MICROBES IN HUMAN WELFARE

1. Jojoba contains
   a) C-20 to C-6 bromohydric alcohol wax and triglyceride
   b) Wax
   c) Triglyceride
   d) Sterol
2. Castor oil is yielding from which of the following?
   a) *Brassica compestris* b) *Sesamum indicum* c) *Ricinus communis* d) *Cocos nucifera*
3. A hybrid where the cytoplasm of two parent cells are fused by retaining only one parental nucleus is called
   a) Asymmetric somatic hybrid b) Cybrid
   c) An interbreed d) Symmetric somatic hybrid
4. Which one of the following is being utilized as a source of biodiesel in the Indian countryside?
   a) Euphorbia b) Beetroot c) Sugarcane d) Pongamia
5. Powdery mildew of wheat is caused by species of
   a) *Puccinia* b) *Erysiphe* c) *Ustilago* d) *Albugo*
6. Toddy is made by ...A... of sap from palm tree by ...B... . Here A and B refers to
   a) A-fermentation; B-yeast b) A-fermentation; B-bacteria
   c) A-distalation; B-yeast d) A-distalation; B-bacteria
7. Which of the following belongs to free living nitrogen fixing bacteria?
   I. *Rhizobium* II. *Azospirillum* III. *Azotobacter*
   Choose the correct option
   a) I and II b) I and III c) II and III d) I, II and III
8. Which one of the following is biofuel?
   a) Wood b) Petroleum c) Natural gas d) Coal
9. Quinine used for treatment of malarial fever is extracted from
   a) *Atropa belladonna* b) *Cinchona officinalis*
   c) *Aconitum napellus* d) *Rauwolffia serpentina*
10. Clove oil is obtained from
    a) Wood of *Santalum* b) Leaves of *Syzygium aromaticum*
    c) Flowers buds of *Syzygium aromaticum* d) Rhizome *of Vatevaria*
11. Which role is played by *Lactobacillus* in our stomach?
    a) Harmful b) Neutral
    c) Beneficial d) Sometimes (a) and sometimes (b)
12. Which one of the following is a systematic insecticide?
    a) Malathion b) Parathion c) Endrin d) Furadan
13. Choose the minor carp from the following
    a) *Cyprinus carpio* b) *Anguilla sp*
    c) *Labeo bata* d) *Ctenopharyngodon idella*
14. 'Himgiri' developed by hybridization and selection for disease resistance against rust pathogens is a variety of
    a) Maize b) Sugarcane c) Wheat d) Chilli
15. The pesticide most persistent in the soil is
    a) DDT b) BHC c) Dieldrin d) Baygon

16. Besides dung, the weed that can be used in biogas production is
    a) *Hydrilla* b) *Solanum nigrum*
    c) *Eichhornia crassipes* d) *Parthenium Hysterophorus*
17. Which one of the following is a petroleum plant?
    a) Euphorbia b) Potato c) Sugarcane d) Maize
18. An organism used as biofertiliser for raising any legume crop is
    a) *Nostoc* b) *Anabaena* c) *Clostridium* d) *Rhizobium*
19. Rice bran oil is used as an
    a) Antibiotic b) Anti-corrosive c) Anti-helminthic d) Insecticide
20. Yeast have been used for the commercial production of
    I. ethanol II. bread III. cheese
    Choose the correct option
    a) I and II b) I and III c) I, II and III d) None of these
21. The plant, which is used for studying hybrid vigour or heterosis is
    a) Maize b) Pea c) Datura d) None of these
22. Sewage contains large amounts of ...A... and ...B... . Here A and B refers to
    a) A-inorganic matter; B-bacteria b) A-organic matter; B-pathogenic microbes
    c) A-organic matter; B-virus d) A-inorganic matter; B-pathogenic microbes
23. Which of the following is a wrong matching of a microbe and its industrial product?
    a) Yeast – Statins
    b) *Acetobacter aceti* – Acetic acid
    c) *Clostridium acedobutylicum* – Lactic acid
    d) *Aspergillus niger* – Citric acid
24. Removal of anthers of some flowers during plant breeding is
    a) Emasculation b) Anthesis
    c) Pollination d) For collection of pollen
25. The plant of *Triticum aestivum* is
    a) Haploid b) Diploid c) Tetraploid d) Hexaploid
26. Physical removal of large and small stable solid particles from the sewage through filtration and sedimentation is called
    a) Primary treatment b) Secondary treatment
    c) Tertiary treatment d) Quaternary treatment
27. Cocaine alkaloid is obtained from
    a) *Erythroxylon coca* b) *Thea chinensis* c) *Coffea arabica* d) *Theobroma cacao*
28. First man-made cereal (*i.e., triticale)* is
    a) Octaploid b) Hexaploid c) Both (a) and (b) d) Diploid
29. Identify the blank spaces A, B, C, D given in the following table and select the correct answer

Types of Microbes	Scientific Name	Product	Medical Application
Fungus *C*	*A Monascus Purpureus*	Cyclosporin Statin	*B* *D*

    a) A-*Trichoderma polysporum,* B-As an immunosuppressive agent in organ transplant patients, C-Yeast, D-as blood-cholesterol lowering agent
    b) A-*Trichoderma polysporum,* B-As blood-cholesterol lowering agent, C-Protozoa, D- As an immunosuppressive agent in organ transplant patients
    c) A-*Clostridium butylicum,* B-used as a clot-buster, C-Yeast, D-As blood-cholesterol agent

d) A-*Clostridium butylicum,* B-As blood-cholesterol lowering agent, C-Yeast, D-used as a clot-buster

30. Organic farming includes
I. use of biofertilisers and biopesticides
II. crop rotation
III. locally developed pest resistant varieties
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III

31. Which of the following plant yields oil and fibre both?
a) *Cocos nucifera* b) *Eucaiyptus*
c) *Brassica compestris* d) *Euphorbia hirta*

32. *Trichoderma* species, free living fungi, are present in root ecosystems are potentially useful as
a) Biopesticides b) Biofertilisers
c) Methanogens d) Vectors for genetic engineering

33. Which of the following plants are used as green manure in crop, fields and in sandy soils?
a) *Crotalaria juncea* and *Alhagi comelorum* b) *Calotropis procera* and *Phyllathus niruri*
c) *Sachharum munja* and *Lantana camara* d) *Dichanthum annulatum* and *Acacia nilotica*

34. Mule is a product of
a) Breeding b) Mutation
c) Hybridization d) Interspecific hybridization

35. The pioneer country in the production of fuel-alcohol is
a) Saudi Arabia b) Iran & Iraq c) Brazil d) Japan

36. The disease in poultry, which reduces immunity and spreads through contaminated food is
a) Ranikhet disease b) Aflotoxicosis c) Thrush d) Marek's

37. Potato is a native of
a) Brazil b) Peru c) Panama d) Mexico

38. Which stage of silkworm secretes silk?
a) Adult b) Larva c) Cocoon d) Pupa

39. Morphine, which is used as an analgesic is obtained from
a) *Cinchona officinalis* b) *Papaver somniferum*
c) *Taxus brevifolia* d) *Berberis nilghiriensis*

40. By which of the following methods, new and better varieties of plants can be formed?
a) Selection b) Grafting
c) Hybridization d) Hybridization followed by selection

41. Methanogens are found in
I. organic acid
II. rumen of cattle
III. butanal
IV. anaerobic sludge
Choose the correct option
a) I and II b) II and III c) II and IV d) III and IV

42. LSD is obtained from
a) *Claviceps purpurea* b) *Rauwolffia serpentina*
c) *Papaver somniferum* d) *Cannabis sativa*

43. Which of the following food items are produced through fermentation by the microorganisms?
I. Idli
II. Dosa
III. Toddy
IV. Cheese
Choose the correct option
a) I, II and III b) I, III and IV c) II, III and IV d) I, II, III and IV

44. Roquefort cheese is formed by ripening with the fungi for a particular
a) Colour b) Flavor c) Shape d) Texture

45. A drug used for ...A... patients is obtained from a species of the organism ....B...
Choose the correct option for A and B
a) A-heart; B-*Penicillium* b) A-organ transplant; B-*Trichoderma*
c) A-swine flu; B-*Monascus* d) A-AIDS; B-*Pseudomonas*

46. Which one of the following is correct?
a) Herbicides kill plant mostly by blocking PS-II (photolysis of water) and occasionally phloem transport
b) Insecticides kill insects mostly through impairment of nerve conduction and sometimes through respiratory arrest
c) Both (a) and (b)
d) None of the above

47. In honey, the percentage of maltose and other sugar is
a) 9.2 b) 8.81 c) 10.5 d) 11.2

48. Yeast is used in the production of
a) Citric acid and lactic acid b) Lipase and pectinase
c) Bread and beer d) Cheese and butter

49. Most of the petrocrops belong to family
a) Malvaceae b) Rutaceae c) Leguminosae d) Euphorbiaceae

50. Which of the following has been covered under the broad patent category?
a) *Triticum* b) *Oryza* c) *Pisum sativum* d) *Brassica*

51. Which of the following is exhaustible but limited source of energy?
a) Nuclear fuels b) Water energy c) Fossil fuels d) Solar energy

52. Consider the following statement
I. Biochemical Oxygen Demand (BOD) represents the amount of dissolved oxygen that would be consumed if all the organic matter in 1 L of water were oxidized by microorganism
II. Low value of BOD means the water is either normal or less polluted by organic matter
III. High value of BOD means the water in highly polluted by organic matter
Which of statement given above are correct?
a) I and II b) I and III c) II and III d) I, II and III

53. *Gossypium hirsutum* is
a) New world tetraploid b) Old world tetraploid
c) New world diploid d) Old world diploid

54. The natural method of pest and pathogen control involving use of viruses, bacteria and other insects is called
a) Biochemical control b) Biological gene control
c) Biocontrol d) Chemical control

55. The function of penicillin as an antibiotic was established by
a) Alexander Flemming b) Ernst Chain c) Howard Florey d) Both (b) and (c)

56. Big holes in Swiss cheese are made by
a) A machine b) A bacterium producing a large amount of carbon dioxide
c) A bacterium that produces carbon monoxide gas d) A fungus that produces a lots of gases during its metabolic activities

57. ...A... is a methane rich fuel gas produced by ...B... breakdown with the help of ...C... bacteria. Here A, B and C refers to
a) A-Gobar gas, B-aerobic, C-fermentative b) A-Biogas, B-anaerobic, C-methanogenic
c) A-water gas, B-aerobic, C-Methanogenic d) A-Biogas, B-anaerobic, C-fermentative

58. The medicinal plants is
a) *Cinchona* b) *Opium* c) *Rauwolffia* d) All of these

59. Which of the following are main the benefits of LAB?
I. Increase vitamin-B_{12} amount, thus increasing nutrient quality of milk
II. Checks disease causing microbes in stomach
Choose the correct option
a) Only I b) Only II c) I and II d) None of these

60. Which is produced during anaerobic fermentation of agricultural wastes?
a) Methane b) CO_2 c) Carbon monoxide d) Biogas

61. Insecticide obtained from neem plant is
a) Pyrethrin b) Pyrethroid c) Thiocarbamate d) Azadirachtin

62. In poultry birds, nasal and eye discharges with foul smell, acute respiratory problem and inflamed and swollen eyes are the symptoms of
a) Chronic respiratory disease b) Infectious coryza disease
c) Brooder pneumonia disease d) Marck's disease

63. Isinglass, a type of byproduct of fish industry is principally used for
a) Feeding cattle, pigs and poultry b) Preparation of paints and varnishes
c) Clarification of vinegar, wines and beer d) Production of insulin

64. Which of the following serve as biofertiliser in paddy fields?
a) *Anabaena* b) *Azospirillum* c) *Nostoc* d) Both (a) and (c)

65. Which one of these microbes is used in the commercial production of butyric acid?
a) *Clostridium butylicum* b) *Streptococcus butylicum*
c) *Trichoderma polysporum* d) *Saccharomyces cerevisiae*

66. Primary treatment is the
a) Physical removal of large and small particles from sewage
b) Biological removal of large and small particles from sewage
c) Both (a) and (b)
d) Chemical removal of large and small particles from sewage

67. Benefits of mycorrhizae are
I. resistance to root borne pathogen
II. tolerance to salinity and pathogen
III. overall increase in the plant growth and development
Choose the correct option
a) I and II b) I and III c) II and III d) I, II and III

68. Biogas is a mixture of inflammable gases like
a) Methane, CO_2, H_2 and H_2S b) Methane, CO, H_2 and N_2
c) CO_2, H_2 and H_2S d) CO, Methane and N_2

69. Biogas production from waste biomass with the help of methanogenic bacteria is
a) Multi step process b) One step process c) Two step process d) Three step process

70. The organisms which are used to enrich the nutrient quality of the soil are called
a) Bacteria b) Cyanobacteria c) Fungi d) All of these

71. In silk fibre, the central core is made up of
a) Sericin b) Fibroin c) Gum d) Cellulose

72. The part of flower of *Crocus* that yields saffron is
a) Calyx b) Corolla c) Perianth d) Style and stigma

73. Which of the following bacteria convert milk into curd?
a) *Propionibacterium sharmanil* b) *Saccharomyces cerevisiae*
c) *Lactobacillus* d) Thermophilic bacteria

74. Which is the major crop in Asia?
a) Rice b) Sugarcane c) Jowar d) Millet

75. Which method of plant breeding resulted in the production of 'Hessian fly resistant' wheat variety?
a) Intrageneric hybridization b) Back cross

c) Bulk method d) Intraspecific hybridization

76. The raw material obtained, from which one of the following plants, and is used in paper making?
a) *Jerusalem artichoke* b) *Oryza sativa* c) *Sorghum vulgare* d) *Butea monosperma*

77. Which of the following fibres is not a plant product?
a) Flax b) Cotton c) Hemp d) Silk

78. The most important of the symbiotic nitrogen fixing bacteria, which forms nodules on the roots of legume plants is
a) *Aspergillus* b) *Rhizobium* c) *Penicilium* d) *Streptococcus*

79. Read the following statement having two blanks (A and B)
A drug used for ...A... patients is obtained from a species of the organism ....B... . It helps in clearing blood clots inside the blood vessels.
The one correct option for the two blanks are
a) A-heart; B-*Streptococcus* b) A-organ transplant; B-*Trichoderma*
c) A-heart; B-*Pseudomonas* d) A-organ transplant; B-*Monascus*

80. Study the following related to uses of plants and identify the correct match for sorghum and cotton respectively.
I. Blood purification and organic fertilizer.
II. Animal feed and paper industry.
III. Vitamin-B and cosmetics.
IV. Explosives and organic fertilizer.
a) I and II b) II and III c) III and IV d) II and IV

81. Consider the following statements about methanogens bacteria
I. Methanogen bacteria are commonly found in the anaerobic sludge formed during sewage treatment
II. These bacteria are also occur in rumen of the cattle where they act upon cellulosic material to breakdown cellulose
III. They play a very important role in the nutrition of cattle by digesting cellulosic material
Which of the statement given above are correct?
a) I, II and III b) I and II c) I and III d) II and III

82. Indian rose wood tree is a common name of
a) *Acacia* b) *Shorea* c) *Delbergia* d) *Eucalyptus*

83. Microorganisms or microbes are found in
a) Soil, air, water and inside the bodies of living organisms
b) Thermal vents deep in soil
c) Under snow as well as acidic environment
d) All of the above

84. Emasculation is concerned with
a) Hybridization b) Clonal selection c) Mass selection d) Pure line selection

85. From which part of coconut coir is obtained?
a) Pericarp b) Mesocarp c) Epicarp d) Endocarp

86. Microorganism such as *Lactobacillus* and others are commonly called
a) Citric Acid Bacteria (CAB) b) Lactic Acid Bacteria (LAB)
c) Tartaric Acid Bacteria (TAB) d) Formic Acid Bacteria (FAB)

87. Which of the following crops have been brought to India from New world?
a) Cashewnut, potato, rubber b) Mango, tea
c) Tea , rubber, mango d) Coffee

88. Which one of the following types of silk is being produced extensively in South East Asia?
a) Eri b) Mulberry c) Tassar d) Muga

89. Aleurone grains are rich in
a) Fat b) Protein c) Carbohydrates d) Auxins

90. Most recent insecticides in India are

a) Chlorinated hydrocarbons
b) Organophosphorus compounds
c) Carbamides
d) Pyrethroids

91. Breeding of crops with high levels of minerals, vitamins and proteins is called
a) Somatic hybridization
b) Biofortification
c) Biomagnifications
d) Micropropagation

92. The microorganism used in production of biogas is
a) Bacteria
b) Virus
c) Algae
d) Yeast

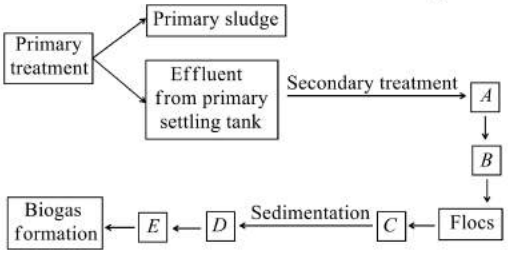
93. Chicks of the first week in the brooder hover are usually susceptible to which one of the following disease?
a) Marek's disease
b) Cotasis
c) Ranikhet disease
d) Whirling disease

