighting the influence of global trade on the evolution of regional cuisines.
 8. (D): 'Totapuri' is a variety of mango. Mango, being the national fruit of India, comes in various shapes, sizes, and flavors, and 'Totapuri' is one of the many celebrated varieties. Recognized by its parrot-beak like tip, the 'Totapuri' mango is commonly found in the southern states of India. This mango is slightly tangier and is often used in salads and pickles due to its firm flesh and unique taste.
 9. (B): The ICAR-Indian Veterinary Research Institute (IVRI) is located in Izatnagar, Uttar Pradesh, India. Established in 1889, it's one of the premier veterinary research institutions in India. The institute has been pivotal in research related to livestock and poultry diseases, developing vaccines, and improving animal health throughout the country. IVRI's role has been crucial in enhancing livestock production and contributing to the economy through its research and development initiatives.
 10. (A): 'Puddling' is an operation that involves the churning of soil in the presence of water to create a soft, saturated, and granular structure. This is primarily done for transplanted rice. The main objectives of puddling are to reduce percolation losses of water, control the growth of weeds by creating anaerobic conditions, and to prepare a soft bed for easy transplanting of rice seedlings. Puddling creates a hardpan below the surface layer, preventing deep-rooted weeds from growing but allowing the shallow roots of rice to spread and grow.
 11. (B): Growing potato in the interspaces of apple trees in the first few years is an example of intercropping. Intercropping is a method where two or more crops are grown together in the same field during a growing season. The aim is to utilize resources efficiently that might otherwise be wasted. In the case of growing potatoes between apple trees, the potatoes can make use of the sunlight, nutrients, and water in the interspaces that the young apple trees aren't yet fully utilizing, ensuring maximum productivity from the land.
 12. (A): India is the second-largest producer of fruits and vegetables in the world, following China. India boasts a diverse range of agro-climatic zones, enabling the cultivation of various fruits and vegetables throughout the year. Not only does the country produce staples like rice and wheat in vast amounts, but it also contributes significantly to the global production of fruits such as mangoes, bananas, citrus fruits, and vegetables like onions, brinjals, and cauliflowers.
 13. (D): A buffer solution is a solution that can resist changes in pH when small amounts of an acid or base are added. A mixture of acetic acid and sodium acetate serves as a buffer solution. Here's why: Acetic acid is a weak acid that partially dissociates in water. Sodium acetate, its salt, can provide acetate ions, which can react with any excess H^+ ions added to the solution. Similarly, the acetic acid can react with any excess OH^- ions. This mutual compensation ensures the pH remains relatively stable.
 14. (C): Pressurized irrigation systems are designed to deliver water directly to the plants in a controlled manner, often reducing water wastage. Among the options provided:
 - Drip irrigation delivers water drop by drop directly to the roots of plants.
 - Rainguns simulate rainfall by spraying water over crops.

