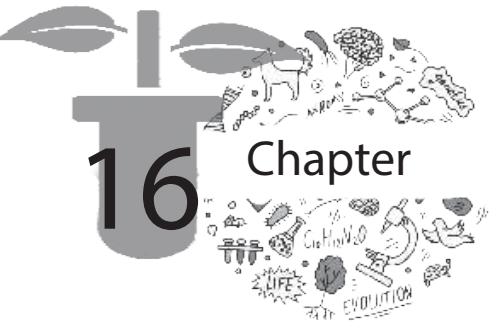

16 Chapter Strategies for Enhancement in Food Production

MULTIPLE CHOICE QUESTIONS

Topic 1	Animal Husbandry

1. Select the incorrect statement.
(a) Inbreeding is essential to evolve pure line in any animal.
(b) Inbreeding selects harmful recessive genes that reduce fertility and productivity.
(c) Inbreeding helps in accumulation of superior genes and elimination of undesirable genes.
(d) Inbreeding increases homozygosity.

2. Homozygous pure lines in cattle can be obtained by
(a) Mating of related individuals of the same breed.
(b) Mating of unrelated individuals of the same breed.
(c) Mating of individuals of different breed.
(d) Mating of individuals of different species.

3. The results of inbreeding are not always desirable because
(a) the selected superior bull produces progeny with improved traits
(b) crossing the related animals of the same breed produces pure lines
(c) the progeny exhibits increased frequency of both undesirable and desirable genes
(d) it increases milk production in cows

4. Match the Column-I with Column-II.

	Column I		Column II
(A)	Outbreeding	(1)	Mating of animals of the same breed but no common ancestors for 4–6 generations.
(B)	Outcrossing	(2)	Mating of animals of different species
(C)	Crossbreeding	(3)	Includes outcrossing and cross-breeding.
(D)	Interspecific hybridization	(4)	Mating of superior males and females of different breeds.

Select the correct option:

	(I)	(II)	(III)	(IV)
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	3	1	4	2

5. Most of the mating done by animal breeders are outcrossing because
(A) it reduces the expression of harmful genes by masking them in heterozygous genotype
(B) it helps in bringing the desirable traits into the progeny
(C) it increases homozygosity
(D) it produces pure lines
Select the correct option.
(a) A, B, C, D are true
(b) A and B are true
(c) A and D are true
(d) C and D are true

6. The offspring of crossbreeding is
(a) pure line
(b) hybrid
(c) homozygous genotype
(d) inbred lines

7. Hisardale is the breed of sheep developed by crossing
(a) Cochin ram and Ghagus ewes
(b) Bikaneri ewes and Marino rams
(c) Bikaneri rams and Marino ewes
(d) Cochin ewes and Marino rams

8. Mule is the hybrid produced by crossing
(a) male donkey and a female horse
(b) female donkey and a male horse
(c) male hinny and a female horse
(d) stallion and mare

9. Interspecific hybridization is the mating of
(a) superior males and females of different breeds
(b) more closely related individuals within the same breed for 4–6 generations
(c) animals within the same breed without having common ancestors
(d) two different related species

10. Interspecific hybridization between stallion and female donkey produces the hybrids called
(a) mule (b) hinny
(c) jack (d) jennet

11. The process of placing the sperms in the female reproductive tract by artificial means is known as-
(a) artificial insemination
(b) interspecific hybridization
(c) asexual reproduction
(d) parthenogenesis

12. The process of artificial insemination is advantageous over normal mating. Select the incorrect statement about the process.
(a) It permits the fertilization of a large number of female animals from the semen collected in one ejaculation of a superior bull.
(b) Collected semen is cooled slowly and stored at −195.5 degrees Celsius for a longer period.
(c) It permits the easier use of exotic breed bulls as superior males.
(d) The collected semen should not be frozen as it kills sperms.

13. The technique of controlled breeding experiments that includes superovulation in cows to make them produce 6–8 eggs per ovarian cycle is known as
(a) artificial insemination
(b) hormonal induction
(c) multiple ovulation embryo transfer technology
(d) embryo transfer technology

14. MOET (Multiple Ovulation Embryo Transfer technology) includes the use of _____ to stimulate superovulation in cows.
(a) LH
(b) FSH and prostaglandins
(c) GnRH
(d) Gonadotropins

15. Consider the following events:
(I) Superovulation in cows
(II) Fertilization of eggs
(III) Mating with elite bull
(IV) Transfer of eggs to surrogate mothers
(V) The second round of superovulation in genetic mother

Arrange the events of MOET in the correct order and select the correct option.
(a) I, II, IV, III, V (b) I, III, II, IV, V
(c) I, III, IV, II, V (d) II, III, I, IV, V

16. Practical applications of biological and biotechnological principles include
(a) animal husbandry and plant breeding to increase the production of food products
(b) plant breeding to increase dairy production
(c) tissue culture techniques
(d) both (a) and (c) are correct