94. The most common fungal partner of mycorrhiza belongs to genus
a) *Azotobacter*
b) *Glomus*
c) *Azolla*
d) *Frankia*

95. Disadvantages of chemical agents are
I. chemicals are toxic and harmful to human beings and animals
II. chemical pollute the environment and plants
III. weedicides used to remove weeds also pollute the soil
Choose the correct option
a) I, II and III
b) I and II
c) I and III
d) II and III

96. *Bacillus thuringiensis (Bt)* strains have been used for designing novel
a) Bio-metallurgical technique
b) Bio-mineralisation processes
c) Bio-insecticidal plants
d) Bio-fertilizers

97. Given below is the flowchart of sewage treatment. Identify A, B, C, D and E and select the correct option



a) A-small aeration tank, B-Microbial digestion, C-High BOD, D-Activated sludge, E-Aerobic sludge digesters
b) A-Large aeration tank, B-Mechanical agitation, C-Increased BOD, D-Activated sludge, E-Aerobic sludge digesters
c) A-small aeration tank, B-Microbial digestion, C-Low BOD, D-Activated sludge, E-Anaerobic sludge digesters
d) A-Large aeration tank, B-Mechanical agitation, C-Reduced BOD, D-Activated sludge, E-Anaerobic sludge digesters

98. Brewer's yeast is
a) *Aspergillus fumigatus*
b) *Saccharomyces cerevisiae*
c) *Streptomyces griseus*
d) *Clostiridium botulinum*

99. The free-living fungus *Trichoderma* can be used for
a) Killing insects
b) Biological control of plant diseases
c) Controlling butterfly caterpillars
d) Producing antibiotics

100. Identify the blank spaces A, B, C and D given in the following table and select the correct answer

Types of Microbes	Scientific Name	Commercial Product
Bacterium	*A*	Clot buster enzyme
B	*Aspergillus niger*	Citric acid
Fungus		*C*

Bacterium	*Trichoderma polysporum* D	Butyric acid

a) A-*Streptococcus*, B-Fungus, C-Cyclosporin-A, D-*Clostridium butylicum*
b) A-*Clostridium butylicum*, B-Bacterium, C-Cyclosporin-A, D-*Lactobacillus*
c) A-*Propionibacterium sharmanii*, B-Bacterium, C-Streptokinase, D-*Penicillium roqueforti*
d) A-Microsporum, B-Fungus, C-Tartaric acid, D- *Streptococcus*

101. Father of green revolution in India is
a) M S Swaminathan b) N Borlaug c) R Mishra d) P Maheswari

102. Which of the following can be controlled by using biopesticides?
a) Insects b) Diseases c) Weeds d) All of these

103. Microbes are used in
I. primary treatment of sewage
II. secondary treatment of sewage
III. anaerobic sludge digesters
IV. production of biogas
Choose the correct option
a) I, II and III b) I, III and IV c) II, III and IV d) I, II, III and IV

104. Desired improved varieties of economically useful crops are raised by
a) Migration b) Biofertilizer c) Hybridization d) Natural selection

105. Neem tree has acquired industrial importance as a source of
a) Biofertilizer, biopesticide and anti-fertility compound
b) Anti-fertility compound, biofertilizer and anti-cancer drug
c) Biopesticide and anti-fertility compound
d) Anti-cancer drug, biopesticide and biofertilizer

106. Which one of the following is not a nitrogen-fixing organism?
a) *Anabaena* b) *Nostoc* c) *Azotobacter* d) *Pseudomonas*

107. Which of the following shows maximum genetic diversity in India?
a) Rice b) Maize c) Mango d) Groundnut

108. Cloves are obtained from
a) Seed b) Fruit c) Coat d) Flower bud

109. Which of the following herbicides and defoliant were used by the US military in its herbicidal warfare programme during the Vietnam war?
a) Agent black b) Agent orange c) Super orange d) Both (b) and (c)

110. In crop improvement programme, haploids are of great importance because they
a) Grow better under adverse condition
b) Are useful in the study of meiosis
c) Requires only about half the amount of chemical fertilizers compared to diploids
d) Give homozygous lines

111. Pollution from animal excreta and organic waste from kitchen can be most profitably minimised by
a) Storing them in underground storage tanks b) Using them for producing biogas
c) Vermiculture d) Using them directly as biofertilizers

112. Cellulose fibre is obtained from *Gossypium*
a) Stem surface b) Seed hair c) Leaf surface d) Root hair

113. Biogas production is carried out by
a) Thermoacidophils b) Methanogens c) Halophiles d) Luminants

114. Methanogens, growing anaerobically on cellulosic material, produce
a) Methane b) Methane and carbon dioxide
c) Methane and hydrogen d) Methane, carbon dioxide and hydrogen

115. Which one is a neem product used as insect repellent?

a) Azadirachtin b) Rotenone c) Parathione d) Endrin

116. *Triticale,* the first man-made cereal crop, has been obtained by crossing wheat with
a) Rye b) Pearl millet c) Sugarcane d) Barley

117. Which one of the following is being tried in India as a bio-fuel substitute for fossil fuels?
a) *Jatropha* b) *Azadirachta* c) *Musa* d) *Aegilops*

118. Mycorrhiza does not help the host plant in
a) Enhancing its phosphorus uptake capacity
b) Increasing its tolerance to drought
c) Enhancing its resistance to root pathogens
d) Increasing its resistance to insects

119. Which of the following is a disease resistant, high yielding breed of poultry developed in Karnataka?
a) Aseel b) White leg horn c) Giriraja d) Plymouth rock

120. Which industrial products are synthesized from microbes?
I. Antibiotics II. Fermented beverages
III. Bioactive molecules IV. Enzyme
Choose the correct option
a) I, II, III and IV b) II, III and IV c) I, III and IV d) III and IV

121. A collection of plants and seeds having diverse alleles of all the genes of a crop is called
a) Germplasm b) Gene library c) Genome d) Herbarium

122. Percentage composition of fibroin and sericin in silk is
a) 50 : 40 b) 80 : 20 c) 30 : 70 d) 40 : 60

123. *Simondesia chinensis* is commonly known as
a) Amla b) Poppy c) Teak wood d) Jojoba

124. The quickest method of plant breeding is
a) Introduction b) Selection c) Hybridization d) Mutation breeding

125. The dough used for making bread is fermented by
a) Bacteria b) Virus c) Prions d) Yeast

126. Chicken pox, small pox, etc., can be cure by
a) Neem b) Tulsi c) Shatavari d) None of these

127. Nitrifying bacteria
a) Convert free nitrogen to nitrogen compounds b) Convert proteins into ammonia
c) Reduce nitrates to free nitrogen d) Oxidize ammonia to nitrates

128. Consider the following statements
I. Ladybirds and dragonflies are used to get rid of aphids and mosquitoes
II. The bacteria *Bacillus thuringiensis* (*Bt*) are used to control butterfly
III. *Trichoderma* sp. free living fungi, are present in root ecosystems where they act against several plant pathogens
IV. *Rhizobium* is a symbiotic bacterium that lives in the stem of legumes
Which of the statements given above are correct?
a) I, II and III b) I, III and IV c) II, III and IV d) II and IV

129. Cultivation of *Bt* cotton has been much in the news. The prefix *Bt* means
a) 'Barium-treated' cotton seeds
b) 'Bigger thread' variety of cotton with better tensile strength
c) Produced by 'biotechnology' using restriction enzymes and ligases
d) Carrying an endotoxin gene from *Bacillus thuringiensis*

130. Which of the following cyanobacteria can fix atmospheric nitrogen?
I. *Volvox* II. *Oscillatoria*
III. *Nostoc* IV. *Anabaena*
Choose the correct option
a) I, II and III b) I, II and IV c) II, III and IV d) III and IV

131. From which one of the following plants, the insecticide pyrethrum is prepared?
a) *Vetivera* b) *Cymbopogon* c) *Chrysanthemum* d) *Tephrosia*

132. Bacterial fertilizer is
a) *Anabaena* b) *Nostoc* c) *Rhizobium* d) *Phycomyces*

133. Which of the following organisms is used in the production of beverages like wine, beer, whisky brandy or rum?
a) *Clostridium butylicum* b) *Aspergillus niger*
c) *Saccharomyces cerevisiae* d) *Penicillium notatum*

134. Recently Govt. of India has allowed mixing of alcohol in petrol. What is the amount of alcohol permitted for mixing in petrol?
a) 2.5% b) 10-15% c) 10% d) 5%

135. The chemical substances produced by some microbes, which can kill or retard the growth of other microbes are called
a) Ethanol b) Citric acid c) Antibiotics d) Opiates

136. Which of the following is/are the approache(s) for biological farming?
I. Familiarity with various life-forms inhabiting the field
II. Gain knowledge about the life cycles, patterns of feeding and habitat of predators and pests
Choose the correct option
a) Only I b) Only II c) I and II d) None of these

137. Which is a useful product of epidermal origin?
a) Saffron b) Cotton fibres c) Clove d) Jute

138. Today is traditional drink of
a) South India b) North India c) West India d) East India

139. Process of biogas production is an
a) Aerobic process b) Anaerobic process c) Active process d) None of these

140. Cork is obtained from
a) *Quercus suber* b) *Pinus roxburghii* c) *Cedrus deodara* d) *Mangifera indica*

141. *Nosema bombycis,* which causes pebrine in silk worms is a
a) Fungus b) Virus c) Bacterium d) Protozoan

142. In September 2001, which of the following was used as a bioweapon agent in America?
a) Botulinum b) Anthrax (Bacillus anathracis)
c) Polio virus d) AIDS virus

143. *Gambusia* fish is
a) Cat fish b) Sucker fish c) Mosquito fish d) Flat fish

144. Biogas produced by fermentation of manure, sewage, cattle dung, etc., predominantly comprises
a) Methane, nitrogen and hydrogen
b) Methane and carbon dioxide
c) Methane and carbon monoxide
d) Methane and nitric oxide

145. Chicory powder, which is mixed with coffee powder is obtained from
a) Root b) Leaf c) Stem d) Seeds

146. 'Kattha' is obtained from the heart wood of
a) *Acacia Arabica* b) *Acacia fornesiana* c) *Acacia auriculiformis* d) *Acacia catechu*

147. *Trichoderma* sp. free living fungi has proved a useful microorganism of
a) Gene transfer in higher plants b) Biological control of soil-borne plant pathogens
c) Bioremediation of contaminated soils d) Reclamation of wastelands

148. Biogas is pathogen free because
a) Anaerobic digestion removes pathogens and bacteria
b) It is toxic to pathogens
c) During decomposition, it produce antibiotics

d) Cattle dung is pathogen free

149. What name has been assigned to the genus produced by a cross between cabbage and radish?
a) *Secale* b) *Bursa pastoris* c) *Lysogenicophyll* d) *Raphanobrassica*

150. Isinglass is a product obtained from air bladder of
a) Some snakes b) Some fishes c) Some aves d) None of these

151. The water soluble protein associated with silk thread is
a) Fibroin b) Sericin c) Chitin d) Mucin

152. Most nutritious among the following is
a) Wheat b) Maize c) Bajra d) Rice

153. Which gas is released during the process of fermentation that gives the puffy appearance to dough for making bread
a) CO_2 b) CO c) O_2 d) H_2

154. Real product of apiculture is
a) Honey b) Bee wax c) Both (a) and (b) d) None of these

155. Integrated Pest Management (IPM) discourages the excessive use of
a) Biological pesticides b) Chemical pesticides
c) Mechanical technology d) All of these

156. A pseudocereal is
a) *Fagopyrum esculentum* b) *Triticum aestivum*
c) *Zea mays* d) *Oryza sativa*

157. An organism used as a biofertilizer for raising soyabean crop production is
a) *Azospirillum* b) *Rhizobium* c) *Nostoc* d) *Azotobacter*

158. In maize, hybrid vigour is exploited by
a) Bombarding the seeds with DNA
b) Crossing of two inbred parental lines
c) Harvesting seeds from the most productive plants
d) Inducting mutations

159. Roquefort cheese is formed by ripening with the fungi
a) *Propionibacterium sharmanii* b) *Penicillium roqueforti*
c) *Propionibacterium roqueforti* d) *Penicillium sharmanii*

160. A straight fertilizer is the one, which is
a) Absorbed by roots directly b) Absorbed by the plants from aerial spray
c) Having only one primary nutrient d) Not easily leached

161. Which of the following microbe convert milk into curd?
a) Bacteria b) Virus c) Fungi d) Protozoa

162. Consider the following statements about organic farming
I. Organic farming promotes the use of crop rotations and cover crops and encourages balanced host/predator relationships
II. Integrated pest and weed management and soil conservation systems are valuable tools on an organic farm
II. Organic farming protects the environment, minimize soil degradation and erosion and decrease pollution
Which of the statements given above are correct?
a) I, II and III b) I and II c) I and III d) II and III

163. *Saccharomyces cerevisiae* is used for commercial production of
a) Butanol b) Ethanol c) Methanol d) Acetic acid

164. In the sewage treatment bacterial flocs are allowed to sediment in a settling-tank. This sediment is called as
a) Activated sludge b) Primary sludge c) Anaerobic sludge d) Secondary sludge

165. Genetic diversity in agricultural crops is threatened by

a) Introduction of high yielding varieties
b) Intensive use of fertilizers
c) Extensive intercropping
d) Intensive use of biopesticides

166. Which one of the following is used as biological insecticide?
a) Tiger beetle
b) Caterpillar
c) Silkmoth
d) Mazra poka

167. During the primary treatment of sewage, solid particles that settle down are called
a) Activated sludge
b) Secondary sludge
c) Primary sludge
d) Anaerobic sludge

168. Recently discovered anti-cancer drug is obtained from
a) *Taxus*
b) *Tagetes*
c) *Tamarix*
d) *Thea*

169. *Triticum aestivum,* the common bread wheat is
a) Triploid with 21 chromosomes
b) Hexaploid with 42 chromosomes
c) Tetraploid with 30 chromosomes
d) Diploid with 14 chromosomes

170. In plant A, $2n = 12$ and in plant B, $2n = 16$. Then the ploidy number of cross breeding plant is
a) 7
b) 21
c) 14
d) 28

171. BOD of waste water is estimated by measuring the amount of
a) Total organic matter
b) Biodegradable organic matter
c) Oxygen evolution
d) Oxygen consumption

172. Secondary sewage treatment is mainly a
a) Chemical process
b) Physical process
c) Mechanical process
d) Biological process

173. Producer gas differs from biogas in having
a) Methane
b) Carbon monoxide
c) Carbon dioxide
d) Formed by fermentation

174. Bacillus thuringiensis is used as
a) Biofungicide
b) Biopesticide
c) Biocontroller
d) Bioweapon

175. The high yielding hybrid crop varieties to exploit hybrid vigour, the farmers to purchase fresh hybrid seed every year because
a) Hybrid vigour is not long standing due to inbreeding depression
b) They are not allowed to grow their own seed
c) It is always associated with increased heterozygosity
d) Government has accepted Dunkel's proposals

176. The residue left after methane production from cattle dung is
a) Burnt
b) Buried in land fills
c) Used as manure
d) Used in civil construction

177. Morphine obtained from opium is
a) Latex
b) Pome
c) Alkaloid
d) Tannin

178. Ethanol is commercially produced through a particular species of
a) *Clostridium*
b) *Trichoderma*
c) *Aspergillus*
d) *Saccharomyces*

179. *Bacillus thuringiensis* is used to control
a) Bacterial pathogens
b) Viral pathogens
c) Protozoans
d) Insect pests

180. Which of the following statements regarding baculoviruses as bio-control agents is/are correct?
I. Baculoviruses are pathogens that attack insects and other arthropods
II. Most of these biocontrol agents belong to the genus *Nucleopolyhedro* virus
III. They do not harm plants mammals, birds, fish and other non-target insects
IV. Baculoviruses are helpful in Integrated Pest Management (IPM) programme, in which beneficial insects are conserved
Choose the correct option
a) I, II and III
b) I, II and IV
c) II, III and IV
d) All of these

181. The timber yielding plant *Shorea robusta* belongs to the which family?
a) Fabaceae
b) Rubiaceae
c) Dipterocarpaceae
d) Verbenaceae

182. Opium is obtained from which the part of *Papaver somniferum?*

a) Seed b) Stem and leaf c) Unripe fruits d) Mature fruits

183. Which one of the following genus forms symbiotic association with plants and helps them in their nutrition?
a) *Glomus* b) *Trichoderma* c) *Azotobacter* d) *Aspergillus*

184. By anaerobic process, the cow dung is used to produce
a) Methane b) Butane c) Ethane d) Propane

185. India's wheat yield revolution in the 1960s was possible primarily due to
a) Hybreed seeds b) Increased chlorophyll content
c) Mutations resulting in plant height reduction d) Quantitative trait mutations

186. Introduced plants in new localities must show adaptations called
a) Selection b) Acclimatization c) Modification d) Propagation

187. The world's highly prized wool yielding 'Pashmina' breed is
a) Sheep b) Goat
c) Goat-sheep cross d) Kashmiri sheep- A fghan sheep cross

188. Which one of the following pesticides is banned now-a-days?
a) DDT b) Eldrin c) Aldrin d) Toxaphene

189. The technology of biogas production from cow dung was developed in India largly by the efforts of
a) Oil and Natural Gas Commission
b) Gas Authority of India
c) Indian Agricultural Research Institute and Khadi and Village Industries Commission
d) Indian Oil Corporation