- Micro-sprinklers are a type of sprinkler system that operates at lower pressures, distributing water in a controlled manner over the crop. In contrast, furrow and flood irrigation methods are gravity-driven and are not pressurized systems.
15. (A): The mitochondrion is often referred to as the “powerhouse” of the cell. This is because mitochondria produce adenosine triphosphate (ATP), the main energy currency of the cell, through a process called cellular respiration. Within the mitochondria, glucose and oxygen are used to produce ATP, carbon dioxide, and water. This ATP is then used to power various cellular activities. Structurally, mitochondria are unique in that they have two membranes and their own DNA, which is believed to be a result of an ancient symbiotic relationship between a primitive eukaryotic cell and a prokaryotic cell.
 16. (B): Ghee is a fat-rich milk product. It is clarified butter, which means it is butter that has been simmered and strained to remove all water. This leaves a product that is nearly 100% fat. Ghee is used extensively in Indian cooking and also in various religious rituals. Due to its high-fat content, ghee has a rich flavour and is often used in small amounts to add depth to dishes. In comparison, paneer, dahi, and kulfi contain fats but are not predominantly fat.
 17. (A): *Triticum aestivum* is the most cultivated species of wheat in India. This type of wheat is commonly referred to as bread wheat. India, being one of the largest producers of wheat globally, primarily grows this variety due to its high yield and adaptability to diverse climatic conditions. *Triticum aestivum* has a hexaploid genome, which means it contains six copies of every chromosome. This genetic makeup contributes to its robustness and versatility.
 18. (B): Cows and buffaloes typically come into heat or experience estrus after a period of 19-21 days. This is known as the estrous cycle. During this time, the female is receptive to mating and shows several behavioral signs like restlessness, increased vocalization, and mounting other animals. Timely identification of the heat period is crucial in animal husbandry to ensure successful mating and optimal reproductive efficiency.
 19. (C): Amoeba belongs to the kingdom Protista. Organisms in this kingdom are generally unicellular and eukaryotic, which means they have a well-defined nucleus. The amoeba is a classic example of a protist and is often studied in biology for its unique movement mechanism using pseudopods. Pseudopods, or “false feet”, are temporary projections that the amoeba forms to move and capture food. The flexibility and adaptability of amoebas make them a fascinating subject in the microscopic world.
 20. (A): Marigold has African and French varieties. Marigold is a popular flower known for its bright yellow and orange blooms. The African marigold, often larger with yellow or orange flowers, is scientifically known as *Tagetes erecta*. On the other hand, French marigold (*Tagetes patula*) is smaller and often displays a wider range of colours, including reds and browns. Both varieties are used for ornamental purposes, and their vibrant colours make them a favourite choice for gardens and floral decorations.
 21. (C): If a heifer is not showing heat symptoms for breeding, a medical examination is generally needed after 2-years of age and after achieving a certain body weight. It is vital to recognize reproductive problems early to ensure optimal herd management and fertility. Weight, more than age, is often a significant determinant because a heifer should achieve a specific weight before coming into heat. In many cattle breeds, a weight of around 300 kg is considered a standard threshold. Therefore, a combination of age and body weight becomes essential criteria to decide when to conduct a medical examination for non-showing of heat symptoms.
 22. (D): Sulphur (S) is known as a secondary nutrient element for plants. While the primary nutrients (N, P, K) are required in the largest amounts by plants, secondary nutrients like Calcium, Magnesium, and Sulphur are needed in moderate quantities. Sulphur plays a vital role in the formation of certain amino acids, vitamins, and enzymes. Moreover, it aids in the production of chlorophyll and promotes nodule formation in leguminous plants. The deficiency of Sulphur can cause plants to turn pale and exhibit stunted growth.
 23. (C): To calculate the amount of single super phosphate (SSP) required, we need to consider the phosphate content in SSP. SSP generally contains around 16% P_2O_5 (Phosphorus pentoxide). If you need to supply 80 kg P_2O_5 to 1-hectare area, the calculation becomes: Required SSP = $(80 \text{ kg } P_2O_5) \div 0.16$ (or 16%) = 500 kg. Thus, 500 kg of SSP is needed to supply 80 kg P_2O_5 to a hectare.
 24. (A): Soil textural classes categorize soils based on the relative percentages of sand, silt, and clay. The order for clay content in descending order among the provided options is: (b) Clay—Comprised of over 40% clay. (a) Sandy clay—Has between 35% to 65% clay. (d) Sandy clay loam—Contains 20% to 35% clay. (c) Sandy loam—Comprised less than 20% clay but more than sand. (e) Sand—Consists mainly of sand particles with minimal clay. Thus, the correct sequence is (b), (a), (d), (c), (e).