17. Selective breeding of livestock is known as
(a) animal husbandry (b) plant breeding
(c) poultry farming (d) fisheries

18. Consider the following statements:
(a) The practices of animal husbandry include raising and breeding the livestock, fisheries and poultry farming.
(b) More than 70% of the world's livestock population is in India and China.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

19. Which of the following sets of organisms does not represent livestock?
(a) Cows, pigs, horses, and fishes
(b) Sheep, pigs, camels, and fishes
(c) Cows, pigs, camel, and goats
(d) Poultry, fishes, and elephants

20. Fisheries include rearing, catching and selling of
(a) fishes, molluscs, and crustaceans
(b) fishes only
(c) fishes and shell-fish only
(d) fishes and crustaceans only

21. Raising and breeding of animals for milk and milk products is known as
(a) fisheries (b) dairying
(c) poultry farming (d) plant breeding

22. Which of the following set of animals is not expected to be found in dairy farms?
(a) Cattle, buffalo, goat, and sheep
(b) Camel, buffalo, goat, and sheep
(c) Cattle, buffalo, goat, and cattle
(d) Poultry, cattle, goat, buffalo

23. Which of the following set of products is not obtained from a dairy farm?
(a) Milk, butter, cheese, yoghurt
(b) Milk, condensed milk, cheese, yoghurt
(c) Butter, egg, cheese, yoghurt
(d) Ice cream, yoghurt, milk, cheese

24. Which of the following measures are taken to realize the yield potential of cattle breeds at dairy farms?
(a) Proper housing, adequate water supply
(b) Cleanliness and hygiene of both cattle and handler
(c) Feeding cattle in a scientific manner
(d) All of these

25. Consider the following statements:
(a) Animal husbandry refers to the domesticated birds used for food and/or eggs.
(b) Chicken, ducks, turkey, geese are some examples of poultry.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

26. Match Column-I with Column-II.

	Column I		**Column II**
(i)	Raised for egg production	(1)	Turkey, geese and ducks
(ii)	Raised for meat	(2)	Ayrshire, Guernsey, Holstein-Friesian and Jersey
(iii)	Cattle breed with high milk production	(3)	Important factors for success with poultry
(iv)	Proper feeding, good management and sanitation	(4)	Hens

Select the correct option

	(i)	(ii)	(iii)	(iv)
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	3	1	4	2

27. The causative agent of Avian Influenza is
(a) H5N1 virus (b) HIV
(c) *E. coli* (d) *Clostridium*

28. Which of the following measures is/are required to prevent the spread of H5N1 virus from birds to a human?
(a) Consumption of poultry and eggs above the temperature of 100°C
(b) Influenza vaccination
(c) Maintain personal hygiene
(d) All of these

29. Leghorn, Minorca and Andalusia are the small-sized breeds of chickens. The most population breed for egg production is
(a) Leghorn (b) Minorca
(c) Andalusia (d) None

30. Consider the following statements:
(a) A breed is a group of related animals that are true to the genetic traits characteristic of the breed.
(b) Animals of the same breed do not share a common ancestor.
Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

31. Use of selective mating for the production of breeds of domesticated animals with desired traits is known as
(a) plant breeding (b) animal breeding
(c) poultry (d) farming

32. Consider the following statements about animal breeding. Which of the given statements is incorrect?
(a) Animal breeding aims to improve the growth rate and production of useful products from the animals.
(b) It includes the production of improved breeds of domesticated animals to obtain milk and meat of superior quality.
(c) It does not aim to improve disease resistance in animals.
(d) Methods of animal breeding are based on selective breeding.

33. Match the terms in Column-I with a suitable description in Column-II.

	Column I		**Column II**
(i)	Inbreeding	(1)	Overcomes inbreeding depression
(ii)	Outbreeding	(2)	Increased homozygosity
(iii)	Inbreeding depression	(3)	Crossing the different breeds.
(iv)	Outcrossing	(4)	Reduced productivity due to inbreeding

Select the correct option:

	(i)	(ii)	(iii)	(iv)
(a)	4	1	2	3
(b)	2	3	4	1
(c)	1	2	4	3
(d)	2	3	4	1

34. The straight-breeding technique of crossing the related animals to increase the genetic purity and homozygosity of progeny is
(a) outbreeding (b) inbreeding
(c) outcrossing (d) crossbreeding

35. The scientific name of the Indian honey bee is
(a) *Apis indica* (b) *Apis Indica*
(c) *Apis Indiana* (d) *Apis melliferae*

36. Maintenance of hives of honeybees for honey production is called
(a) bee-keeping (b) apiculture
(c) bee-breeding (d) both (a) and (b)

37. Which of the following does not represent the importance of apiculture?
(a) Obtain nutritious honey
(b) Provides bee wax
(c) Honey bees are pollinating agents
(d) All are the importance of apiculture