190. Which of the following is wrongly matched?
a) *Indigofera* – Dye b) *Sesbania* – Fodder c) *Petunia* – Fumigatory d) *Aloe* – Medicine

191. *Rauwolffia* is obtained from which part of the plant?
a) Stem b) Root c) Fruit d) Leaf

192. Which one of the following is the American poultry breed?
a) Australop b) Minorica c) Assel d) Rhod Island Red

193. ...A... released by LAB during growth coagulate and partially digest ...B... . Here A and B refers to
a) A-Acid; B-milk protein b) A-Base; B-harmful bacteria
c) A-Enzyme; B-milk protein d) A-Bacteria; B-other microbes

194. Which of the following is correct?
I. Wine and beer are produced without distillation of fermented broth
II. Whisky, brandy and rum are produced by distillation of the fermented broth
III. Wine and beer are produced by distillation of the fermented broth
IV. Whisky, brandy and rum are produced without distillation of the fermented broth
Choose the correct option
a) I and II b) I and III c) II and III d) III and IV

195. Quarantine regulation is meant for
a) Preventing entry of diseased plants in the country b) Spraying diseased plants with insecticides
c) Promoting dry farming d) Growing fruit trees in all the states

196. Which one of the following is not used in organic farming?
a) Snail b) *Glomus* c) Earthworms d) *Oscillatoria*

197. Which type of endosperm will be formed on hybridization of diploid female plant and tetraploid male plant?
a) Triploid b) Pentaploid c) Tetraploid d) Diploid

198. Protoplasts of two different species are used in
a) Micro-propagation b) Somatic hybridization
c) Clonal propagation d) Organography

199. An important drug is obtained from the bark of
a) *Papaver* b) *Cinchona* c) *Withania* d) *Momordica*

200. Morphine is obtained from
a) *Rauwolffia serpentina* b) *Papaver somniferum*
c) *Cannabis sativa* d) *Cajanus cajan*

201. Which type of honey bees are useful for apiary industries in India?
a) *Apis indica* b) *Apis dorsata* c) *Apis mellifera* d) *Apis florae*

202. The term heterosis was first coined by
a) McClintock b) Boweri c) Swaminathan d) None of these

203. Consider the following statements
I. Yeast used in making bread and beverages is a prokaryotic fungus
II. Streptokinase is produced by *Streptococcus* and modified by genetic engineering is used as a clot buster
III. Lipases are added in detergent for removing only stains from laundry
IV. Pectinases are used in clearing fruit juices
Which of the statement given above are correct?
a) I, II, III and IV b) I, II and III c) II, III and IV d) III and IV

204. A sewage treatment process in which a part of decomposer bacteria present in the wastes is recycled into the starting of the process is called
a) Cyclic treatment b) Activated sludge treatment
c) Primary treatment d) Tertiary treatment

205. The main sources of biofertilisers are
a) Protista b) Cyanobacteria c) Fungi d) All of these

206. Cotyledons and testa are edible parts of
a) Groundnut and pomegranate b) Walnut and tamarind
c) French bean and coconut d) Cashew nut and litchi

207. Cotton fibre is basically a type of
a) Trichome b) Scale c) Dried seed coat d) Non glandular hair

208. Name the group of microbes used in biogas production
a) Lactic acid bacteria b) Yeasts c) Cyanobacteria d) Methanogens

209. Root cells of wheat has $2n = 42$ chromosomes. Which one of the following is the basic chromosome number of wheat?
a) 42 b) 21 c) 7 d) 14

210. An undistillled alcoholic beverage produced from grain-mesh fermentation is
a) Beer b) Rum c) Curd d) Wine

211. Cytosporin-A an immunosuppressive drug is produced by the fungus
a) *Aspergillus niger* b) *Monascus purpureus*
c) *Penicillium notatum* d) *Trichoderma polysporum*

212. Choose the cat fish from the following
a) *Cirrhina mrigala* b) *Wallago attu* c) *Labeo rohita* d) *Catla catla*

213. 'Jaya' and 'Ratna' developed for green revolution in India are the varieties of
a) Rice b) Wheat c) Bajra d) Maize

214. Shakti, Rattan and Protina are three important lysine rich varieties of
a) Rice b) Pulses c) Wheat d) Maize

215. Gobar gas generation technology was developed by the collaboration of ...A... and ...B... . Here A and B refers to
a) A-Rural Bank of India, B-Khadi and Village industries Commission
b) A-Indian Agricultural Research Institute, B-Khadi and Village Industries Commission
c) A-National Bank for Agriculture and Development, B-Indian Agricultural Research Institute
d) A-National Bank for Agriculture and Development, B-Khadi and Village Industries Commission

216. Select the correct statement from the once given below
a) Barbiturates when given to criminals make them tell the truth

b) Morphine is often given to persons, who have undergone surgery as a pain killer
c) Chewing tobacco lowers blood pressure and heart rate
d) Cocaine is given to patients after surgery as it stimulates recovery

217. Pyrethrin is extracted from
a) *Chrysanthemum cinorarifolium* b) *Derris eliptica*
c) *Azadirachta indica* d) *Ryania speciosa*

218. Cod and shark liver oil is a source of
a) Energetic nutrients b) Constructive nutrients
c) Energetic and constructive nutrients d) Protective nutrients

219. Agricultural chemicals include
a) Growth regulators b) Fertilizers c) Pesticides d) All of these

220. Leaves of which plant can sharpen the memory?
a) *Asparagus* b) *Adhatoda* c) *Aloe vera* d) *Ocimum*

221. Which of the following plants is used as biofertilizer?
a) *Nostoc* b) *Funaria* c) *Volvox* d) *Rhizopus*

222. Antibiotics are used to treat diseases like
a) Diphtheria whooping cough b) Plaque
c) Leprosy d) All of the above

223. The scientific name of zebu is
a) *Bos indicus* b) *Bombyx mori* c) *Bubalus bubalus* d) *Gallus domesticus*

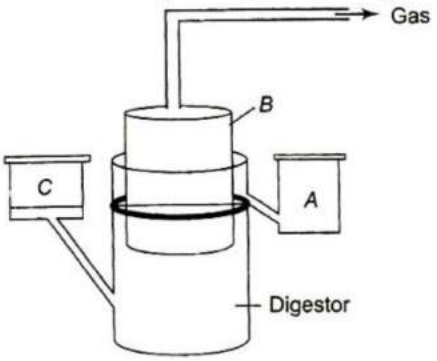
224. Reserpine is obtained from
a) *Asafoetida* b) *Rauwolffia serpentina*
c) *Curcuma longa* d) *Papaver somniferum*

225. The microscopic proteinaceous infectious agents are
a) Viroids b) Prions c) Protozoa d) Bacteria

226. Biochemical Oxygen Demand (BOD) in a river water
a) Has no relationship with concentration of oxygen in the water
b) Gives a measure of *Salmonella* in the water
c) Increases when sewage gets mixed with river water
d) Remains unchanged when algal bloom occurs

227. Autopolyploids (numeric or quantitative polyploids or intraspecific polyploids) like ferns, garden plants, gram, maize, rice, banana, grapes, apple, etc, show
a) Increased gene dosage b) Gigas effect and seedless fruits
c) More yields and better adaptation d) All of the above

228. The below diagram represent a typical biogas plant. Select the correct option for A, B and C refers to



a) A-Sludge, B-Dung + water, C-CH_4 + CO_2
b) A-Dung + water, B-Sludge, C-CH_4 + CO_2
c) A-Sludge, B- CH_4 and CO_2, C-Dung + water
d) A-CH_4 + CO_2, B-Dung + water, C-Sludge

229. For cryopreservation, plant materials are frozen at

a) −196°C b) −150°C c) −80°C d) −40°C

230. Activated sludge have the ability to settle quickly so that it can
a) Be rapidly pumped back from sedimentation to aeration tank
b) Absorb pathogenic bacteria present in waste water, while sinking to the bottom of the settling-tank
c) Be discarded and anaerobically digested
d) Absorb colloidal organic matter

231. Which of the following are the part or example of symbiotic mutualistic association?
I. Yeast
II. *Rhizobium*
III. Mycorrhiza
IV. *Oscillatoria*
a) I and II b) I and III c) II and III d) III and IV

232. *Leucaena leucocephala is*
a) Called subabul
b) A small leguminous tree with edible fruits and seeds
c) A fodder plant as its pods and leaves are consumed by cattle
d) All of the above

233. High content of lysine is present in
a) Wheat b) Apple c) Maize d) Banana

234. Which one of the following is not a biofertilizer?
a) Bacillus thuringiensis b) Azotobacter c) Azolla d) Clostridium

235. Which of the following helps in absorption of phosphorus from soil by plants?
a) *Rhizobium* b) *Frankia* c) *Anabaena* d) *Glomus*

236. Both power and manure are provided by
a) Biogas b) Water gas c) Energy crops d) Nuclear plant

237. Opium is obtained from
a) *Oryza sativa* b) *Selection* c) *Thea sinensis* d) *Papaver somniferum*

238. The part of castor seed that yields oil is
a) Cotyledon b) Caruncle c) Endospherm d) Nucellus

239. Which one of the following is a viral disease of poultry?
a) Salmonellosis b) Coryza c) New castle disease d) Pasteurellosis

240. Which one of the following is a disease of poultry?
a) Foot and mouth disease
b) Pebrine disease
c) Anthrax
d) Ranikhet disease

241. Baculoviruses do not show harmful effect on
I. plants II. Mammals
III. bird IV. Non-target insects
Choose the correct option
a) I, III and III b) II, III and IV c) I, III and IV d) I, II, III and IV

242. *Atropa* belladonna yields medicine used for
a) Gastric ulcers b) Checking the eyes c) Leprosy d) Constipation

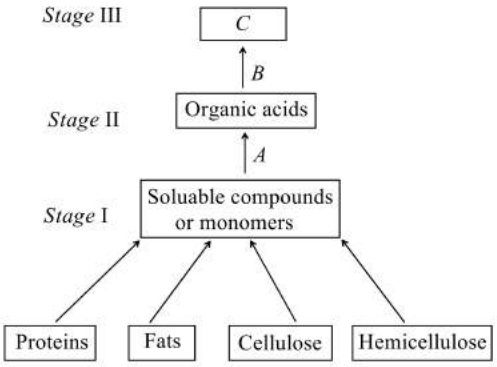
243. The terminator gene technology causes
a) Failure of seed setting after one generation
b) Breakage of seed dormancy
c) Early flowering in plants
d) None of the above

244. What will your conclude, when a cow is crossed to a bull and the female progeny is yielding more milk than its mother?
a) More number of genes for high yielding milk are inherited, only from the female parent
b) More number of genes for high yielding milk are inherited only from the male parent
c) More number of genes for high yielding milk are inherited from both the parents
d) The progeny through mutation achieved more number of genes for high yielding milk

245. CFCL is situated at
a) Delhi b) Faridabad c) Mumbai d) Amritsar

246. Insecticides usually act upon
a) Digestive system b) Nervous system c) Circulatory system d) Muscular system

247. Study the following flow chart of biogas production and select the correct option for *A*, *B* and *C*



a) A-Methanogenic bacteria, B-Fermentative microbes, C-CO_2 and hydrogen (biogas)
b) A-Anaerobic microorganisms, B-*Methanococcus,* C-CO_2 and nitrogen (biogas)
c) A-Fermentative microbes, B-Methanogenic bacteria, C-CO_2 and methane (biogas)
d) A-Aerobic microorganisms, B-Methanobacter, C-CO_2 and methane (biogas)

248. Which of the following is used as biofertiliser?
I. Cyanobacteria
II. Yeast
III. Symbiotic bacteria
IV. Free living bacteria
Choose the correct option
a) I, II and III b) I, III and IV c) II, III and IV d) I, II and IV

249. A commonly used mastigator called 'supari' is obtained from the plant
a) *Acacia catechu* b) *Areca catechu* c) *Piper betel* d) *None of these*

250. Which of the following is not used as a biopesticide?
a) Bacillus thuringiensis b) Trichoderma harzianum
c) Nuclear Polyhedrosis Virus (NPV) d) Xanthomonas campestris

251. Which one of the following is not a biofertilizer?
a) *Rhizobium* b) *Nostoc* c) Mycorrhiza d) *Agrobacterium*

252. Which of the following is used as 'clotbuster'. For removing clots from blood vessels of patient who have undergone myocardial infartion
a) Ethanol b) Statins c) Cycloporin-A d) Streptokinase

253. Which of the following is an endogenic species of earthworm?
a) *Octochaetonae serrata* b) *Lampito mauritti*
c) *Lumbricus teretris* d) All of the above

254. Which bacteria are utilized in gobar gas plant?
a) Methanogens b) Nitrifying bacteria
c) Ammonifying bacteria d) Denitrifying bacteria

255. Energy cropping is
a) Production of ethanol b) Production of methane
c) Production of sugarcane d) Production of gas

256. What would happen if oxygen availability to activated sludge flocs is reduced?
a) It will slow down the rate of degradation of organic matter
b) The centre of flocs will become anoxic, which would cause death
c) Flocs would increase in size as anaerobic bacteria would grow around flocs
d) Protozoa would grow in large number

257. *Asafoetida* is obtained from
a) Roots and stem b) Leaves c) Fruit d) Flower
258. The plant most commonly used as green manure is
a) Dilbergia sissoo b) Polyalthea c) Sesbania aculeata d) None of these
259. What happened when we inoculate *Rhizobium* in the wheat field?
a) No increase in production (nitrogen content of soil remains same)
b) A lot of increase in production (nitrogen content of soil increases)
c) Fertility of soil decreases
d) Fertility of soil increases
260. In the biological treatment of sewage the masses of bacteria held together by fungal filament to form mesh like structures called as
a) Activated sludge b) Aerobic process c) Flocs d) Anaerobic sludge
261. Toddy is
I. a traditional drink of Southern India
II. made by fermentation of sap from palm trees by bacteria
Which of the statements given above about toddy is/are correct?
a) Only I b) Only II c) I and II d) None of these
262. The symbiotic association of fungi with the roots of higher plants is called
a) Eubacteria b) Actinomycetes c) Mycorrhiza d) Lichen
263. Sunhemp is obtained from
a) *Crotalaria juncea* b) *Linum usitatissimum*
c) *Corchorus capsularis* d) None of these
264. A common biocontrol agent for the control of plant diseases
a) *Agrobacterium* b) *Glomus* c) *Trichoderma* d) Baculovirus
265. Three crops that contribute maximum to global food grain production are
a) Wheat, rice and maize b) Wheat, maize and sorghum
c) Rice, maize and sorghum d) Wheat, rice and barley
266. Pomato is
a) Natural mutant b) Somatic hybrid c) Androgenic hybrid d) Somaclonal variant
267. The large holes in swiss cheese are due to production of a large amount of ...A... by a bacterium ...B... . Here A and B refers to
a) A-CO_2; B-*Penicillium roqueforti* b) A-CO_2; B-*Propionibacterium sharmanii*
c) A-CO_2; B-*Penicillium notatum* d) A-CO_2; B-*Saccharomyces cerevisiae*
268. The primary treatment of waste water involves the removal of
a) Dissolved impurities b) Stable and particles c) Toxic substances d) Harmful bacteria
269. Green manures are prepared from
a) *Saccharum officinarum* b) *Zea mays*
c) *Crotalaria juncea* d) *Sorghum vulgare*
270. Crossing of unrelated pure breeding animals of different traits within the same breed is called
a) cross breeding b) Out crossing
c) Close breeding d) Species hybridization
271. Heroin is obtained from plant of family
a) Papaveraceae b) Leguminosae c) Cruciferae d) Liliaceae
272. Disease resistance crop is obtained by
a) Crossing with new varieties b) Crossing with wild varieties
c) Injecting with organic compounds d) None of the above
273. Mating between two individuals differing in genotypes to produce genetic variation is called
a) Domestication b) Introduction c) Hybridization d) Mutation
274. Carbamates pesticides act by combining with acetylcholinesterase enzyme. Which one of the following is a carbamate?

a) Propoxur (baygon) b) Aldicarb (temik) c) Carbofuran (furadan) d) All of these

275. The nutritive medium for growing bacteria and many fungi in the laboratory is called
a) Culture media
b) Fermentation media
c) Baking media
d) None of these

276. Which of the following statement is correct?
a) Cyanobacteria such as *Anabaena* and *Nostoc* are important mobilisers of phosphates and potassium for plant nutrition in soil
b) At present it is not possible to grow maize without chemical fertilisers
c) Extensive use of chemicals fertilisers may lead to eutrophication of nearby water bodies
d) Both *Azotobacter* and *Rhizobium* fix atmospheric nitrogen in root nodules of plants

277. Mycorrhiza promotes plant growth by
a) Absorbing inorganic ions from soil
b) Helping the plant in utilizing atmospheric nitrogen
c) Protecting the plant from infection
d) Serving as plant growth regulator

278. Rotenone is a
a) Bioherbicide
b) Commonly used biofertilizer
c) Bioinsecticide
d) Juvenile hormone

279. The starter or inoculum is added to the fresh milk in order to convert milk into curd, the term starter or inoculum here refers to
a) Bacteria rich in vitamin-B_{12}
b) Bacteria rich in protein
c) Bacteria containing millions of LAB
d) All of the above

280. 'Nagkesar' is obtained from the flowers of
a) *Mesua ferrea* b) *Crocus sativus* c) *Viola odorata* d) *Centella asiatica*