25. (C): Di-ammonium phosphate (DAP) is a complex fertilizer that contains both Nitrogen and Phosphorus. DAP is widely used as a source of both these essential nutrients to enhance plant growth. The nitrogen is provided in the ammonium form, which can be quickly taken up by plants, while the phosphorus is readily available for plant uptake. DAP has the benefit of providing essential nutrients in a balanced form, ensuring optimal growth and development of crops. It does not contain potash, so if a soil requires potassium supplementation, an additional source must be added.
26. (C): Acrocentric chromosomes have a centromere situated close to one end, resulting in one very long arm and one very short arm. The positioning of the centromere dictates the chromosome's shape and how it will align and separate during cellular processes like mitosis. Other categories based on centromere positioning include metacentric (middle), sub-metacentric (between the center and the end), and telocentric (at the very end). The acrocentric chromosome plays a role in certain genetic conditions and evolutionary processes.
27. (C): Operation Flood, launched in 1970, is the world's largest dairy development program. Initiated by the National Dairy Development Board (NDDB) of India, it transformed India from a net importer of dairy products into the world's largest milk producer. This was achieved by creating a nationwide milk grid linking producers throughout India with consumers in over 700 towns and cities, emphasizing the value of milk as a source of rural income and of reasonable prices for consumers. This success was built on the foundational cooperative approach, allowing both production and demand-side measures to be integrated.
28. (C): For jams (excluding raspberry and strawberry jams), the minimum percentage of fruit pulp required is 45% (w/w). This standard ensures that the jam retains the flavor, aroma, and essential characteristics of the fruit it is made from. In many countries, legal standards mandate this minimum to prevent adulteration or dilution with excess sweeteners and water, ensuring consumers get a product that is truly representative of the fruit mentioned.
29. (B): Through the process of Artificial Insemination (AI), semen from a single bull can be used to inseminate more than 20,000 females. AI is an assisted reproduction technique where sperm is collected, processed, and stored to be used later for breeding. It has many advantages over natural mating: it prevents disease transmission, allows for genetic improvement by using semen from superior bulls, and reduces the need for maintaining bulls on the farm. Moreover, with the cryopreservation technique, semen can be stored for an extended period without losing its viability.
30. (C): Commercial propagation methods vary according to the flower crop in question, as they possess distinct biological characteristics:
- (a) Gladiolus II. Corm—Gladiolus is propagated mainly by corms. A corm is a swollen stem base that is modified into a mass of storage tissue.
 - (b) Rose III. T-Budding—Roses are commonly propagated using the T-budding method, especially for the hybrid varieties. This method ensures true-to-type plants that maintain the characteristics of the parent.
 - (c) Marigold I. Seed—Marigold is often propagated by seeds because they germinate easily and grow rapidly.
 - (d) Chrysanthemum IV. Suckers—Chrysanthemums can be propagated by suckers that arise from the base of the plant. This ensures uniformity in the progeny.
31. (C): National Bureau of Plant Genetic Resources, New Delhi is the primary institution in India responsible for the collection and conservation of plant germplasm. Germplasm is living tissue from which plants can be grown. It can be a seed or another plant part – a leaf, a piece of stem, pollen or even just a few cells that can grow into a whole plant. The NBPGR conducts explorations to collect the germplasm, conserves them in gene banks, and conducts research on their genetic characterization and documentation.
32. (B): Allelopathy refers to the biological phenomenon where one plant inhibits the growth of another plant, neighboring or nearby, by producing and releasing chemical substances into the environment. These chemicals, often referred to as allelochemicals, can be beneficial (positive allelopathy) or detrimental (negative allelopathy) to the receiver organisms. Allelopathic interactions are considered important in understanding plant community structures, agricultural practices, and forest regeneration.
33. (B): The phenological stages of wheat, in their correct order, are: (b) Crown root initiation: It is the initial stage where roots start to emerge. (a) Tillering: It is the phase when the plant starts branching out. (c) Jointing: This phase witnesses the elongation of internodes above the ground. (e) Milk: At this stage, if the grain is squeezed, a milky substance comes out. (d) Dough: This is the final stage before maturity when the grain becomes hard but still has moisture. It feels doughy when squeezed. Understanding these stages is crucial for efficient crop management and achieving optimal yield.
34. (C): Deep litter and cage systems for poultry fall under the Intensive system of rearing. The intensive system is designed to raise a large number of birds in a relatively smaller space. In the deep litter system,

birds are raised on the floor covered with litters like straw or husk, while in the cage system, birds are kept in cages, usually in layers. Both methods aim at maximizing production while minimizing the land required, ensuring better monitoring of birds, and providing a controlled environment for feeding, growth, and disease management.