38. Which of the following sets of industries use the products obtained from apiculture?

(a) Indigenous system of medicines, cosmetics and polishes
(b) Allopathic medicines, cosmetics
(c) Medicines, leather production
(d) Food industry, dairy products

39. Honey bees are pollinator of
(a) corn, sunflower, apple and oats
(b) barley, corn, apple and sunflower
(c) sunflower, Brassica, apple and pear
(d) wheat, rye, apple and pear

40. Which of the following species are most commonly domesticated to obtain honey?
(a) *Apis dorsata* and *Apis indica*
(b) *Apis dorsata* and *Apis mellifera*
(c) *Apis florea* and *Apis indica*
(d) *Apis indica* and *Apis mellifera*

41. Match Column-I with Column-II

	Column I		**Column II**
(A)	Edible freshwater fishes	(1)	Prawn, lobster, oyster
(B)	Edible marine fishes	(2)	Catla, Rohu and common carp
(C)	Seafood	(3)	Improved production of useful products from aquaculture
(D)	Blue revolution	(4)	Hilsa, Sardines, Mackerel and Pomfrets

Select the correct option.

	A	B	C	D
(a)	2	4	1	3
(b)	1	3	4	2
(c)	4	2	1	3
(d)	3	1	4	2

42. Among the following edible fishes, which one is a marine fish having a rich source of omega-3 fatty acids?
(a) Mrigala (b) Mackerel
(c) *Mystus* (d) Mangur

43. Fisheries have an important place in Indian economy because
(a) it provides food to the population
(b) it serves as the only source of livelihood in many coastal regions
(c) it provides fish oil, pearls, fish protein, etc.
(d) all the given options are correct.

44. Select the incorrect match from the following?
(a) Pisciculture: fish farming
(b) Aquaculture: raising aquatic animals to obtain useful products
(c) Fishes: a rich source of vitamin D, riboflavin, omega-3 fatty acid and minerals
(d) Honey: a rich source of sugars, fats, and fibers

45. Father of Blue revolution in India is
(a) Dr. Arun Krishnan (b) Nirpakh Tutej
(c) Vishal Shekhar (d) Durgesh Patel

46. Assertion: Bird flu is a viral disease and is caused by the H5N1 virus.

Reason: Bird flu is transmitted from affected birds to humans through direct contact or consumption of their eggs.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

47. Assertion: Inbreeding is required to obtain pure line in any animal.

Reason: Mendel obtained pure line of pea plants by cross-pollination.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

49. Assertion: Controlled breeding experiments are done using interspecific hybridization.

Reason: Outcrossing increases homozygosity in the progeny.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

50. Assertion: A group of bees is called swarm.

Reason: Honey bees are pollinators of many crop plants.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

51. A tremendous increase in crop and food production as an outcome of the application of plant breeding and production technology is known as
(a) Green revolution (b) White revolution
(c) Blue revolution (d) Grey revolution

52. Father of the Freen revolution in India is
(a) Verghese Kurien (b) Vikram Sarabhai
(c) M.S. Swaminathan (d) Homi J Bhabha

53. Consider the following statements about plant breeding.
(a) It is the deliberate manipulation of plant genome to create or impart the desired traits in the plants.
(b) It aims to obtain plant types with better productivity and disease resistance.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

54. A true breeding plant is
(a) near homozygous and produces offspring of its own kind
(b) always homozygous recessive in its genetic constitution
(c) one that is able to breed on its own
(d) produced due to cross-pollination among unrelated plants

55. Classical breeding approach uses the proven tools of
(a) hybridization of pure-lines and artificial selection of desired genotypes.
(b) hybridization of pure-lines and genome manipulation of selected progeny.
(c) incorporation of desired genes and artificial selection of progeny.
(d) genome manipulation only.

56. Which of the following is not an objective of plant breeding?
(a) To improve crop productivity and quality.
(b) To impart stress and pathogen resistance in crop plants.
(c) To increase tolerance of crop plants for insect pests.
(d) All are the objectives of plant breeding.

57. Which of the following set of factors cause environmental stress in plants?
(a) Pathogens, drought and flood
(b) Salinity, extreme temperatures and drought
(c) Parasites, extreme temperatures and drought
(d) Parasites, pathogens and flood

58. Consider the following steps in plant breeding:
(I) Testing, release and commercialization of new cultivars
(II) Collection of variability

(III) Selection and testing of superior recombinants
(IV) Cross hybridization among the selected parents
(V) Evaluation and selection of parents
Arrange the steps in correct order and selection the correct option.
(a) I, V, IV, II, III (b) II, V, III, IV, I
(c) II, V, IV, III, I (d) II, IV, V, III, I

59. In the plant breeding programs, the entire collection (plants/seeds) having all the diverse alleles for all genes of a given crop is called
(a) Germplasm collection
(b) Selection of superior recombinants
(c) Cross-hybridization among the selected parents
(d) Evaluation and selection of parents

60. Sum total of all the hereditary material belonging to single species is known as
(a) genotype (b) germplasm
(c) hybrid (d) cultivar

61. Consider the following statements about germplasm collection:
(a) The gene of interest should be present in the base population to initiate a breeding program.
(b) Genetic variability is a prerequisite to develop a new cultivar by breeding programs.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b)are false.
(d) (a) is false but (b) is true.