281. The larvicidial fish used in biocontrol of mosquitoes,is
a) *Gambusia* b) *Hilsa* c) *Scalophagus* d) Gold fish

282. Which one of the following plants found in India is an escape from the quarantine?
a) Coffee plant b) *Eichhornia* c) Congress weed d) Cocoa

283. Green potatoes are toxic due to
a) Phytoalexins b) Solanin c) Triazine d) Hormones

284. Baker's yeast is
a) *Propionibacterium sharmanii*
b) *Saccharomyces cerevisiae*
c) *Trichoderma polysporum*
d) *Lactobacillus*

285. Which one is not produced by aquaculture?
a) Oyster b) Silkworm c) Singhara d) Frog

286. Intoxicant caffeine is found in
a) Tea b) Coffee c) Cocoa d) All of these

287. The purpose of biological treatment of waste water is to
a) Reduce BOD
b) Increase BOD
c) Reduce sedimentation
d) Increase sedimentation

288. International Rice Research Institute (IRRI) is located at
a) Hyderabad (India)
b) Manila (Philippines)
c) New York (USA)
d) Tokyo (Japan)

289. Regulation to restrict the movement of diseased plant material from one place to another are called

a) Plant regulations b) Plant quarantine c) Plant protection d) Crop rotation

290. Which of the following is common to *Azospirillum*, *Anabaena*, *Nostoc* and *Oscillatoria*
a) N_2-fixer microbes b) Prokaryotic organism c) Both (a) and (b) d) Eukaryotic organism

291. Plants having similar genotypes produced by plant breeding are called
a) Haploid b) Autoploid c) Clone d) None of these

292. Quinine is obtained from
a) Bark of *Cinchona* b) Root of *cinchona* c) Wood of *cinchona* d) Leaves of *cinchona*

293. Which of the following plan has been initiated by the Ministry of Environment and Forests to protect rivers from water pollution?
a) Ganga action plan b) Yamuna action plan c) Both (a) and (b) d) Neither (a) nor (b)

294. In rice fields biological nitrogen fixation is chiefly brought by
a) Lichen b) Brown algae c) Cyanobacteria d) *Rhizobium*

295. Which of the following is correctly matched?
a) Central Rice Research institute – Shimla
b) National Botanical Research Institute – Delhi
c) Central Drug Research Institute - Cuttack
d) Central Drug Technology Research Institute – Mysore

296. Sewage or municipal waste should not be directly passed into rivers, streams and other water bodies because
I. it contains human excreta and other organic waste
II. it contains a number of pathogenic microbes
Which of the statement given above is/are correct?
a) Only I b) Only II c) Both (a) and (b) d) None of the above

297. Turpentine oil is obtained from
a) *Pinus longifolia* b) *Melia azadirachta* c) *Eucalyptus* d) All of these

298. Curd is formed by adding a small amount of curd to milk, which acts as a
a) Starter b) Inoculum c) Both (a) and (b) d) None of these

299. Statins used as blood cholesterol lowering agents are extracted from
a) Algae b) Yeast c) Virus d) Bacteria

300. *Triticum vulgare* has been found to be presently evolved as
a) Diploid b) Tetraploid c) Pentaploid d) Hexaploid

301. A good example for organic fertilizer, which improves phosphorus uptake, is
a) A M fungi b) Rhizobium c) Azosprillum d) None of these

302. Cricket bat is made from the wood of
a) *Pinus walichiana* b) *Shorea robusta* c) *Salix sp* d) *Cedrus deodara*

303. Consider the following statements about *Bt*
I. The bacteria *Bacillus thuringiensis* (*Bt*) are used to control butterfly catterpillers
II. Fresh spores of *Bt* are mixed with water and sprayed on seeds such as brassicas and fruit trees
III. Insect larvae, after eating these are killed by the toxin released in their gut
IV. *Bt* toxin genes have been introduced into plants to provide resistance to pests
Which of the statements given above are correct?
a) I, II and III b) I, III and IV c) II, III and IV d) I, II, III and IV

304. Hybrid vigour is mostly due to
a) Superiority of all the genes b) Homozygosity of pure characters
c) Heterozygosity d) None of the above

305. Protein in silk thread is
a) Fibroin b) Keratin c) Albumin d) Globulin

306. Which of the following is a dual purpose breed?
a) Sindhi b) Deoni c) Jersey d) Sahiwal

307. Which is correctly matched?

a) Apiculture – Honey bee
b) Pisciculture – Silk moth
c) Sericulture – Fish
d) Aquaculture – Mosquito

308. In poultry, first deworming is usually done around this age
a) 4 weeks b) 8 weeks c) 12 weeks d) 16 weeks

309. 'Heterosis' is related to
a) Cloning b) Selection c) Hybridization d) Introduction

310. Which hexaploid wheat is used to make bread?
a) *Triticum turgidum*
b) *Triticum durum*
c) *Triticum monococcum*
d) *Triticum aestivum*

311. Somatic hybridization is a technique of
a) Natural breeding
b) Natural pollination
c) Artificial pollination
d) Somatic cells Hybridization

312. Allethrin is a commonly used
a) Fertilizer b) Herbicide c) Growth hormone d) Insecticide

313. Which one of these diseases in animals is caused by *Babesia bigemina?*
a) Rinderpest b) Tick fever c) Anthrax d) Diarrhoea

314. Which one of the following antibiotic was extensively used to treat American soldiers wounded in World War-II?
a) Streptokinase b) Penicillin c) Statins d) Neomycin

315. Blue-green algae are mainly used as biofertilisers in the field of which crop?
a) Gram b) Millet c) Rice d) Maize

316. A water fern, which is used as a green manure in rice fields is
a) Salvinia b) Mucor c) Aspergillus d) Azolla

317. A man made allopolyploid cereal crop is
a) *Hordeum vulgare* b) *Triticale* c) *Raphanobrassica* d) *Zea mays*

318. IPM (Integrated pest Management) involves
a) Tissue culture b) Biological control c) Biofertilizers d) Confusion technique

319. The part of cotton producing pure cellulose is
a) Root hair b) Leaf hair c) Seed hair d) Stem hair

320. *Mosascus purpureus* is a yeast (fungus) commercially used in the production of
a) Acetic acid
b) Ethanol
c) Blood cholesterol lowering statin
d) Streptokinase

321. Study the following pathogens .
I. *Yersinia pestis*
II. *Borrelia sp*
III. *Odium albicans*
IV. *Microbacterium leprae*
V. *Haemophilus gallinarium*
Which of the above cause damage to poultry industry?
a) I and IV b) III and V c) II and V d) IV and V

322. During anaerobic digestion of organic waste, such as in producing biogas, which one of the following is left undegraded?
a) Hemicellulose b) Cellulose c) Lipids d) Lignin

323. The source of intoxicating beverage called 'Saky' is
a) *Sorghum vulgare* b) *Arachis hypogea* c) *Oryza sativa* d) *Mangifera indica*

324. Which of the following aquatic weeds is not used in production of biogas?
a) Eichhornia crassipes b) Hydrilla c) Pistia stratiotes d) Spirulina

325. In which method electric current is created for capturing fishes?
a) Fish finding b) Light fishing c) Gill net fishing d) Electro fishing

326. Which of following plant species you would select for the production of bioethanol?

a) *Brassica* b) *Zea mays* c) *Pongamia* d) *Jatropha*

327. Stramonium is a drug obtained from the plant species of
a) Datura b) *Ocimum* c) *Rauwolffia* d) *Asphodelus*

328. Silk is obtained from
a) *Bombyx mori* b) *Laccifera lacca* c) *Apis melliffera* d) None of these

329. Caffeine, cocaine and amphetamine are
a) Hallucinogens b) Sedative c) Tranquillizer d) Stimulant

330. Which one of the fungi is used for production of citric acid?
a) *Lactobacillus bulgaricus* b) *Penicillium bulgaricus*
c) *Aspergillus niger* d) *Rhizopus nigricans*

331. Methanogens, particularly *Methanobacterium* grow anaerobically on cellulosic material and produce
I. methane
II. carbon dioxide
III. oxygen
IV. ethane
Choose the correct option
a) I and II b) I and III c) III and IV d) I, II and III

332. Consider the following statements about, secondary sewage treatment
I. In secondary treatment useful aerobic microbes grow rapidly and form flocs. Flocs are masses of bacteria associated with fungal filaments to form mesh-like structures.
II. The growing microbes consume organic matter and thus reduce the biochemical oxygen demand. When BOD of sewage has reduced, the effluent is passed into settling tank.
III. In settling tank, the bacterial flocs settle and the sediment is called activated sludge.
IV. A small part of the sludge is used as an inoculum in the aeration tank and the remaining part is passed into large tanks called anaerobic sludge digesters.
V. In the digesters, heterotrophic microbes anaerobically digest bacteria and fungi in sludge producing mixture of gases such as, carbon dioxide nitrogen and carbon monoxide which form the biogas
Which of the statements given above are correct?
a) I, II, III and IV b) I, III, IV and V c) II, III, IV and V d) I, II, III, IV and V

333. Gobar gas contains mainly
a) CH_4 and CO_2 b) CH_4 and O_2 c) CH_4 and H_2 d) CH_4 and SO_2

334. One of the major difficulties in the biological control of insect pest is that the
a) Method is less effective as compared with the use of insecticides
b) Predator does not always survive when transferred to a new environment
c) Predator develops a preference to other diets and may itself become a pest
d) Practical difficulty of introducing the predator to specific area

335. Study the following flow chart that shows curd formation from milk and select the correct option for A and B
Milk is incubated with curd
↓
LAB shows growth in milk
↓
Production of .....A.....
↓
Coagulation and digestion of milk protein
↓
Improved nutritional quality by increased ....B....
a) A-citric acid; B-vitamin-B_{12} b) A-lactic acid; B-vitamin-B_{12}
c) A-lactic acid; B-vitamin-C d) A-citric acid; B-vitamin-B_2

336. Pencils are prepared from the wood of

a) *Pinus vinaster* b) *Juniperus virginiana*
c) *Chamaecyparis piscifera* d) *Abies pindrow*

337. *Rauwolffia serpentina* is used in
a) Curing high blood pressure b) Kidney failure
c) Eye defect d) Diabetes

338. Agriculture by using only biofertilisers is called
a) Manuring b) Composting c) Inorganic farming d) Organic farming

339. Penicillin is the first antibiotic. It was discovered by
a) Alexander Flemming : 1928 b) Alexander Flemming : 1930
c) S Waksman : 1928 d) S Waksman : 1930

340. In paddy fields biological nitrogen fixation is chiefly brought by
a) Cyanobacteria b) Green algae c) Mycorrhiza d) *Rhizobium*

341. Superiority of hybrid over parents is
a) Introduction b) Selection c) Hybridized progeny d) Hybrid vigour

342. Which of the following insecticides is obtained from the roots of *Derris elleptica*?
a) Cinerin b) Nicotine c) Rotenone d) Pyrethrum

343. Which of the following bacteria is present in the rumen of cattle?
a) Rhizobium b) Azotobacter c) Methanobacterium d) Clostridium

344. Which is a bioinsecticide?
a) *Cactoblastis cactorum* b) *Anabaena*
c) *Bacillus thuringiensis* d) *Rhizobium*

345. Wonder wheat is new wheat variety developed by
a) Mexico's international Wheat and Maize Improvement center
b) Indian National Botanical Research Institute
c) Australian Crop Improvement Center
d) African Crop Improvement Center

346. Which of the following in an opioid drug?
a) Heroin b) Cocaine c) Marijuana d) Hashish

347. Select the correct statement from the following
a) Activated sludge sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria
b) Biogas is produced by the activity of aerobic bacteria on animal wastes
c) *Methanobacterium* is an aerobic bacterium found in rumen of cattle
d) Biogas, commonly called gobar gas is pure methane

348. Jute fibres are obtained from the
a) Secondary phloem b) Pith c) Xylem d) Endodermis

349. Para rubber is obtained from the latex of
a) *Ficus elastica* b) *Hevea brasiliensis* c) *Carica papaya* d) *Musa paradisica*

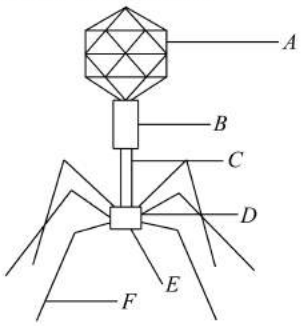
350. Identify the blank species *A*, *B*, *C* and *D* given in the following table and select the correct answer

Types of Microbes	Scientific Name	Commercial, Product
Bacterium	*A*	Lactic acid
Fungus	*B*	Cyclosporine-A
C	*Monascus purpureus*	Statins
Fungus	*Penicillium notatum*	*D*

a) A-*Lactobacillus,* B-*Trichoderma polysporum,* C-Yeast, D-Penicillin
b) A-*Staphylococcus,* B-*Clostridium, C-Yeast, D-Penicillin*
c) A-*Lactobacillus,* B-*Microsporum,* C-Yeast, D-Penicillin

d) A-*Straphylococcus,* B-*Microsporum,* C-*Agaricus,* D-Penicillin

351. Given below is the diagram of a virus bacteriophage. In which one of the option all the six parts A, B, C, D, E and F are correct?



a) A-Head, B-Tail, C-Collar, D-Pins, E-Plate, F-Prongs
b) A-Head, B-Collar, C-Tail, D-Plate, E-Pins, F-Prongs
c) A-Head, B-Tail, C-Collar, D-Plate, E-Prongs, F-Pins
d) A-Head, B-Collar, C-Tail, D-Pins, E-Plate, F-Prongs

352. Consider the following statements
I. Antibiotics are chemical substances produced by some microorganisms which can kill or retard the growth of other disease-causing microorganisms
II. Penicillin is the first antibiotic discovered by Alexander Fleming (1928), while working o bacterium *Staphylococcus aureus*
III. The function of penicillin as an antibiotic was established by Ernst chain and Howard Florey
Which of the statement given above are correct?
a) I and II b) I and III c) II and III d) I, II and III

353. Swiss cheese is formed by the bacterium
a) *Aspergillus niger* b) *Lactobacillus*
c) *Propionibacterium sharmanii* d) *Penicillium roqueforti*

354. *Azolla* is used as a biofertilizer because it
a) Multiplies very fast to produce massive biomass
b) Has association of nitrogen-fixing *Rhizobium*
c) Has association of nitrogen-fixing cyanobacteria
d) Has association of mycorrhiza

355. Methanogens do not produce
a) Nitrogen b) Methane c) Hydrogen sulphide d) Carbon dioxide

MICROBES IN HUMAN WELFARE

: ANSWER KEY :

1)	a	2)	c	3)	b	4)	a	165)	a	166)	a	167)	c	168)	a
5)	b	6)	b	7)	c	8)	a	169)	b	170)	c	171)	d	172)	d
9)	b	10)	c	11)	c	12)	a	173)	b	174)	b	175)	c	176)	c
13)	c	14)	c	15)	c	16)	c	177)	c	178)	d	179)	d	180)	d
17)	a	18)	d	19)	b	20)	a	181)	c	182)	c	183)	a	184)	a
21)	a	22)	b	23)	c	24)	a	185)	c	186)	b	187)	b	188)	a
25)	d	26)	a	27)	a	28)	c	189)	c	190)	c	191)	b	192)	d
29)	a	30)	d	31)	a	32)	a	193)	a	194)	a	195)	a	196)	a
33)	a	34)	d	35)	c	36)	b	197)	c	198)	b	199)	b	200)	b
37)	b	38)	b	39)	b	40)	d	201)	a	202)	d	203)	c	204)	b
41)	c	42)	a	43)	d	44)	b	205)	b	206)	a	207)	a	208)	d
45)	b	46)	c	47)	b	48)	c	209)	c	210)	a	211)	d	212)	b
49)	d	50)	d	51)	d	52)	d	213)	a	214)	d	215)	b	216)	b
53)	a	54)	c	55)	d	56)	b	217)	c	218)	d	219)	d	220)	d
57)	b	58)	d	59)	c	60)	d	221)	a	222)	d	223)	a	224)	b
61)	d	62)	b	63)	c	64)	d	225)	b	226)	c	227)	c	228)	c
65)	a	66)	a	67)	d	68)	a	229)	a	230)	a	231)	c	232)	d
69)	a	70)	d	71)	b	72)	d	233)	a	234)	a	235)	a	236)	a
73)	c	74)	a	75)	a	76)	b	237)	d	238)	c	239)	c	240)	d
77)	d	78)	b	79)	a	80)	d	241)	d	242)	b	243)	a	244)	c
81)	a	82)	c	83)	d	84)	a	245)	b	246)	b	247)	c	248)	b
85)	b	86)	b	87)	a	88)	a	249)	b	250)	d	251)	d	252)	d
89)	b	90)	d	91)	b	92)	a	253)	a	254)	a	255)	a	256)	b
93)	c	94)	b	95)	a	96)	c	257)	a	258)	c	259)	a	260)	c
97)	d	98)	b	99)	b	100)	a	261)	c	262)	c	263)	a	264)	c
101)	a	102)	d	103)	c	104)	c	265)	a	266)	b	267)	b	268)	b
105)	d	106)	d	107)	a	108)	d	269)	c	270)	b	271)	a	272)	b
109)	d	110)	d	111)	b	112)	b	273)	c	274)	d	275)	a	276)	c
113)	b	114)	d	115)	a	116)	a	277)	a	278)	c	279)	c	280)	c
117)	a	118)	c	119)	a	120)	a	281)	a	282)	c	283)	b	284)	b
121)	a	122)	b	123)	d	124)	c	285)	b	286)	d	287)	a	288)	b
125)	d	126)	c	127)	d	128)	a	289)	b	290)	c	291)	c	292)	a
129)	d	130)	c	131)	c	132)	c	293)	c	294)	c	295)	d	296)	c
133)	c	134)	d	135)	c	136)	c	297)	a	298)	c	299)	b	300)	d
137)	b	138)	a	139)	b	140)	a	301)	a	302)	c	303)	c	304)	c
141)	d	142)	b	143)	c	144)	b	305)	a	306)	b	307)	a	308)	b
145)	a	146)	d	147)	b	148)	a	309)	c	310)	d	311)	d	312)	d
149)	d	150)	b	151)	b	152)	c	313)	b	314)	b	315)	c	316)	d
153)	a	154)	c	155)	b	156)	a	317)	b	318)	b	319)	c	320)	c
157)	b	158)	b	159)	b	160)	c	321)	b	322)	d	323)	c	324)	d
161)	a	162)	a	163)	b	164)	a	325)	d	326)	b	327)	a	328)	a

329)	d	330)	c	331)	a	332)	a	345)	a	346)	a	347)	a	348)	a
333)	a	334)	b	335)	b	336)	a	349)	b	350)	a	351)	b	352)	d
337)	a	338)	d	339)	a	340)	a	353)	c	354)	c	355)	a		
341)	d	342)	c	343)	c	344)	c								

MICROBES IN HUMAN WELFARE

: HINTS AND SOLUTIONS :

1 **(a)**
Jojoba or hohoba (*Simondesia chinensis)* contains C-20 to C-6 bromohydric alcohol wax and triglyceride.