35. (C): Pure line selection is an effective method of crop improvement primarily for Self-pollinated crops. In this method, genetically identical or nearly identical plants are produced over successive generations. Pure lines are essentially homozygous and show little variability, ensuring consistent characteristics over generations. This technique is beneficial for self-pollinated crops because these crops have naturally high levels of homozygosity. Using pure line selection in such crops can lead to the stabilization of desirable traits, ensuring uniformity in yield and other attributes.
36. (D)
37. (A): Removal of weeds through methods like hand pulling, hoeing, and mowing is considered a Physical method. Physical weed control involves the manual or mechanical removal of weeds. Hand pulling is self-explanatory, where weeds are uprooted by hand. Hoeing involves the use of a hoe to cut or uproot weeds, and mowing is the process of cutting off the tops of weeds. These physical methods are effective but can be labor-intensive, especially in larger areas.
38. (D): Glucose is not a polysaccharide. Glucose is a simple sugar or monosaccharide. It serves as an essential energy source for plants and animals. On the other hand, pectin, lignin, and hemicellulose are complex carbohydrates or polysaccharides. Polysaccharides are made up of multiple monosaccharide units linked together. While glucose serves primarily as an energy source, polysaccharides can have structural roles (like in the case of lignin in plants) or can act as food storage molecules.
39. (B): Rinderpest is not a bacterial disease; it's a viral disease. Rinderpest, also known as cattle plague, was caused by the rinderpest virus and was characterized by fever, oral erosions, diarrhea, and high mortality. This disease was declared eradicated in 2011 by the World Organisation for Animal Health (OIE). On the other hand, *Haemorrhagic septicaemia*, Black quarter, and Mastitis can be caused by bacteria. Specifically, Mastitis can be caused by a range of microorganisms, including bacteria, viruses, and algae.
40. (B): In wheat, the 'crown-root initiation' is considered the most moisture-sensitive stage for irrigation. Wheat has several growth stages, and the crown root initiation is a critical phase in its development. This is the time

when secondary roots start to develop from the base of the shoot. Adequate moisture during this phase ensures healthy root development, which is essential for the plant's overall growth, nutrient uptake, and eventual grain yield. Proper irrigation management ensures that the crop gets the right amount of water at the most critical times, optimizing yield and quality.

41. (B): Thymine is the common name for 5-methyl uracil. Both thymine and uracil are pyrimidine bases, but thymine is specific to DNA, while uracil is found in RNA. The presence of a methyl group at the 5th position differentiates thymine from uracil. This substitution of thymine in DNA instead of uracil is critical as it adds an additional level of stability to the DNA structure.
42. (C): The base that is present in RNA but not in DNA is uracil. In DNA, thymine takes the place of uracil. This distinction is essential for maintaining the integrity of the genetic code. If uracil were present in DNA, it could easily be deaminated to form cytosine, leading to potential mutations. By using thymine instead of uracil, DNA minimizes the chance of this mutation occurring.
43. (C): The ratio between Guanine (G) and Cytosine (C) in DNA is 1:1. This is based on the observation made by Erwin Chargaff, known as Chargaff's rules. He observed that the quantity of adenine (A) always equaled the quantity of thymine (T), and the quantity of guanine (G) always equaled the quantity of cytosine (C). These observations laid the groundwork for understanding the base-pairing rules that are foundational to the structure of the DNA double helix.
44. (C): The initial name given to DNA was "nuclein". Friedrich Meischer identified DNA as an acidic substance present in the nucleus in 1869. The name "nuclein" derived from its location in the nucleus and its acidic nature. Over time, as our understanding of its structure and function evolved, the name was changed to deoxyribonucleic acid, or DNA.
45. (B): The 'Double Helix' structure of DNA was proposed by James Watson and Francis Crick. Their groundbreaking work in 1953 unveiled the molecular structure of DNA, which explained how genetic information could be stored and replicated. While Watson and Crick made this revolutionary discovery, it was based on the X-ray diffraction data produced by Maurice Wilkins and Rosalind Franklin. Franklin, in particular, played a significant role in producing the X-ray images that were key to understanding the double helix structure, but her contribution was not fully recognized until much later.

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| 46. (D) | 47. (B) | 48. (C) |
| 49. (A) | 50. (D) | |