62. The selected superior recombinants in plant breeding program are self-pollinated for several generations so as to
(a) increase the homozygosity to prevent segregation of the desired trait in the progeny.
(b) increase the heterozygosity to prevent segregation of the desired trait in the progeny.
(c) increase the homozygosity to allow segregation of the desired trait in the progeny.
(d) increase the heterozygosity to allow segregation of the desired trait in the progeny.

63. The new cultivars produced by plant breeding programs are evaluated for
(a) yield
(b) morphological and quality traits
(c) resistance to diseases and stress
(d) all the given choices are correct

64. Around _____ of the Indian population is employed in agricultural activities which in turn accounts for _____ of the country's GDP.
(a) 62%, 33% (b) 33%, 62%
(c) 32%, 63% (d) 30%, 62%

65. Which of the following factors were responsible for limited agricultural production after the independence of India?
(a) Limited land for agriculture and scarce resources
(b) Seasonal rainfall in deserts
(c) Lower temperature conditions in Northern plains
(d) A small fraction of the population involved in agricultural activities

66. The key strategies targeted by Dr. Norman E. Borlaug that resulted in the Green Revolution in the world were
(a) development of sugarcane cultivars with insect pest resistance
(b) development of high yielding wheat cultivars with desired agronomic traits to realize the maximum productivity
(c) development of maize cultivars with disease resistance
(d) all the given options are correct

67. Which of the following set of the traits correctly represent the features of semi-dwarf varieties

developed by Dr. Norman E. Borlaug?
(a) Better crop production and lodging resistance
(b) Adapted to local climatic conditions and lodging resistance
(c) High yielding, adapted to local climatic conditions, lodging resistance
(d) Lodging resistance and better crop yield

68. Nobel laureate Norman E. Borlaug was the director of Wheat Program at_____ and developed semi-dwarf varieties of wheat.
(a) Center for Plant Breeding and Genetics
(b) Indian Society of Genetics and Plant Breeding
(c) Centro Internationale de Mejoramiento de Maiz y Trigo
(d) International Centre for Plant Breeding Education and Research

69. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Kalyan Sona, Sonalika	(1)	Pearl millet
(B)	Jamnagar Giant and Improved Ghana	(2)	Wheat
(C)	Pusa Lal and Pusa Sunhari	(3)	Tomato
(D)	Pusa Ruby	(4)	Sweet potato

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	2	1	4	3
(c)	4	2	1	3
(d)	3	1	4	2

70. Which of the following crop cultivars is incorrect matched?
(a) Sonora 64 and Lerma Rojo: Wheat
(b) TN 1, IR8, IR 28: Rice
(c) P 1542, Rachna: Linseed
(d) C251, K12: Barley

71. Which of the following rice cultivar is incorrectly matched with its land of origin?
(a) IR 8: International Rice Research Institute (IRRI), Philippines
(b) Taichung Native-1: Taiwan
(c) Jaya: India
(d) Ratna: Mexico

72. The _____ and _____ were the rust resistant high yielding varieties of wheat introduced in India from Mexico.
(a) Kalyan Sona and Sonalika
(b) TN-I and Sonalika
(c) IR-8 and Kalyan Sona
(d) IR-8 and TN-1

73.
(a) The semi-dwarf wheat and rice varieties that made India self-sufficient in food grains were lodging resistant, responsive to the application of fertilizers and high yielding.
(b) The rice varieties were resistant to all three rusts and other prevalent diseases.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

74. The photoperiod insensitive wheat and rice varieties are beneficial because-
(a) they are disease resistant.
(b) It allows the late planting of the crop.
(c) these varieties could be grown in non-traditional regions.
(d) both (b) and (c)

75. The scientific name of Indian canes is
(a) *Saccharum officinarum*
(b) *Saccharum spontaneum*
(c) *Saccharum munja*
(d) *Saccharum barberi*

76. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Saccharum barberi	(1)	South Indian cane with thicker stems and higher sugar content
(B)	Saccharum officinarum	(2)	High yield, thick stems, high sugar and adapted to grow in North India

(C)	Nobilized canes	(3)	Resistant to water stress
(D)	Hybrid millets	(4)	North Indian cane with poor sugar content and yield

Select the correct option:

	A	B	C	D
(a)	4	1	2	3
(b)	2	1	4	3
(c)	2	4	1	3
(d)	2	3	4	2

77. The objective/s of development of disease resistance in crop plants is/are
(a) to reduce or prevent the invasion, growth, and development of pathogen
(b) to reduce dependence on the use of fungicides and bacteriocides
(c) to realize the maximum crop production
(d) all the given choices are correct