2 **(c)**
Castor oil is obtained from *Ricinus communis* (Euphorbiaceae).

3 **(b)**
When the nuclear genetic material of one of the parents is eliminated though the cytoplasm from both the parents are retained, such a fusion product is called **cybrid** (cytoplasmic hybrid) or heteroplast.

4 **(a)**
Some plants accumulate hydrocarbons in form of latex, e.g., *Euphorbia, Asclepias, capaifera.*

5 **(b)**
Powdery mildew of wheat-*Erysiphe graminis.*
Loose smut of wheat-*Ustilago tritici.*

6 **(b)**
A-fermentation; B-bacteria

7 **(c)**
Azospirillum and *Azotobacter* are free living nitrogen fixing bacteria. Free living N_2-fixing bacteria fix atmospheric nitrogen in the soil and make it available for the higher plant

8 **(a)**
Wood, agro-industrial residues and petroleum and oil producting plants are the sources of biofuel. Biofuels are the combustible bodies of plants or comsustible product derived from biomass. Biofuels are renewable.

9 **(b)**
Quinine is obtained from the bark of *Cinchona officinalis* (family-Rubiaceae). The bark of this plant contains about 30 alkaloids including quinine, cinchonine, quinidine and cinchonidine.

10 **(c)**
Clove (*Syzygium aromaticum)* belongs to family-Myrtaceae. Unopended flower buds of this plant yield an oil which is used for perfumes and medicines.

11 **(c)**
Lactobacillus bacteria inhibit the growth of hostile or illness causing bacteria inside the intestinal tract and promote beneficial bacteria needed for digestion

12 **(a)**
A systemic insecticide, when applied to seeds, roots, stems or leaves of plants is absorbed and translocated to various parts of the plant in amounts lethal to insects, which feed on them, e.g., dimethoate, phosphamidon, phorate, aldicarb, parathion etc.

13 **(c)**
Labeo bata is minor carp, its size is smaller and growth rate is slower.

14 **(c)**
'Himgiri' is a wheat variety resistant to leaf and stripe rust, hill bunt etc.

15 **(c)**
Dieldrin is an example of organochlorines and most persistent in soil. Most importantly dieldrin is five times more toxic than DDT.

16 **(c)**
An aquatic weed like water hyacinth (*Eichhornia crassipes*) is used as a source of biogas through harvesting, chopping and crushing.

17 **(a)**
Those plants whose latex contains long chain of hydrocarbons are called petroplants, e.g., *Euphorbia lathyris, Euphorbia caudicifolia, Calotropis procera, Pittosporum resiniferum, etc.*

18 **(d)**
Rhizobium is used as biofertiliser for raising any legume crop. *Rhizobium* is a symbiotic bacterium that lives in the root nodules of legumes and fixes atmospheric nitrogen into organic compound

20 **(a)**
Alcoholic beverages are defined as beverages that contain ethanol (C_2H_5OH). This ethanol is almost

always produced by fermentation, the metabolism of carbohydrates by certain species of yeast under anaerobic or law-oxygen conditions. Beverages such as, wine, beer, or distilled spirits all use yeast at some stage of their production.
Yeast the most common one being *Sacharomyces cerevisiae,* is used in baking as leavening agent, where it converts the food/fermentable sugars present in dough into the gas carbon dioxide. This causes the dough to expand or rise as gas forming pockets or bubbles. When the dough is baked, the yeast dies and the air pockets 'set', giving the baked product a soft and spongy textures.
Cheese is formed by partial degradation of milk by different other microorganisms

21 **(a)**
Maize is used to study the hybrid vigour or heterosis.

22 **(b)**
Sewage contains large amount of organic matter and pathogenic microbes

23 **(c)**
Butyric acid is produced during fermentation activity of bacterium *Clostridium acetobutylicum.*
Lactic acid fermentation is carried out by *Lactobacillus* sp.

24 **(a)**
Emasculation is the process of removal of anthers from a bisexual flower before the anthers mature.

25 **(d)**
The common bread wheat (*Triticum aestivum)* is an allohexaploid, which has two copies each of the genomes A, B and D. Its somatic complement is represented by AABBDD.

26 **(a)**
Primary treatment of sewage is mostly mechanical and concerned mainly with the removal of coarse solid material through filtration and sedimentation

27 **(a)**
Cocaine alkaloid is obtained from *Erythroxylon coca.*

28 **(c)**
First man-made cereal, *i.e.,Triticale* may be hexaploid or octaploid depending upon the species of wheat used in hybridization with *Secale (i.e.,* tetraploid wheat or hexaploid *Secale).*

29 **(a)**
A-*Trichoderma polysporum,* B-As an immunosuppressive agent in organ transplant patients, C-Yeast, D-As blood-cholesterol lowering agent

30 **(d)**
Chemical fertilisers cause pollution of water bodies as well as ground water, besides getting stored in crop plants. Therefore, environmental scientist are pressing for switch over to organic farming. **Organic farming** is a from of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest

31 **(a)**
Coconut (*Cocos nucifera*) is the plant which yields both oil as well as fibres (coir).

32 **(a)**
Biopesticides.
Trichoderma is a free living saprophytic fungi that most commonly lives on dead organic matter in the soil and rhizosphere. It acts as a biopesticides for control of many soil borne disease

33 **(a)**
In green manure quick growing crops cultivated and ploughed into the soil which increase crop yield by 30-50% e.g., *Sesbania aculiata, Crotalaria juncea, Vigna sinensis,* etc.

34 **(d)**
Mule is a result of interspecific hybridization, *i.e.,* between two different species but between two same generic members. Here, the hybridization is made between male ass and female horse.

35 **(c)**
Fuel alcohol (bioethanol) is produced from biomass by microorganisms. It is successfully used as motor fuel in Brazil and USA.

36 **(b)**
Aflatoxicosis is a fungal disease. In poultry, it reduces the immunity and spread through contaminated food.

37 **(b)**
Potato is a native of Peru
Pineapple, Rubber, groundnut – Brazil
Maize, cotton - Mexico

38 **(b)**
The fully grown caterpillar larva of *Bombyx mori* stops feeding and develops salivary glands, then it undergoes pupation. In this, the larva secretes a sticky fluid through a narrow pore situated on the hypopharynx. This secreted fluid when comes in contact with air, takes the form of long thread of silk and is wrapped around the body of caterpillar in the form of a covering called as cocoon. The silk

threads are then removed from cocoon after killing them.
Hence, silk is secreted by caterpillar larva of silkworm but is obtained from the cocoon.

39 **(b)**
Morphine ($C_{17}H_{19}O_3N$) physiologically is the most active alkaloid of opium (*Papaver somniferum).* It has sleep and dream inducing properties. Besides, it is essentially an analgesic and sedative and is used as a well known pain killer.

41 **(c)**
Methanogens, particularly *Methanobacterium,* anaerobically breakdown cellulosic material to products CO_2 and H_2 in
(i) Anaerobic sludge in sewage treatment plants
(ii) Rumen (a part of stomach) of cattle, thus providing nutrition to cattle

42 **(a)**
LSD is lysergic acid diethylamide. It is a crystalline alkaloid obtained from **ergot,** an extract obtained from fruiting body of fungus *Claviceps purpurea.*

43 **(d)**
Idli and dosa are fermented preparation of rice and black gram. The two are allowed to ferment for 3-12 hours with air borne *Leuconostoc* and *Streptococcus* species of bacteria
Toddy is a traditional drink of some parts of south India, which is made by fermentation of sap of palms by bacterias
Cheese is formed by partial degradation of milk by different microorganisms

44 **(b)**
Roquefort cheese is formed by ripening with the fungi *Penicillium roqueforti* for a particular flavour

45 **(b)**
A-Organ transplant; B-*Trichoderma*

46 **(c)**
Herbicides kill weeds and unwanted plants in cultivated land. Insecticides are those chemicals that destroy or kill insects. Herbicides kill plant mostly by blocking PS-II and occasionally phloem transport. Insecticides kill insects mostly through impairment of nerve conduction and sometimes through respiratory arrest.

47 **(b)**
Honey is a near neutral sweet syrup extracted from tires of honey bee. The chemical composition of honey is –ash 01.00%, enzyme and pigments 02.21%, maltose and other sugar 08.81%, water 17.20%, dextrose 21.28% and levulose 88.90%.

48 **(c)**
Bread is made through fermentation by *Saccharomyces cerevisiae* or commonly called baker's yeast. Yeast species also used in alcoholic fermentation is *S. cerevisiae* (Brewer's yeast)

49 **(d)**
Most of the petrocrops belong to family- **Euphorbiaceae, Apocyanaceae** and **Asclepiadaceae.** The plants of these families convert a substancial amount of the photosynthetic products into latex.

50 **(d)**
The patent granted for biological entities and the products derived from them are called biopatents. Several biopatents are very broad in their coverage, *e.g.,* one patent covers "all transgenic plants of *Brassica* family".

51 **(d)**
Exhaustible resources are natural resources with finite supply, which if used indiscriminately are likely to diminish and then get exhausted. Fossil fuel is a non-renewable (limited) exhaustible source of energy. Nuclear fuels are renewable source of energy. **Solar energy** and **water energy** are inexhaustible but renewable source of energy.

52 **(d)**
BOD refer to the amount of oxygen consumed if all the organic matter in one litre of water is oxidized by bacteria. Higher BOD indicates higher polluting potential

53 **(a)**
Gossypium hirsutum is an American (new world) cotton crop, which is tetraploid having 26 pairs ($n = 26$) of chromosomes.

54 **(c)**
The natural method of pest and pathogen control involving use of viruses, bacteria and other insects is called biocontrol or biological control. For example, lady bird Bettle Feeds on aphids while dragonflies prey upon mosquitoes

55 **(d)**
Penicillin was the first antibiotics to be discovered by Alexander Flemming (1928). The antibiotic was however, commercially extracted by efforts of **Chain** and **Florey** Flemming, Chain and Florey were awarded Nobel Prize in 1945

56 **(b)**

Large holes Swiss cheese is ripened with the help of CO_2 producing (causing holes) bacterium called *Propionibacterium sharmanii*

57 **(b)**
Biogas is a methane rich fuel gas produced by anaerobic breakdown with the help of methanogenic bacteria

58 **(d)**
Cinchona, opium and Rauwolffia all are medicinal plants.

59 **(c)**
A small amount of curd added to the fresh milk as inoculum or starter contain millions of LAB, which at suitable temperatures multiply, thus converting milk to curd, which improves its nutritional quality by increasing vitamin-B_{12}. In our stomach too, the LAB play very beneficial role in checking disease causing microbes

60 **(d)**
Biogas or gobar gas is produced during anaerobic fermentation of agricultural wastes. Biogas is used as fuel for heating and cooking, lighting power for irrigation and other purposes as an alternative of fire wood, kerosene, dung cakes or even electricity and LPG. It is considered as ecofriendly and pollution free source of energy

61 **(d)**
Neem extracts contain an antifeedant compound azadirachtin, which keeps away insects.

62 **(b)**
All the given symptoms are of infectious coryza disease of poultry birds.

63 **(c)**
Isinglass is produced from air bladder of cat fishes and carps. Isinglass is principally used for clarifying wines, beer and making purse, honey, comb, book and ribbon. The Isinglass prepared in Russia is of best quality in the world.

64 **(d)**
Nostoc, Anabaena and *Oscillatoria* are cyanobacteria. They fix atmospheric nitrogen and increase the organic matter of soil through their photosynthetic activity. Blue-green algae increase the soil fertility by adding organic matter to the soil

65 **(a)**
Clostridium butylicum is used in the commercial production of butyric acid

66 **(a)**
Primary treatment is the physical removal of large and small particles from sewage

67 **(d)**
Fungi form symbiotic association with the roots of higher plants called mycorrhiza, *e. g.*, *Glomus.* Mycorrhiza shows benefits such as resistance to root borne pathogens, tolerance to salinity and drought and an over all increase in plant growth and development

68 **(a)**
The major component of biogas is methane (about 50-68%), which is highly inflammable. The other gases a carbon dioxide (25-35%), hydrogen (1-7%) and rarely hydrogen sulphide

69 **(a)**
Biogas is a methane rich fuel gas produced by anaerobic break down of biomass with the help of methanogenic bacteria. It is a three step anaerobic digestion of animal and other organic wastes.

Biogas (methane + CO_2)
Step – III ↑ Methanogenic bacteria
Organic acid
Step – II ↑ Fermentive microbes
Soluble compounds or monomers
Step – I ↑
Proteins, fats, cellulose, hemicelloulose, etc.

70 **(d)**
Biofertilisers are the microorganisms which enrich the nutrient quality of the soil. Bacteria, fungi and cyanobacteria are the three main sources of biofertilisers

71 **(b)**
In silk fibre, the central core is made up of fibroin.

72 **(d)**
Saffron is obtained from the stigma and upper portion of style of the flower of *Crocus plant.*

73 **(c)**
Lactic Acid Bacteria (LAB) like *Lactobacillus* are added to milk. It converts lactose sugar of milk into lactic acid. Lactic acid causes coagulation and partial conversion of milk protein casein to cal paracaesinate. Milk is changed into curd, yoghurt and cheese

74 **(a)**
Rice (*Oryza sativa*) is a tropical crop grown in almost all parts of India. It is a major crop with 90% production in Asia. It is a staple food of 60% of world's population and more than 50% Indians. It is grown as kharif crop in north India.

75 **(a)**

The production of 'Hessian fly resistant' wheat variety is obtained through intrageneric hybridization.

76 **(b)**
The pulp prepared from the straw of several species of family-Poaceae is used in manufacturing paper of almost course and fine quality, straw board, artificial rayon, etc. Some commonly used genera are *Bambusa, Erianthus, Oryza, Saccharum,* etc.

77 **(d)**
Silk is not a plant product. It is a secretion of the silk glands of the larvae of the silk moth, *Bombyx mori.*

78 **(b)**
Rhizobium are soil bacteria that fix nitrogen after becoming established inside root nodules of legumes (Fabaceae). *Rhizobia* require a plant host; they cannot independently fix nitrogen

79 **(a)**
A-heart; B-*Streptococcus*. Streptokinase is an enzyme obtained from the cultures of some haemolytic bacterium *Streptococcus* and modified genetically to function as clot buster

80 **(d)**
Cotton contains cellulose textile fibre and suitable for a wide range of clothing, household and industrial products. The *Sorghum* crop is quite valuable for forage and can be used safely for feeding fresh *Sorghum* to animals.

81 **(a)**
Methanogens, particularly *Methanobacterium,* anaerobically breakdown cellulosic material to produce CO_2 and H_2 in anaerobic sludge in sewage treatment plants and rumen of cattle, thus providing nutrition to cattle

82 **(c)**
Indian rose wood tree is **sissoo**, *i.e., Delbergia sissoo.*

83 **(d)**
Microbes can be found everywhere, *i.e.,* in soil, water, air and inside the bodies of living organisms. They can be found in thermal vents deep in soil, under snow as well as acidic environment

84 **(a)**
Removal of stamens from a bisexual flower before anthesis is called emasculation. Emasculation is done during hybridization for preventing self-pollination.

85 **(b)**
Commercial coir is obtained from the fibrous husk (mesocarp) of the fruits of coconut plam of *Cocos nucifera* (family-Arecaceae). The fibre is very light, elastic, waterproof, sound proof, exceedingly high resistant to mechanical wear and dampness but less durable and more rough surfaced. It is used for making mats, gunny bags, marine cordage, fishing nets, etc.