78. Which of the following sets of plant diseases include all fungal diseases?
(a) Turnip mosaic, black rot of crucifers and brown rust of wheat
(b) Black rot of crucifers, brown rust of wheat and red rot of sugarcane
(c) Brown rust of wheat, red rot of sugarcane and late blight of potato
(d) Tobacco mosaic, black rot of crucifers and brown rust of wheat

79. Which of the following statements correctly differentiates conventional breeding techniques for the disease resistance in plants from the mutational breeding?
(a) Mutational breeding screens germplasm for the source of disease resistance genes.
(b) Conventional breeding includes the introduction of disease resistance genes in plants by induced mutations.
(c) Mutational breeding induces mutations in plants to introduce disease resistance in them.
(d) Mutational breeding cannot be applied to crop plants.

80. Breeding for disease resistance in crop plants is carried out by conventional techniques or by mutational breeding. Which of the following crop was not bred by conventional techniques for disease resistance?
(a) Resistance to white rust in *Brassica*
(b) Resistance to bacterial blight in cowpea
(c) Resistance to hill bunt in wheat
(d) Resistance to powdery mildew in mung bean

81. Which of the following is a wheat variety bred by conventional breeding techniques to develop resistance to leaf and stripe rust in them?
(a) Himgiri (b) Pusa Swarnim
(c) Pusa Shubhra (d) Pusa Snowball K-1

82. Pusa Komal variety of cowpea is resistant to _____ while Pusa Sadabahar variety of chilly is resistant to _____
(a) Bacterial blight and Leaf curl
(b) White rust and Tobacco mosaic virus
(c) Black rot and Chilly mosaic virus
(d) Bacterial blight and hill bunt

83. Plant breeding for disease resistance by conventional techniques has limited success due to-
(a) Time consuming screening of germplasm
(b) Limited availability of disease resistance genes in the collected germplasm
(c) The tedious process of evaluation of developed cultivars
(d) Limited knowledge about the pathology of plant disease

84. When a source of disease resistance gene is not available or not known, _____ is followed to produce disease resistant mutants plants.
(a) Conventional breeding
(b) Mutagenesis
(c) Plant breeding
(d) Germplasm screening

85. Consider the following statements:
(a) Disease resistant somaclonal variants may serve as a source of disease resistance for plant breeding.
(b) Recombinant DNA technology develops the disease resistant transgenic crop plants by transferring the disease resistance gene in crops from any other source.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b)are false.
(d) (a) is false but (b) is true.

86. Which of the following is a yellow mosaic virus resistant variety of *Abelmoschus esculentus*?
(a) TN-1 (b) Prabhani Kranti
(c) Himgiri (d) Pusa Komal

87. Which of the following set of examples represent insect resistance due to morphological features?
(a) Resistance to jassids in cotton and cereal leaf beetle in wheat
(b) Stem borer resistance in maize
(c) Rust resistance in wheat
(d) Rot resistance in cauliflower

88. Cereals are the staple source of nutrition in human diet. Which of the following is a man made cereal?
(a) *Triticum* (b) *Triticale*
(c) *Sorghum* (d) Bajra

89. Select the incorrect statement about insect pest resistance in crop plants.
(a) Solid stems of wheat are not preferred by stem sawflies.
(b) The presence of smooth leaves and no nectar makes the cotton varieties resistant to bollworms.
(c) High aspartic acid and low nitrogen in maize impart stem borer resistance.
(d) Maize varieties with high sugar content are resistant to maize stem borers.

90. Pusa Gaurav is the _____ resistant variety of _____ plants bred by conventional hybridization techniques.
(a) Wheat, stem borer
(b) Jassids, cotton
(c) Aphids, rapeseed mustard
(d) Jassids, beans

91. Pusa Sem 2 and Pusa Sem 3 varieties of the flat bean are resistant to
(a) bollworms and jassids
(b) stem sawfly and aphids
(c) leaf beetle and fruit borer
(d) jassids, aphids and fruit borer

92. Which of the following are the shoot and fruit borer resistant varieties of Okra?
(a) Pusa Gaurav (b) Pusa Sem 3
(c) Pusa Sem 2 (d) Pusa A-4

93. Which of the following set correctly represents the three major food crops that feed most of the world population?
(a) Maize, wheat, and rice
(b) Maize, jowar, and bajra
(c) Corn, soybean, and wheat
(d) Corn, soybean, and rice

94. Which of the given statements is incorrect about the nutritional quality of food crops?
(a) Cereals are generally low in protein content.
(b) Legumes tend to be low in tryptophan amino acid.
(c) Corn, wheat, and rice are low in lysine amino acids.
(d) Rice is a rich source of proteins and vitamin A.

95. Select the option that correctly represents some of the essential micronutrients required by the human body.
(a) Iron, nitrogen, oxygen and phosphorus
(b) Iron, vitamin A, iodine and zinc
(c) Iron, vitamin A, carbon and potassium
(d) Manganese, copper, nitrogen and carbon

96. Parents often complain about fatigue and weakness in their children despite the proper intake of food. Which of the following could be a reason behind the same?
(a) Hidden hunger
(b) Over consumption of proteins
(c) Obesity
(d) Over consumption of carbohydrates

97. Which of the following micronutrients is correctly matched with its respective deficiency disorder?
(a) Vitamin A – anemia
(b) Iron – night blindness
(c) Iodine – goiter
(d) Zinc – beriberi

98. Application of breeding or biotechnological processes to improve the nutrient levels of crop plants is known as
(a) biogeochemistry
(b) biofortification
(c) biomagnification
(d) plant breeding

99. Which of the following components determine the nutritional quality of food crops?
(a) Protein content and balance of amino acids
(b) Oil content and fatty acid composition
(c) Vitamin and mineral content
(d) All the given choices are correct

100. To improve the protein content of cultivated wheat, the high protein content gene from _____ was transferred into commercial variety_____. This improved wheat variety exhibited higher protein content with no reduction in its yield.
(a) Atlas 56, Lancota (b) Atlas 66, Lancota
(c) Lancota, Atlas 66 (d) Lancota, Atlas 56

101. Which of the following food/vegetable crop is incorrectly matched with the nutrients for which they were bred?
(a) Maize: Lysine and tryptophan
(b) Carrots, spinach, pumpkin: Vitamin A
(c) Bitter gourd, bathua, mustard, tomato: Vitamin C
(d) Spinach and bathua: Lysine and phenylalanine

102. Assertion: Limited land availability for agriculture was the major reason for food production in India before the green revolution.

Reason: High yielding and disease resistant varieties of cereal crops made India self-sufficient in food production.
(a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

103. Assertion: The presence of genetic variability is a prerequisite for plant breeding techniques.

Reason: Conventional breeding use existing genes for desired traits as parents for hybridization.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

104. Assertion: *Saccharum barberi* was the south Indian sugarcane with higher sugar content and yield.

Reason: Saccharum officinarum was grown in north India and had thicker stems but poor sugar content.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

105. Assertion: The random changes in the genome of living beings are called mutations.

Reason: Mutations introduce new genes/alleles and add variations.

(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

106. Assertion: Mutation breeding uses artificial mutations to obtain the plants with desired genetic traits.

Reason: Yellow mosaic virus resistance variety of mung bean was developed by mutation breeding.

(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

107. Assertion: Cereals are a poor source of carbohydrates.

Reason: Legumes are rich in tryptophan amino acid.

(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

Topic 2 Single Cell Protein

108. Which of the following microorganisms serve in the production of single-cell protein?

(a) Bacteria (b) Yeast
(c) Algae (d) All of these

109. A bulk of dead and dry cell microbes that possess high levels of proteins and is grown on varieties of carbon sources is known as

(a) hyphae (b) single cell protein
(c) colony (d) microbial mount

110. Consider the following statements:

(a) Single cell proteins are rich sources of essential amino acids such as lysine and tryptophan which are scarce in plant and animal proteins.
(b) Around 60%–82% of dry cell weight of single cell protein is protein.

Select the correct option.

(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

111. Consider the following statements:

(a) A shift from grain to meat diet creates more demand for grains.
(b) Only 10% energy of one trophic level is available for the next trophic level.

Select the correct option.

(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

112. Single cell proteins as an alternative to human food sources is an environment-friendly approach because

(a) microbes are a good source of protein
(b) microbes have higher reproduction rates

(c) microbes are grown on the organic waste matter
(d) conventional breeding programs cannot meet the demand for food

113. Single cell proteins are being produced using waste organic matter. Which of the following set correctly represents the organic waste materials used for the purpose?
(a) Waste water from potato processing plants, straw, molasses
(b) Animal manure, sewage, antibiotics
(c) Sewage, industrial waste, waste from nuclear reactors
(d) Hydrocarbon, straw, volcanic eruptions

114. Consider the following statements.
(a) More than 50% of the human population is suffering from hunger and malnutrition.
(b) Single cell protein is also known as microbial protein or bio-protein.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

115. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Cucumber and orange peel	(1)	Bacterial
(B)	*Methanomonas*	(2)	Algae
(C)	*Spirulina*	(3)	Fungus
(D)	*Aspergillus*	(4)	Production of single cell proteins

Select the correct option.

	A	B	C	D
(a)	1	4	2	3
(b)	4	1	2	3
(c)	4	2	1	3
(d)	3	1	4	2

116. Which of the following represents the production of single cell proteins?
(a) Production of *Saccharomyces* cerevisiae from molasses in World War I.
(b) Production of Torula yeast on sulfite liquor waste from paper production plants during World War II.
(c) Growing cell biomass of *Saccharomyces cerevisiae* on fruit peels.
(d) All the given choices are correct.