86 **(b)**
Microorganism such as *Lactobacillus* and others commonly called Lactic Acid Bacteria (LAB). These bacteria are widely used in food fermentation because of their ability to improve flavours, texture and safety of perishable raw materials such as milk, meat and vegetables

87 **(a)**
Cashewnut, potato and rubber are new world crops. Mango, tea and coffee are old world crops.

88 **(a)**
Eri silkworm (*Attacus rechinii* or *Phlosamia ricinii*) of S E Asia, feeds on castor and produces a rough and strong silk locally known as 'Arandi silk' or Eri silk.

89 **(b)**
Aleurone grains are rich in proteins. Aleurone layer is the peripheral part of endosperm and is very important physiologically because it secretes or accumulates the hydrolysing enzymes, which help in digestion of reserve food material during digestion.

90 **(d)**
Pyrethroids are the most recent insecticides in India. These are called 'third generation insecticides', e.g., heseif, deltamethrin. Chlorinated hydrocarbons are first generation insecticides and organophosphorus are second generation insecticides.

91 **(b)**
Biofortification differs from ordinary fortification because it focuses on making plant foods more nutritious as the plants are growing rather than nutrients added to the foods when they are being processed.

92 **(a)**
Biogas is a methane rich fuel gas produced by anaerobic breakdown or digestion of biomass with the help of methanogenic bacteria. Biogas is made up of methane, carbon dioxide with traces of hydrogen

93 **(c)**
Chicks of the first two weeks in the **brooder hover** are usually susceptible to Ranikhet disease, in which the beak of bird becomes dry and later on becomes filled with mucus. Crop contains undigested food and bird suffers from fever and yellowish white diarrhoea.

94 **(b)**
Glomus is a genus of *Arbuscular Mycorrhizal* (AM) fungi and all species form symbiotic relationships (mycorrhizae) with plant roots. Roots infected with *Glomus* may protect the host plant from harmful soil borne pathogens, provided limiting nutrients, and increase overall fitness of the host. The *Glomus* plant symbiosis plays an important role in the economic sectors involving the growth of plants such as agriculture, horticulture and forestry

95 **(a)**
Commercial chemical fertilisers are more expensive than natural fertilisers. They may contain ingredients that may be toxic to the skin or respiratory system. Chemical fertilisers help increase the productivity of many garden plants and keep desirable plants healthy. But their use is also a major cause of many forms of pollution. Chemical fertilisers can build up in the soil, causing long-term imbalances in soil pH and fertility

96 **(c)**
Bt strains have been used to design bio-insecticidal plants, through genetic engineering.

98 **(b)**
Saccharomyces cerevisiae.
Bread is made through fermentation by *Saccharomyces cerevisiae* or commonly called baker's yeast. Yeast species also used in alcoholic fermentation is *S. cerevisiae* (Brewer's yeast)

99 **(b)**
Trichoderma is a free living saprophytic fungi that most commonly lives on dead organic matter in the soil and rhizosphere. It acts as a biopesticides for control of many soil borne disease

100 **(a)**

Types of Microbes	Scientific Name	Commercial Product
Bacterium	*Streptococcus* (A)	Clot buster enzyme
Fungus (B)	*Aspergillus niger*	Citric acid
Fungus	*Trichoderma polysporum*	Cyclosporine-A (C)
Bacterium	*Clostridium butylicium* (D)	Butyric acid

101 **(a)**
Green revolution is the rapid increase in agricultural production (especially wheat and rice) during 1960-1970. In march 1963, **Dr. N E Borlaug** visited India on the invitation of **Dr. B P Pal** (Director of IARI) and sent a wide range of material in September 1963. Father of green revolution in India is **M S Swaminathan. N Borlaug** is known as father of green revolution in the world.

102 **(d)**
Biopesticides are pesticides of biological origin, which may be of various types depending upon the types of pests killed or controlled by them, e.g., algicides, fungicides bacteriocides, herbicides or weedicides, insecticides, nematicides and rodenticides, etc. These were initially employed to protect crop plants against pests but they are non equally important for destroying or controlling vectors for various animals and human pathogens, thus, can be used for controlling various diseases also.

103 **(c)**
Primary treatment is the physical removal of large and small particals from sewage.
Secondary treatment of the liquid effluent from the primary settling-tank is purely a biological treatment involving microbial activity.
In the anaerobic sludge digesters, heterotrophic microbes anaerobically digest bacteria and fungi in sludge producing mixture of gases such as methane, hydrogen sulphide and CO_2, which form the biogas

104 **(c)**
Hybridization is defined as the crossing of two varieties or species with desirable characters and bringing together these characters in their progeny.

105 **(d)**
Azadirachtin, meliantial and salanin obtained from *Azadirachta indica* (neem) are insect repellent as well as antifeedant. It is perhaps the first natural insecticide used by man. It's fruits are used as biofertilizer.

106 **(d)**

Nitrogen-fixing bacteria, microorganisms capable of transforming atomospheric nitrogen into fixed nitrogen, inorganic compounds usable by plants.
Two kinds of nitrogen fixers are recognized
(i) Free-living (non-symbiotic) bacteria, including the cyanobacteria (blue-green algae) *Anabaena* and *Nostoc* and such genera as *Azotobacter, Azospirillum* and *Clostridium*
(ii) Mutualistic (symbiotic) bacteria such as *Rhizobium,* associated with leguminous plants, and *Spirillum lipoferum,* associated with cereal grasses
Pseudomonas is a common bacterium that can cause disease in animals, including humans

107 **(a)**
There are an estimated 2,00,000 varieties of rice in India alone. The diversity of rice in India is one of the richest in the world. Basmati rice has 27 documented varieties grown in India.

108 **(d)**
Cloves are dried, highly aromatic, unexpanded, flower buds of *Eugenia caryophyllus,* family-Myrtaceae.

109 **(d)**
Agent orange and super orange were used from 1961 to 1971. They released dioxins, which have caused harm to the health of those exposed during the Vietnam war. Agent blue and white were part of the same programme but did not contain dioxins.

111 **(b)**
Pollution from human excreta and organic wastes from kitchen can be most profitably minimised by using them for producing biogas. These wastes release methane and other gases as a result of action of anaerobic microorganisms. Biogas contains methane in bulk and other gases like CO_2, H_2, N_2, and O_2.

112 **(b)**
Cotton is the seed surface fibre of *Gossypium.* Its processing involves ginning, bailing, picking, lapping, carding and twisting. It is used in textile industry.

113 **(b)**
Methanogens.
Biogas is a methane rich fuel gas produced by anaerobic breakdown or digestion of biomass with the help of methanogenic bacteria. Biogas is made up of methane, carbon dioxide with traces of hydrogen

114 **(d)**
Methane, CO_2 Hydrogen.
Biogas is a methane rich fuel gas produced by anaerobic breakdown or digestion of biomass with the help of methanogenic bacteria. Biogas is made up of methane, carbon dioxide with traces of hydrogen

115 **(a)**
Azadirachtin obtained from neem plant is used as insect repellent.

116 **(a)**
Triticale is the first man-made cereal crop. It has been obtained by crossing wheat (*Triticum* sp) with rye (*Secale cerale*).

117 **(a)**
Petroplants are the plants, which can yield large amount of latex having long chained liquid hydrocarbons. e.g., *Jatropha, Euphorbia* (family-Euphorbiaceae) and other members of family-Euphorbiaceae, Asclepiadaceae and Apocyanaceae.

118 **(c)**
Mycorrhiza shows the following benefits
(i) resistance to root borne pathogens
(ii) tolerance to salinity and drought
(iii) overall increase in plant growth and development

119 **(a)**
Aseel is an indigenous breed. Aseel is one of the best table bird but it cannot be raised on commercial purpose because of its poor growth and low fertility. The original Aseel is a medium sized aggressive bird commonly known as the Reza or the Tikra. Pure specimens of this breed are now rare and are available with some fanciers in parts of AP, Karnataka and UP.

120 **(a)**
Microbes are used to synthesise a number of products valuable to human beings. Beverages, antibiotics, bioactive molecules and enzymes are some example

121 **(a)**
A germplasm is a collection of genetic resources for an organism. For plants, the germplasm may be stored as a seed collection. It includes, diverse alleles of all the genes of an organism.

122 **(b)**
Silk is composed of proteins. It consists of an inner part made up of fibroin protein and is covered with an outer envelope made up of

sericerin protein. The silk thread contains 75-80% fibroin and 20-25% of sericin.

123 **(d)**
Jojoba is *Simendesia chinensis.* Its seed contain about 50% of liquid wax just like sperm whale oil. It is a drought resistant desert shrub. Now-a-days it is used as lubricant.

124 **(c)**
Hybridization involves simple process of emasculation and transfer of pollens from one flower to the stigma of other flower.

125 **(d)**
The dough used for making bread is fermented by *Saccharomyces cerevisiae* or commonly called baker's yeast. CO_2 released during the process of fermentation gives the puffy appearance to dough. It is used to make foods like idli, dosa, bread, etc.

126 **(c)**
The roots of shatavari (*Asparagus ramosus)* are used extermally to cure chicken pox, small pox, measles etc.

127 **(d)**
Nitrifying bacteria (one of the chemosynthetic bacteria) oxidise ammnonia to nitrites and obtain energy for the preparation of food. This oxidation occurs in two steps. In the first step, ammonia is oxidised to nitrite by nitrite bacteria (e.g., *Nitrosomonas* and *Nitrococcus*). In the second step, nitrite is oxidised to nitrate by nitrate bacteria (e.g., *Nitrocystis* and *Nitrobacter*).

128 **(a)**
The ladybird and dragonflies are useful to get rid of aphids and mosquitoes, respectively.
(i) A bacteria species namely *Bacillus thuringiensis (Bt)* is known to kill a wide range of insects such as butterfly, caterpillars, ant etc., some strains of *Bt* can kill animal and plant parasitic nematodes, protozoans and even cockroaches
(ii) *Trichoderma* is a free-living saprophytic fungi that most commonly lives on dead organic matter in the soil and rhizophere
(iii) The fungus is being developed as an effective biocontrol agent of several plant pathogens
(iv) *Rhizobium* is a symbiotic bacterium that lives in the root nodules of legumes and fixes atmospheric nitrogen into organic compounds

129 **(d)**
In *Bt* cotton, *Bt* means carrying an endotoxin gene from *Bacillus thuringiensis.* Specific *Bt* toxin gene were isolated from *Bacillus thuringiensis* and incorporated into the several crop plants such as cotton, corn. The choice of genes depends upon the crop and the targeted pest as most *Bt* toxins are insect group specific. The toxin is coded by a gene named *cry*

130 **(c)**
Cyanobacteria fix atmospheric nitrogen and increase the organic matter of the soil through photosynthetic activity, *e. g.*,*Nostoc, Anabaena, Oscillatoria,* etc.

131 **(c)**
Insecticide pyrethrum is obtained from the plant *Chrysanthemum.*

132 **(c)**
Rhizobium is found in the roots nodules of leguminous plants. It is a nitrogen fixing symbiotic bacterium which increases the fertility of soil, hence *Rhizobium* is called bacterial fertilizer.

133 **(c)**
Beverages are formed by fermenting malted cereals and fruit juices with *Saccharomyces cerevisiae* or brewer's yeast to produce ethanol

134 **(d)**
According to union petroleum minister, 5% of alcohol (ethanol) will be mixed in petrol for meeting energy needs.

135 **(c)**
The chemical substances produced by some microbes which can kill or retard the growth of other microbes are called antibiotics. The term antibiotic was coined by Waksman (1942). Penicillin was the first antibiotic to be discovered by Alexander Flemming (1928)

136 **(c)**
An important part of the biological farming approach is to become familiar with the various life forms that inhabit the field, predators as well as pests and also their life cycles, patterns of feeding and the habitats that they prefer. This will help to develop appropriate means of biocontrol

137 **(b)**
Cotton is obtained from the epidermal hair present on the surface of seeds of *Gossypium* sp. These are made up of cellulose only and may be of two types, *i.e.,* extractable lint and non-extractable fluffy fuzz. Cotton fibres are mainly used for textiles, celluloid, cellophane, rayon and papet pulp.

138 **(a)**
Toddy is a traditional drink of Southern India. It is made by fermentation of sap from palm tree by bacteria

139 **(b)**
Biogas generation is a three stages anaerobic digestion of animal and other organic wastes by methanogenic bacteria
(i) brackdown of polymers
(ii) conversion of monomers into organic acids by fermentation microbes
(iii) generation of methane by methanogenic bacteria (conversion of organic acids into CH_4 and CO_2)

140 **(a)**
Cork is obtained from *Quercus suber.*

141 **(d)**
Nosema bombycis is a protozoan, which causes the epidemic disease pebrine in silkworms, attacks all tissues and all developmental stages from embryo to adult. In advanced infections, small brown spots cover the body of the silkworm.

142 **(b)**
Anthrax is a fatal human disease caused by the bacterium *Bacillus anthracis.* This was used as a bioweapon agent in America in September 2009.

143 **(c)**
Gambusia (mosquito fish) feeds on mosquito larvae and is therefore, used as larvicidal.

144 **(b)**
Biogas produced by fermentation of manure, sewage, cattle dung, etc., predominantly comprises methane and carbon dioxide. The major component of biogas is methane (about 50-68%). The other gasess are carbon dioxide (25-35%), hydrogen (1-5%), nitrogen (2-7%) and rarely hydrogen sulphide

145 **(a)**
Chicory is the chief substitute of coffee, which is obtained from the roots of *Cichorium intybus,* which is a member of family-**Asteraceae.** The dried roots of this plant are roasted, pulverised and mixed with coffee powder.

146 **(d)**
Commercially, kattha is obtained from heart wood of *Acacia catechu* of family-Mimosaceae.

147 **(b)**
Trichoderma sp. has proved a useful microorganism for biological control of soil borne plant pathogens. It inhibits pathogens through release of gliotoxin, viridian, gliovirin and trichodermin like substances

148 **(a)**
Biogas is pathogen free because anaerobic digestion inactivates pathogens and parasites and is quite effective in reducing the incidence of water borne diseases.

149 **(d)**
Raphanobrassica and *Triticale* are intergenic hybrids. *Raphanobrassica* is the result of cross between *Raphanus* (radish) and *Brassica* (cabbage).

151 **(b)**
Silk thread is obtained from the cocoon of *Bombyx mori.* It contains a water soluble protein, **sericin.**

152 **(c)**
Bajra is the most nutritious cereal it has more proteins than other cereals.

153 **(a)**
CO_2 gas is released during the process of fermentation gives the puffy appearance to dough

155 **(b)**
Integrated Pest Management (IPM) discourages the excessive use of chemical pesticides. IPM involves use of different pest control methods, better agricultural practice like crop rotation, sanitation, etc.

156 **(a)**
Fagopyrum esculentum is a pseudocereal.

157 **(b)**
Rhizobium leguminosarum is a symbiotic bacteria found in root nodules of legume. This bacterium has nitrogen *nif* gene and fixing N_2. Soyabean is a legume. Thus, *Rhizobium* is used as a biofertilizer for raising soyabean crop.

158 **(b)**
Hybrid vigour is the increased vigour or offspring over their both of the parents. Such offsprings (hybrids) are obtained from a cross between two genetically different pureline varieties (parents).

159 **(b)**
Roquefort cheese is formed by ripening with the fungi *Penicillium roqueforti* for a particular flavor

160 **(c)**
A fertilizer, which contains only one nutrient is known as straight fertilizer or simple fertilizer.

161 **(a)**

In the process of making curd, bacteria convert milk into curd and milk protein into predigest milk protein. These bacteria then inside the growth of hostile (illness causing) bacteria inside the intestinal tract and promote beneficial bacteria needed for digestion

162 **(a)**
Advantage of using organic farming are, it promotes the use of crop rotation and cover crops, encourages balanced host/predator relationships, helps in soil conservation, minimize soil degradation and erosion and decrease pollution. Integrated pest and weed management and soil conservation systems are valuable tools on an organic farm

163 **(b)**
Saccharomyces cerevisiae is used for commercial production of ethanol. *S. cerevisiae* is a single celled eukaryotic budding yeast belonging to the Ascomycetes (a highly diverse group of fungi)

164 **(a)**
In the sewage treatment when Biochemical Oxygen Demand (BOD) of sewage has reduced, the effluent is passed into settling tank. Here, the bacterial flocs settle and the sediment is called activated sludge

165 **(a)**
Genetic diversity in agricultural crops is threatened by introduction of high yielding varieties.

166 **(a)**
Carbid beetles, an insect group containing ground and tiger beetles, are important biological agents in agroecosystems. Carbid beetles play a major role in agroecosystems by contributing to the mortality of weed seeds, insects and slugs.

167 **(c)**
Primary or physical treatment of sewage is the physical removal of large and small particle from sewage. First, the floating debris is removed by sequential filtration by passing through wire mesh screens. Then, the grit (soil and small pebbles) are removed by sedimentation in settling tank. The sediment is called primary sludge and the supernatant is the effluent

168 **(a)**
Now-a-days, *Taxus,* a gymnosperm, is used as source of a recently discovered anti-cancer drug. It produces taxol, which is used against breast cancer.

169 **(b)**
Triticum aestivum is hexaploid with $2n = 42$.

170 **(c)**
In this case, the ploidy number of cross breeding plant will be 14.

171 **(d)**
Biochemical Oxygen Demand (BOD) measures the amount of organic matter in water by measuring the rate of oxygen uptake by microbes

172 **(d)**
Secondary treatment of the liquid effluent from the primary settling tank is purely a biological treatment involving microbial activity

173 **(b)**
Biogas is methane rich fuel gas produced through anaerobic breakdown and fermentation of biomass. It contains 50-70% CH_4, 30-40% CO_2 and trace of H_2, H_2S and N_2. Whereas producer gas mainly contains CO, H_2, and N_2.

174 **(b)**
Bacillus thuringiensis (*Bt*) is a Gram positive, soil-dwelling bacterium, commonly used as a biological alternative to a pesticide, alternatively, the cry toxin may be extracted and used as a pesticide.

175 **(c)**
Hybrid vigour or heterosis is a phenomenon where the F_1 generation of a cross between inbreed lines is superior to the parental lines. The farmers need to purchase fresh hybrid seeds every year because hybrid vigour is not long standing due to inbreeding depression.

176 **(c)**
The residue left after methane production from cattle dung is used as fertilizer

177 **(c)**
Opium is the dried latex obtained from unripe capsules of *Papaver somniferum* (poppy). Morphine, codeine are the alkaloids formed from the dried latex and have the pain relieving property.

178 **(d)**
Yeast (*Saccharomyces cerevisiae*) is used for commercial production of ethanol.

179 **(d)**
The bacteria *Bacillus thuringiensis* a wide range of insects such as (*Bt*) are used to controls butterfly caterpillars, ants, moths, etc. Some strains of this bacteria can kill animal and plant

parasitic nematodes, snails, protozoans and even cockroaches

180 **(d)**
Baculovirus heliothis (a group of virus) are known to infect the larval stages of many harmful insects beetles, wasps and ants. A number of baculovirus, which are used as biopesticides belongs to the genus *Nucleopohyledro* virus
These biological weapons are not only effective as potential biological control of harmful insects, but are also harmless to non-target organisms insects (plants, birds, mammals, non-targets insects etc). They are important in organic farming because of their specific action on harmful insects without causing any damage to beneficial insects as well as to the environment. Baculoviruses are helpful in Integrated Pest Management (IPM) Programme, in which beneficial insects are conserved

181 **(c)**
The timber yielding plant *Shorea robusta* belongs to the family-Dipterocarpaceae. It is used for construction work and eminently suited for railway sleeper.

182 **(c)**
The latex from unripe fruits of (*Papaver somniferum)* yields opium. It contains alkaloids like morphine, codeine, papaverene, etc. Morphine relieves pain and codeine is mild analgesic.

183 **(a)**
Glomus is a genus of *Arbuscular Mycorrhizal* (AM) fungi and all species form symbiotic relationships (mycorrhizae) with plant roots. Roots infected with *Glomus* may protect the host plant from harmful soil borne pathogens, provided limiting nutrients, and increase overall fitness of the host. The *Glomus* plant symbiosis plays an important role in the economic sectors involving the growth of plants such as agriculture, horticulture and forestry

184 **(a)**
Biogas is the **methane rich** fuel gas produced through anaerobic breakdown and fermentation of animal dung (of biomass).

185 **(c)**
In 1963, ICAR introduced many dwarf selections from CIMMYT, including those developed by **Norman Borlaug** using Norin-10 as the source of dwarfing genes.

186 **(b)**
The process that leads to the adaptation of variety, line or population to a new environment is known as **acclimatization.**

187 **(b)**
Pashmina wool is obtained from Kashmiri goat.

188 **(a)**
DDT is an organochlorine. Now-a-days DDT is banned because it has an affinity for fatty tissues of animals, which lead to biomagnification. Besides, with the repeated use of such pesticides, a kind of accelerated evolution occurs to produce resistant population of pests.

189 **(c)**
Biogas or gobar gas generation has been taken up in India on a large scale. The technology was developed by the collaboration of Khadi and Village Industries Commission (KVIC) and Indian Agricultural Research Institute (IARI)

190 **(c)**
Petunia, family- Solanaceae is an ornamental plant.

191 **(b)**
Rauwolffia is obtained from root of *Rauwolffia serpentina* which belongs to family-Apocynaceae.

192 **(d)**
Plymoth rock, Wyandotte, new Hampshire, Rhod Island Red are some of the American breeds of poultry, Aurtralop and Sussex are British breeds, white leghorn and Minorica are Mediterranean breeds and Assel is a desi or indigenous breed.

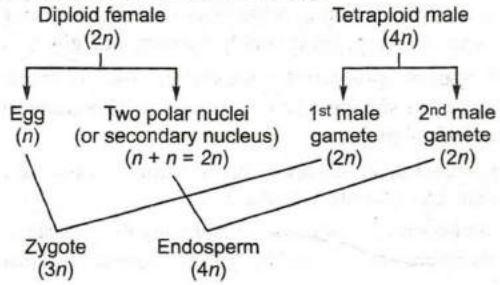
193 **(a)**
A-Acid; B-Milk protein.
Lactic Acid Bacteria (LAB) like *Lactobacillus* are added to milk. It converts lactose sugar of milk into lactic acid. Lactic acid causes coagulation and partial conversion of milk protein casein to cal paracaesinate. Milk is changed into curd, yoghurt and cheese

194 **(a)**
Wine and beer are produced without distillation of fermented broth
Whisky, brandy and rum are produced by distillation of the fermented broth

196 **(a)**
Glomus (fungi), earthworm, *Oscillatoria* are used in organic farming.
(i) *Glomus* absorb phosphorus from soil and passes it to the plant

(ii) Vermiculture and its application are now recognized as one of the best ways to restore soil health. Earthworms are now synonymus with organic farming.
(iii) *Oscillatoria* fix atmospheric nitrogen and increase the organic matter of the soil

197 **(c)**
Endosperm is formed by the fusion of two polar nuclei or their fusion product (secondary nucleus) with second male gamete. A diploid female plant will produce a haploid egg and two haploid polar nuclei. The chromosome number in the male gamete produced from a tetraploid male plant will be half of its mate parent (tetraploid male) *i.e.,* male gametes will be diploid. Hence, these plants when crossed, produce triploid zygote (fusion product of diploid male gamete with haploid egg) and tetraploid endosperm (fusion product of diploid male gamete and diploid secondary nucleus).



198 **(b)**
Somatic hybridization or parasexual hybridization involves the fusion of isolated protoplasts of two different species.

199 **(b)**
Quinine is obtained from bark of Cinchona officinale. Opium is obtained from fruits of Papaver somniferum. Ashwagandha is obtained from root of *Withania somnifera*.

200 **(b)**
Morphine is obtained from *Papaver somniferum.*

201 **(a)**
Apiary is the place where bees are cultured and breed to get commercial products. *Apis indica* is the small Indian bee (about 15mm long) that inhabits forests and plain regions throughout India. It can be easily domesticated because of gentle nature. *Apis indica* is the best, used in India for apiculture industries.

202 **(d)**
Heterosis is also known as hybrid vigour. It is the presence of superior qualities in the hybrid than either of the parents. The term 'hybrid vigour' was given by **G H Shull.**

203 **(c)**
Yeast used in baking and the alcohol in alcoholic beverages is a type of **eukaryotic fungus**.
Streptokinase is an enzyme obtained from the cultures of some haemolytic bacterium *Streptococcus* and modified genetically to function as clot busters. Lipases are lipid dissolving enzymes that are obtained from *Candida lipolytica* and *Geotrichum candidum.* They are added in detergents for removing oily stains from laundry. Pectinases are obtained commercially from *Byssochlamys fulva.* Along with proteases, they are used in clearing of fruit juices

204 **(b)**
A sewage treatment process in which a part of decomposer bacteria present in the wastes is recycled into the starting of the process is called activated sludge treatment

205 **(b)**
Cyanobacteria.
The most suitable source of biofertiliser is achieved by the use of blue-green algae (cyanobacteria), particularly in rice fields. These organisms grow well in symbiotic association with other plants or as free living individuals on the surface of moist soil or under water logged conditions

206 **(a)**
Cotyledons and testa are edible parts of groundnut and pomegranate respectively. The edible part of walnut is cotyledon; tamarind-mesocarp; french bean-seeds, coconut-endosperm, testa, cotyledons and embryo, cashewnut-cotyledons and fleshy pedicels and of litchi is fleshy aril.

207 **(a)**
Cotton fibres are basically trichomes.

208 **(d)**
Methanogens.
Biogas is a methane rich fuel gas produced by anaerobic breakdown or digestion of biomass with the help of methanogenic bacteria. Biogas is made up of methane, carbon dioxide with traces of hydrogen

209 **(c)**
Wheat is hexaploid. Thus, basic chromosome number of wheat will be $7(42/6 = 7)$.

210 **(a)**
An undistilled alcoholic beverage produced from grain-mesh fermentation is beer. Beer has an alcoholic content of 3-6%

211 **(d)**
Cyclosporine-A is an eleven membered cyclic oligopeptide obtained through fermentative activity of fungus *Trichoderma polysporum.* It inhibits activation of T-cells and therefore, prevents rejection reactions in organ transplantation

212 **(b)**
Wallago attu (Mullhe), *Rita rita* (Tikanda), *Mystus singhara* (Singhara) and *Clarius batrachus* (Indian cat fish or magur) are some freshwater cat fishes of India.

213 **(a)**
'Jaya' and 'Ratna' are better-yielding semi-dwarf varieties of rice developed in India.

214 **(d)**
Shakti, Rattan and Protina are recently developed composite (germplasm complex) varieties of maize, which have a higher lysine and tryptophan content than traditional maize varieties.

215 **(b)**
A-Indian Agricultural Research Institute, B-Khadi and Village Industries Commission

216 **(b)**
In clinical settings, morphine exerts its principal pharmacological effect on the central nervous system and gastrointestinal tract. Its primary actions of therapeutic value are analgesic and sedation.

217 **(c)**
'Pyrethrin' a chemical is produced by grinding of flowers of the plant *Chrysanthemum cinerarifolium.* Pyrethroids are synthetic derivatives of pyrethrin and are quick-acting broad spectrum, toxic **insecticides**. They are quite expensive, not used on a large scale in India at present.

219 **(d)**
As growth regulators control the growth of plants, pesticides control the pests and fertilizers enhance productivity of the soil, hence all of these are regarded as agricultural chemicals.

220 **(d)**
Leaves of *Ocimum* (tulsi) can sharpen the memory and are also used as nerve tonic.

221 **(a)**
Nostoc is nitrogen fixing cyanobacteria. It contains a special cell called heterocyst, which has the capacity to fix the atmospheric nitrogen.

222 **(d)**
Antibiotics are used as medicines for the treatment of a number of pathogenic or infections diseases. It is because of antibiotics and their newer more potent forms a number formidable diseases are now curable, *e. g.*, plaque, typhoid, tuberculosis, whooping cough, diphtheria, leprosy, etc.

223 **(a)**
The scientific name of zebu cattle is *Bos indicus,* buffalo is *Bubalus bubalus,* silk worm is *Bombyx mori* and domestic fowl is *Gallus domesticus.*

224 **(b)**
Reserpine is obtained from root's bark o plant *Rauwolffia serpentine* (sarpagandha) which belongs to family-Apocynaceae.

225 **(b)**
Prion is a microscopic protein particle similar to a virus but lacking nucleic acid, thought to be the infectious agent responsible for **scraple** and certain other degenerative disease of the nervous system

226 **(c)**
Biochemical Oxygen Demand (BOD) in a river water increases when sewage gets mixed with river water
'Whanever untreated sewage are disposed into natural waters such as streams, ponds, lakes, etc., the normal amount of dissolved oxygen, present in water, gets quickly utilized by microorganisms. The oxygen demand for oxidation of organic matter present in swage is increased'. This, high value of BOD means the water is highly polluted by organic matter

227 **(c)**
Autopolyploids are those polyploids, which have the same basic set of chromosome, multiplied like autotriploid (AAA), autotetraploid (AAAA), etc. They show more yield and better adaptation.

229 **(a)**
In cryopreservation, plants materials are frozen at-196°C.

230 **(a)**
Activated sludge should have the ability to settle quickly so that it can be rapidly pumped back from sedimentation to aeration tank

231 **(c)**

Mycorrhiza and *Rhizobium* both are shows symbiotic association.
In the Mycorrhizal association fungi surround the root hairs of plants. This increases the surface area of the root hairs and allows it to better absorb nutrients in the soil. It also provides the plant roots with protection. In exchange the fungi attached to the root hairs gets glucose from the plant
The other type of root symbiosis is *Rhizobium* symbiosis. This type of symbiosis occurs in legumes. Here, nodules containing the bacteria *Rhizobium* attach themselves to root hairs of the legume. The *Rhizobium* absorbs and converts unusable nitrogen in the soil, to biologically usable nitrogen, which is then used by the legume. The root of the legume supplies the *Rhizobium* with glucose obtained photosynthetic parts of the plant

232 **(d)**
Leucaena leucocephala (subabul) is a fast growing leguminous tree, native to Central America. The tree produces nutritive forage and is used for revegetating deforested tropical lands.

233 **(a)**
Lysine is an essential amino acid found in wheat.

234 **(a)**
Bacillus thuringiensis is a bacterium used to produce genetically engineered *Bt* cotton.

235 **(a)**
Glomus is a genus of Arbuscular Mycorrhiza (AM) fungi. It helps in nutrient uptake mainly the absorption of phosphorus.

236 **(a)**
Biogas is used as fuel for heating cooking and lighting Slurry remained after the production of biogas can be used as fertilisers

237 **(d)**
Opium (apheem) is obtained from latex of unripe capsules of *Papaver somniferum.*

238 **(c)**
The seeds of *(Ricinus communis) Cocos nucifera , Zea mays* and other cereals are albuminous or endospermic (seeds with endosperm), where endosperm acts as the food storage tissue of a seed.
So, the part of castor *(Ricinus communis)* seed that yields oil (food material) is endosperm.

239 **(c)**
New castle disease or **Ranikhet disease** is a very dangerous viral disease of poultry which is caused by a filter passing virus.

240 **(d)**
Ranikhet disease is a common viral disease in poultry. Foot and mouth disease is a common viral disease in cattles. Anthrax is also found in cattles. Pebrine is a protozoan disease of **silkworm.**

241 **(d)**
All of these.
Baculovirus heliothis (a group of virus) are known to infect the larval stages of many harmful insects beetles, wasps and ants. A number of baculovirus, which are used as biopesticides belongs to the genus *Nucleopohyledro* virus
These biological weapons are not only effective as potential biological control of harmful insects, but are also harmless to non-target organisms insects (plants, birds, mammals, non-targets insects etc). They are important in organic farming because of their specific action on harmful insects without causing any damage to beneficial insects as well as to the environment. Baculoviruses are helpful in Integrated Pest Management (IPM) Programme, in which beneficial insects are conserved

242 **(b)**
Atropa belladona (Solanaceae) is the source of drug atropine. Atropine is an alkaloid obtained from leaves and is used in eye testing by dilating pupil of eye.

243 **(a)**
In terminator gene technology, the plants are introduced a gene, called terminator gene, which causes failure of seed setting after one generation. It will give the seed producer a monopoly over a particular variety.

244 **(c)**
In this case, more number of genes for high yielding milk are inherited from both the parents.

245 **(b)**
CFCL is situated at Faridabad (Haryana).

246 **(b)**
The chemical, which kills or inhibits the growth of insects is called **insecticide.** These chemicals control insects by acting upon the respiratory system or nervous system.

248 **(b)**

Cyanobacteria or blue-green algae is the most suitable source of biofertiliser, particularly in rice fields, *e. g.*, *Nostoc, Anabaena*
Rhizobium is a symbiotic bacterium that lives in the root nodules of legumes and fixes atmospheric nitrogen into organic compound
Azospirillum and *Azotobacter* are free-living bacteria which absorb free nitrogen from soil, air and convert it into salts of nitrogen like amino acids and enrich soil nutrients

249 **(b)**
Supari is obtained from the plant *Areca catechu.*

250 **(d)**
The bacterium *Xanthomonas campestris* is the causative agent of plant disease, black rot of cabbage.
Bacillus thuringiensis, T. harzianum and NPV are biopesticides.

251 **(d)**
Agrobacterium is a Gram negative bacterium that casuse tumours in plants. It is well known for its ability to transfer DNA between itself and plants, and for this reason it has become an important tool for genetic engineering. *A. tumefaciens* causes crown-gall disease in plants. It has Ti-plasmid.

252 **(d)**
Streptokinase is used as clot-buster for removing clots from blood vessels of patients who have undergone myocardrial infarction

253 **(a)**
Endogenic species live in deep soil up to 10-30 cm and feed on humic matters and mineral matters, *e.g., Octohaetonal serrata.*
Lampito mauriti is epigenic variety.

254 **(a)**
Biogas production involves three steps-(a) breakdown of polymers (b) conversion of monomers into organic acids by fermentation microbes (c) generation of methane by methanogenic bacteria (conversion of organic acids into CH_4 and CO_2).

255 **(a)**
Plant species that are efficient users of solar energy for converting CO_2 into biomass, which can be used as a source of energy are called energy crops, e.g., plant species, which can produced bioethanol, biodiesel, biogas, etc.

256 **(b)**
The centre of flocs will become anoxic, which would cause death. Without oxygen the microbes cannot survive
There are certain bacteria lives in anoxic condition example *Clostridium tetani*

257 **(a)**
Asafoetida (Heeng) is obtained from the secretion of roots or rhizomes of *Ferula asafoatida* (family-Umbelliferae). It is a resin plant.