117. 250 g of *Methylophilus methylotrophus* can obtain as much as _____ of proteins as compared to 250 kg cow that produces only 200 g of proteins.
(a) 250 tonnes (b) 25 tonnes
(c) 2.5 tonnes (d) 12 tonnes

118. Select the incorrect match from the given examples of single cell protein microbes.
(a) Bacteria: *Methanomonas, Pseudomonas*, *Bacillus*
(b) Yeast: *Candida utilis, S. cereviseae, Pichia pastoris*
(c) Fungi: *Fusarium, Aspergillus, Penicillium*
(d) Algae: *Spirullina, Hydrogenomonas*

119. Assertion: Microbes have higher growth rates and produce more biomass in less time.

Reason: Some microbial species are rich sources of essential amino acids.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

120. Assertion: Algae are autotrophs and produce organic matter by the process of photosynthesis.

Reason: *Spirulina* and *Scenedesmus* are the most commonly used bacterial sources of single cell proteins.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

Topic 3 Tissue Culture

121. Growth of tissues or cells in an artificial medium under sterile conditions is known as:
(a) Callus
(b) Tissue culture
(c) Somatic hybridization
(d) Somatic hybrid

122. The excised plant tissue or organ grown in a test tube under aseptic conditions to generate whole plants is known as:
(a) meristem (b) explant
(c) hybrids (d) stem cells

123. Which of the following plant parts serve as source of explant for tissue culture?
(a) Petal, leaves and flower buds
(b) Ovaries and anther
(c) Seeds and nodal segment
(d) All of these

124. Consider the following statement:
(a) A totipotent cell contains a complete set of genetic information to direct the development of an entire organism.
(b) A pluripotent cell is a stem cell that can produce many but not all the cell types in an organism.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

125. Concept of totipotency was given by
(a) Morgan (b) Haberlandt
(c) MS Swaminathan (d) Norman Borlaug

126. Given below are the various steps of plant tissue culture. Arrange them in correct order and select the correct option.
(I) Preparation of instrument and nutrient culture medium
(II) Preparation of explant
(III) Sterilization of culture medium
(IV) Acclimatization of plantlets and transfer to pots
(V) Inoculation of explant and incubation for growth
(a) I, III, II, V, IV (b) II, I, III, V, IV
(c) I, II, III, V, IV (d) I, III, II, IV, V

127. Sterilization of tissue culture apparatus is done by
(a) autoclave only
(b) autoclave and washing with chromic acid and detergent
(c) autoclave and washing with detergent
(d) surface treatment with chromic acid

128. During the 1950s, _____ and _____ performed various experiments that led to the development of synthetic growth medium to stimulate growth and division in explants.
(a) Miller and Morgan
(b) Miller and Skoog
(c) Morgan and Mendel
(d) Hugo de Vries and Morgan

129. The basic requirements for tissue culture techniques are
(a) Aseptic conditions
(b) Synthetic growth medium
(c) Explant
(d) All of these

130. Consider the following statements about tissue culture.
(a) A tissue culture medium provides minerals and growth regulators to the growing cells.
(b) It serves as a source of organic compounds but does not provide physical support.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

131. Which of the following growth regulators is incorrectly matched with its effect on the growing explant in a synthetic medium?
(a) Naphthalene acetic acid (NAA) and indole-3-butyric acid (IAA): Induce rooting
(b) 2, 4-diclorophenoxyacetic acid (2, 4-D): Induce rooting
(c) Kinetin: Induces shoot formation
(d) Higher auxin to cytokinin ratio: Promotes shoot formation

132. A callus is
(a) undifferentiated mass of cells formed on an explant.
(b) aggregation of totipotent cells that can be manipulated to develop into any plant part.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

133. Based on their ability to give rise to new cell types, how would you classify zygote and spermatogonia in humans?
(a) Totipotent and pluripotent respectively
(b) Totipotent and unipotent respectively
(c) Unipotent and pluripotent respectively
(d) Pluripotent and pluripotent respectively

134. A synthetic growth medium should provide all the nutrients required for the development of a new plant. Select the nutrient category that is correctly matched with its representative.
(a) Carbon source: Vitamins
(b) Inorganic nutrients: Sucrose
(c) Growth regulators: Minerals
(d) Salts: Sulfates

135. Match Column-I with Column-II.

	Column I		**Column II**
(A)	Micro-propagation	(1)	Apical and axillary
(B)	Somaclones	(2)	Protoplast fusion
(C)	Somatic hybrids	(3)	*In vitro* clonal propagation of plants
(D)	Meristem	(4)	Genetically identical plants produced by tissue culture

Select the correct option.