258 **(c)**
Green manuring is a farming practice where a leguminous plant which has derived enough benefits from its association with appropriate species of *Rhizobium* is ploughed into the soil and then non-legume is grown and allowed to take benefits of already fixed nitrogen.
Some common green manuring crops are *Sesbania aculeate, Cyamopsis, Tetragonoloba, Crotalaria Juncea, Vigira sinensis, Lens esculenta, Macrotyloma uiflorum, etc.*

259 **(a)**
When we inoculate *Rhizobium* in wheat field there is no increase in production and the nitrogen content of soils remains same because *Rhizobium* is a symbiotic bacterium that lives in root nodules of legumes and fixes atmospheric nitrogen into organic compounds

260 **(c)**
Useful aerobic microbes grow rapidly and flocs. Flocs are masses of bacteria associated with fungal filaments to from mesh like structure. The growing microbes consume organic matter and thus reduce the Biochemical Oxygen Demand (BOD)

261 **(c)**
Toddy is a traditional drink of some parts of South India, which is made by fermentation of sap from palm trees by bacteria

262 **(c)**
A mycorrhiza is a symbiotic association between a fungus and the roots of a vascular plant. They are an important component of soil life and soil chemistry

263 **(a)**
Sunnhemp is obtained from plant *Crotalaria juncea,* a member of family-Papilionaceae. It is used for making ropes, fish nets, sacks, etc.

264 **(c)**
A biological control being developed for use in the treatment of plant disease is the fungus

Trichoderma. *Trichoderma* species are free-living that are very common in root ecosystems.

265 **(a)**
Wheat, rice and maize contribute maximum to global food grain production.

266 **(b)**
Pomato is a somatic hybrid of potato and tomato.

267 **(b)**
A-CO_2; B-*Propionibacterium sharmanii*.
Swiss cheese is manufactured with a single strains of *Propionibacterium shermanii* and *Propionibacterium arabinosum*. Its characteristic feature is formation of large holes due to production of large amount of CO_2

268 **(b)**
Primary treatment of sewage is the process of removal of small and large, floating and suspended solid from sewage through filtration and sedimentation

269 **(c)**
Green manure includes leguminous crops like *Crotalaria juncea* (sunnhemp), *Sesbania aculeata* (daincha), *Cyamposis tetragonoloba* (cluster bean), etc.

270 **(b)**
Out crossing is the crossing of unrelated pure breeding animals of different traits within the same breed.

271 **(a)**
Heroin is diamorphine or diacetylmorphine. It is a semi-synthetic opiate, derived from opium, which is a dried latex of unripe capsular fruits of poppy plant, *Papaver somniferum* of family-**Papaveraceae.**

273 **(c)**
Hybridization is a method of producing new crop varieties, in which to or more plants of unlike genotype (genetically dissimilar) are crossed.

274 **(d)**
Carbamates are organic esters of hypothetical carbonic acid. These have affinity for enzyme acetylcholinesterase, e.g., propoxur , aldicarb , carbofuran , dimetan, etc.

275 **(a)**
The nutritive medium for growing bacteria and many fungi in the laboratory is called culture media

276 **(c)**
Excess fertilizer in the environment, especially nitrogen and phosphorus, can pollute local ground water as well as lakes and streams, resulting in eutrophication

277 **(a)**
Mycorrhiza promotes plant growth by absorbing inorganic ions from soil. Fungi form symbiotic association with the roots of higher plants called mycorrhiza. The fungal hyphae absorb phosphorus from soil and passes it to the plant

278 **(c)**
Rotenone is a bioinsecticide obtained from the roots of *Derris elliptica* and *Lonchocarpurs.*

279 **(c)**
Bacteria containing millions of LAB.
The starter or inoculum used in preparation of milk products actually contains million of Lactic Acid Bacteria (LAB)

280 **(c)**
Nagkesar is obtained from the flower of *Viola odorata.* Leaves are used in flavouring and perfumeries. The drug is used medicinally as expectorant, anti-pyretic, anti-bacterial and anti-fungal, etc.

281 **(a)**
Gambusia is an exotic fish that feeds on the larvae of mosquito. Now-a-days, it is widely used to eradicate mosquito.

282 **(c)**
Congress grass/carrot grass/*Parthenium* is called so as it leaves are similar to leaves of carrot and it introduced in India in 1956 during congress regimse.

283 **(b)**
Due to presence of solanin, green potatoes are toxic.

284 **(b)**
Saccharomyces cerevisiae.
Bread is made through fermentation by *Saccharomyces cerevisiae* or commonly called baker's yeast. Yeast species also used in alcoholic fermentation is *S. cerevisiae* (Brewer's yeast)

285 **(b)**
Silkworm is an insect. The rearing of silk worm on large scale is called **sericulture** not aquaculture. The other three being found in water, their rearing can be grouped under aquaculture.

286 **(d)**
Caffeine ($C_8H_{10}N_4O_2$), an oxidation product of the methyl derivative of purine is found in coffee beans, tea leaves, cocoa beans, guarana and mate. It is a stimulant of central nervous system.

287 **(a)**
The growing microbes consume organic matter and thus reduce the Biochemical Oxygen Demand (BOD)

288 **(b)**
International Rice Research Institute is situated at Manila (Philippines) and Indian Rice Research institute is situated at Cuttack.

290 **(c)**
Azospirillum is a Gram negative, free living bacteria, which absorb free nitrogen from soil and air and convert it into salts of nitrogen like amino acids and enrich soil nutrients.
Nostoc, Anabaena and *Oscillatoria* fix atmospheric nitrogen and increase the organic matter of the soil through their photosynthetic activity

291 **(c)**
Cloning means the production of exact genetic replica of an individual. A clone, on the other hand, cannot be considered as an offspring, but is simply the copy of a given individual.

292 **(a)**
Quinine is obtained from bark of *Cinchona* sp. (*Cinchona calisaya,C. officinalis, C. succirubra,C. ledgeriara).* All of these belong to family-Rubiaceae.

293 **(c)**
In order to protect the major rivers of India from sewage pollution, the ministry of environment and forests, has initiated development of sewage treatment plants under the National River Conservation Authority, *e. g.*, Ganga Action Plan (GAP), Yamuna Action Plan, Sutlej Action Plan, Gomti Action Plan

294 **(c)**
The most suitable source of biofertiliser is achieved by the use of blue-green algae (cyanobacteria), particularly in rice fields. These organisms grow well in symbiotic association with other plants or as free living individuals on the surface of moist soil or under water logged conditions

295 **(d)**
(a) Central Rice Research Institute - Cuttack
(b)National Botanical Research Institute – Lucknow
(c)Central Drug Research Institute – Lucknow
(d)Central Food Technology Research Institute - Mysore

296 **(c)**
Sewage or municipal waste should not be directly passed into rivers, streams and other water bodies because it is not only contains human excreta and other organic waste but a number of pathogenic microbes. It is made less polluting by passing it through Sewage Treatment Plants (STPs)

297 **(a)**
Turpentine oil is obtained from *Pinus longifolia.* It is used in rubber, paint and varnish industries.

298 **(c)**
The starter or inoculum used in preparation of milk products actually contains million of Lactic Acid Bacteria (LAB)

299 **(b)**
Statins are products of fermentation activity of yeast *Monascus purpureus.* Statins are used in lowering blood cholesterol. It competitively inhibits enzymes for cholesterol synthesis

300 **(d)**
The common bread wheat (*Triticum aestivum = T. vulgare)* is an allohexaploid. It has two copies of each of the genomes A, B and D. Its somatic complement is represented as AA BB DD.

301 **(a)**
In endophytic mycorrhiza, fungal hyphae present inside or between the cells of cortex, act as biofertilizer. In many grasses and some other crops, the fungal hyphae penetrate to the cortical cells, which swell to from vesicles or arbuscules. This is called Vesicular Arbuscular Mycorrhiza (VAM). It has significant role in phosphate nutrition in plants.

302 **(c)**
White wiltom (*Salix alba*) of family-Salicaceae is used for manufacture of sports goods, specially cricket bats, badminton rackets and hockey sticks.

303 **(c)**
All statements are correct Fresh spores of *Bt* are mixed with water and sprayed on plants such as brassicas and fruit trees

304 **(c)**
Hybrid vigour is mostly due to **heterozygosity.**

305 **(a)**

Protein	Present in
Fibroin	Silk
Albumin	Egg, blood plasma
Keratin	Hair, skin
Globulin	Blood plasma

306 **(b)**

Deoni is a dual purpose breed usually females are **good milk yielder** and the males serve in **ploughing.**

307 **(a)**
Apiculture is the rearing of bee or bee keeping for the production of honey and wax.

308 **(b)**
In poultry, the first deworming is usually done around the period of about 8 weeks.

309 **(c)**
The term **heterosis** is related to **hybridization** and it was first used by **Shull** in 1914. A heterozygous individual resulting from the cross of two unlike parents is a hybrid, which is usually vigours. This increased vigour is often referred as hybrid vigour or heterosis. Thus, heterosis is the phenomenon, in which the hybrid of two genetically similar parents show increased vigour at least over the mid-parental value.

310 **(d)**
Bread wheat (*Triticum aestivum*) is hexaploid and is used in making bread.

311 **(d)**
Somatic hybridization is a process of obtaining hybrids by fusion of protoplast *in vitro.*

312 **(d)**
Allethrin is a type of pyrethroids. Pyrethroids are synthetic derivatives of pyrethrin, a chemical produced by grinding of flowers of the plant *Chrysanthemum cinerarifolium.* These are broad-spectrum insecticides.

314 **(b)**
Penicillin antibiotic was extensively used to treat American soldiers wounded in World War II. **Alexander Flemming, Ernst Chain** and **Howard Florey** were awarded the Nobel Prize in 1945, for the discovery

315 **(c)**
Biofertilisers are the microorganisms, which enrich the nutrient (nitrogen, phosphorus, etc) quality of the soil. Bacteria like *Rhizobium,* fungi [mycorrhiza (*Glomus*)] and cyanobacteria (*Nostoc* and *Anabaena*) are the three main sources of biofertilisers

316 **(d)**
Azolla is cultivated in rice fields as it provides both green compost and fixed nitrogen to the crop. The use of *Azolla* in rice fields at the rate of 200 gm per square metre area can increase rice yield by 12.38%. Eexperiments have revealed that application of 10 tonnes of fresh *Azolla* biomass in one hectare, adds as much as 100 kg nitrogen.

317 **(b)**
Allopolyploid means a mixture of two different genetic formsio. Intergeneric hybridization of cereal crops. *Triticale* is first man made allopolyploid cereal crop.

318 **(b)**
Sustainable pest management is otherwise, known as integrated pest management (IPM). IPM involves use of different pest control methods, which are ecologically sound, e.g., biological control methods, better agricultural practice like crop rotation, sanitation, etc, starving methods etc.

319 **(c)**
Cotton fibres represent epidermal prolongation of seed-coat cells. The cotton fibres contain 94% **cellulose**, 1.3% protein and small amount of pectic substance. Cotton is major cash crop gives fibre, food and feed.

320 **(c)**
Statins are products of fermentation activity of yeast *Monascus purpureus.* This inhibits cholesterol synthesis, statins are therefore, used in lowering blood cholesterol

321 **(b)**
Infectious coryza – *Haemophilus gallinarium*
Moniliasis – *Odium albicans.*

322 **(d)**
Lignin does not degraded in production of biogas.

323 **(c)**
Saky is an intoxicating beverage obtained from *Oryza sativa.*

324 **(d)**
Spirulina is a blue - green algae, used as a source of valuable food specifically for proteins. It is not used in production of biogas.

325 **(d)**
Electrofishing is a new method of fishing which has been developed by the use of electric current of low voltage. If two electrodes are put into water, the fish starts swimming towards the positive pole, while the current was on. Thus, a large number of fish can be easily caught by placing anode into the fishing net and the cathode near the boat.

326 **(b)**

Biodiesel oil as well as bioethanol fuel, two new and clean fuels for environmental protection, have already been approved as substitutes for fuel or fuel additive. Four most promising alcohol crops are sweet potato, maize, sugarcane and sorghum.

327 **(a)**
The drug stramonium is obtained from *Datura.*

328 **(a)**
Silk is a secretory product of silk glands of the larva (caterpillar) of silk worm (*Bombyx mori*).

329 **(d)**
Caffeine, cocaine and amphetamine are stimulants.

330 **(c)**
Citric acid is obtained through the fermentation carried out by *Aspergillus niger* and *Mucor* species on sugary syrups. Citric acid is employed in dyeing, engraving, medicined, inks, flavouring and preservation of food and candies

331 **(a)**
Biogas is a methane rich fuel gas produced by anaerobic breakdown or digestion of biogas with the help of methanogenic bacteria. Biogas is made up of methane (50-70%), carbon dioxide (30-40%) with traces of nitrogen, hydrogen sulphide and hydrogen

332 **(a)**
All statements are correct except (V). In the digestors, heterotrophic, microbes anaerobically digest bacteria and fungi in sludge producing mixture of gases such as methane, hydrogen sulphide and CO_2, which form biogas

333 **(a)**
Biogas is a methane rich fuel gas produced by anaerobic breakdown or digestion of biomass (mainly animal wastes) with the help of mathanogenic bacteria. It is composed of methane (50-70%), CO_2 (30-40%) and traces of hydrogen, nitrogen and H_2S.

334 **(b)**
Harmful insects and pests can be controlled through biological control by the introduction of their natural predators. The major difficulty in this control is that the predator does not always survive when transferred to a new environment.

335 **(b)**
Milk is incubated with curd
↓
Lab shows growth in milk
↓
Production of lactic acid (A)
↓
Coagulation and digestion of milk protein
↓
Improved nutritional quality by increased vitamin-B_{12} (B)

336 **(a)**
Juniperus virginiana wood is used for making pencils.

337 **(a)**
The alkaloid reserpine is obtained from the bark of root of *Rauwolffia serpentine.* It reduces the high blood pressure and mental hypertension. *Rauwolffia* was the first medicinal plant to be reported to cure a disease.

338 **(d)**
Organic farming is a form of agriculture that relies on techniques such as corp rotation, green manure, compost and biological pest control

339 **(a)**
Penicillin was the first antibiotic to be discovered by **Alexander Flemming** (1928)

340 **(a)**
Non-symbiotic nitrogen fixation is carried out by *Azotobacter, Clostridium, Azopirillum* fungi and cyanobacteria (Nostoc, Anabaena).

341 **(d)**
Outbreeding usually takes place between members of different varieties of strains and in certain plants of closely related species. The progeny is known as hybrid. When the hybrid has phenotypes showing characteristics, which are superior to either of the parental stock. This phenomenon is known as **hybrid vigour** or **heterosis (Shull).**

342 **(c)**
Rotenone is a natural insecticide, which is obtained from the root of *Derris elleptica.*

344 **(c)**
Bacillus thurigiensis is a natural insecticide. It secretes a toxin protein thurisoide, which is effective against insects like moths, flies mosquitoes and beetles.

345 **(a)**
Wonder wheat is a new wheat variety with a yield of 18 tonnes per hectare. It has some 200 grains per stalk and has developed by Mexico's international wheat and maize improvement centre.

346 **(a)**
Opiates or opioids are derived from opium along with their synthetic relatives. Heroin (diamorphine or diacetylmorphine) is an opioid.

347 **(a)**
Activated sludge sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria. In activated sludge system. The primary efflument is taken to aeration tank. In side the aeration tank, several aerobic microbes (bacteria, Protozoa, micro fungi and micro algae) are employed to consume a major part of organic matter

348 **(a)**
Jute is a rough, weaving fibre chiefly used for making gunny bags, carpets and curtains. It is obtained from *Cochorus capsularis* or *olitorius* (family-Tiliaceae). The fibres are separated from the secondary phloem of the plant by retting which is done in still water.

349 **(b)**
Para rubber is obtained from the latex of *Hevea brasiliensis.*

350 **(a)**

Types of Microbes	Scientific Name	Commercial Products
Bacterium	*Lactobacillus* (A)	Lactic acid
Fungus	*Trichoderma polysporum* (B)	Cyclosporin-A
Yeast (C)	*Monascus purpureus*	Statins
Fungus	*Penicillium notatum*	Penicillin (D)

352 **(d)**
Antibiotics are chemical substances produced by some microorganism, which can kill or retard the growth of other disease causing microorganisms. Penicillin, discovered by Alexander Flemming, is the first antibiotic discovered. While working on *Staphylococcus aureus* bacteria, Flemming observed growth of mould around, which the bacteria did not grow. It was found to be a chemical, penicillin, produced by *Penicillium notatum.* The function of penicillin as an antibiotic was established by Ernst Chain and Howard Florey

353 **(c)**
Swiss cheese is manufactured with a single strains of *Propionibacterium shermanii* and *Propionibacterium arabinosum.* Its characteristic feature is formation of large holes due to production of large amount of CO_2

354 **(c)**
The leaves of *Azolla* (fern) have as many as 80,000 blue-green algae belonging to *Anabaena azollae*, which have the capacity to fix atmospheric nitrogen and make it available to *Azolla. Azolla pinnata* is an excellent biofertilizer for rice. Farmers may have reported 50% increase in yield of rice by using this biofertilizer.

355 **(a)**
Nitrogen.
The major component of biogas is methane (about 50-68%), which is highly inflammable. The other gases a carbon dioxide (25-35%), hydrogen (1-7%) and rarely hydrogen sulphide