	A	B	C	D
(a)	4	1	2	3
(b)	2	3	4	2
(c)	3	4	2	1
(d)	3	1	4	2

136. Rapid clonal propagation of explant to obtain genetically identical plants is known as
(a) somatic hybridization
(b) micropropagation
(c) protoplasts
(d) meristem culture

137. Micropropagation is advantageous over sexual reproduction in orchids as:
(a) It is a rapid process and reduces the dependency on seeds for reproduction.
(b) It maintains the desirable genetic traits present in the parent plant.

Select the correct option.
(a) Both (a) and (b) are true.
(b) (a) is true but (b) is false.
(c) Both (a) and (b) are false.
(d) (a) is false but (b) is true.

138. Production of virus-free plants from a virus-infected plant is done by meristem culture because
(a) meristem culture is a technique of rapid clonal propagation.
(b) some of the progeny from the meristem culture may be virus-free.

(a) a plant cell without a cell wall
(b) a plant cell without a cell membrane
(c) a plant cell undergoing division
(d) a plant cell without a nucleus

140. Which of the following options represents the correct sequence of steps in somatic hybridization?
(a) Isolation of plant cells → Fusion of protoplasts from different plant varieties → Production of somatic hybrids → Digestion of cell wall.
(b) Isolation of plant cells → Digestion of cell wall → Fusion of protoplasts from different plant varieties → Production of somatic hybrids.
(c) Isolation of plant cells → Fusion of protoplasts from different plant varieties → Digestion of cell wall → Production of somatic hybrids.
(d) Isolation of plant cells → Fusion of protoplasts from different plant varieties → Production of somatic hybrids.

141. A technique of micropropagation is
(a) somatic embryogenesis
(b) protoplast fusion

(a) IAA and kinetin
(b) IAA and gibberellins
(c) Sodium chloride and potassium chloride
(d) Polyethylene glycol and sodium nitrate

143. Select the mismatch from the given options.
(a) Tissue culture: Jaya and Ratna
(b) Somatic hybridization: Pomato
(c) Micropropagation: Tomato, banana, apple
(d) Meristem culture: Banana, sugarcane, potato

144. Assertion: Totipotency is the ability of explants to give rise to a whole plant.

Reason: The cells of explants contain a complete set of genetic information.
(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

145. Assertion: Meristems are the localized regions of active cell division in a plant body.

Reason: Somaclones are genetically identical plants.

(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but Reason is false.
(d) Both Assertion and Reason are false.

146. Assertion: Pomato is an intergeneric somatic hybrid.

Reason: Cybrids are the somatic hybrids with the nuclear genome from both the parent plants.

(a) Both Assertion and Reason are true but Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) Assertion is true but reason is false.
(d) Both assertion and reason are false.

ANSWER KEY

1. (b)	2. (a)	3. (c)	4. (d)	5. (b)	6. (b)	7. (b)	8. (a)	9. (d)	10. (b)
11. (a)	12. (d)	13. (c)	14. (b)	15. (b)	16. (d)	17. (a)	18. (a)	19. (d)	20. (a)
21. (b)	22. (d)	23. (c)	24. (d)	25. (d)	26. (d)	27. (b)	28. (a)	29. (d)	30. (a)
31. (b)	32. (b)	33. (c)	34. (b)	35. (b)	36. (a)	37. (d)	38. (d)	39. (a)	40. (c)
41. (d)	42. (a)	43. (b)	44. (d)	45. (d)	46. (a)	47. (b)	48. (c)	49. (d)	50. (b)
51. (a)	52. (c)	53. (a)	54. (a)	55. (a)	56. (d)	57. (b)	58. (c)	59. (a)	60. (b)
61. (a)	62. (a)	63. (d)	64. (a)	65. (a)	66. (b)	67. (c)	68. (c)	69. (b)	70. (c)
71. (d)	72. (a)	73. (b)	74. (d)	75. (d)	76. (a)	77. (d)	78. (c)	79. (c)	80. (d)
81. (a)	82. (a)	83. (b)	84. (b)	85. (a)	86. (b)	87. (a)	88. (b)	89. (d)	90. (c)
91. (d)	92. (d)	93. (a)	94. (d)	95. (b)	96. (a)	97. (c)	98. (b)	99. (d)	100. (a)
101. (d)	102. (b)	103. (a)	104. (d)	105. (a)	106. (b)	107. (d)	108. (d)	109. (b)	110. (a)
111. (a)	112. (c)	113. (a)	114. (d)	115. (b)	116. (d)	117. (b)	118. (d)	119. (b)	120. (c)
121. (b)	122. (b)	123. (d)	124. (a)	125. (b)	126. (a)	127. (b)	128. (b)	129. (d)	130. (b)
131. (d)	132. (a)	133. (b)	134. (d)	135. (c)	136. (b)	137. (a)	138. (d)	139. (a)	140. (b)
141. (d)	142. (d)	143. (a)	144. (a)	145. (b)	146. (d)				