COMBINED TECHNICAL SERVICES EXAMINATION

(NON-INTERVIEW POSTS)

COMPUTER BASED TEST

PAPER – II – MICROBIOLOGY

(PG DEGREE STANDARD) (CODE: 459)

1. ———————— are commonly used in culture media, because they act both as acid neutralizing and phage-inhibitory agents.

(A) Glucose
(B) Ammonium
(C) Potassium
(D) Phosphates
(E) Answer not known

2. Identify the dairy starter cultures which is characterized by the presence of both thermophilic and therapeutic lactic fermentation from the following.

(A) Leuconostoc
(B) Lactococcus
(C) Lactobacillus
(D) Pediococous
(E) Answer not known

3. The primary purpose of subculturing starter culture propagation is

(A) To increase cell density
(B) To reduce contamination risk
(C) To maintain genetic stability
(D) To enhance metabolic activity
(E) Answer not known

4. The advantage of using super concentrated starter cultures in dairy product manufacturing is

(A) Reduced storage space
(B) Improved culture stability
(C) Increased product yield
(D) Faster fermentation times
(E) Answer not known

5. Identify the pathway by which homofermentative lactobacilli ferment hexose sugars to lactic acid.

(A) AMP pathway
(B) Heme-synthesis pathway
(C) Glycolysis pathway
(D) Citrate pathway
(E) Answer not known

6. Pick out the non-lactic starter cultures from the following.

(A) Bifidobacter species
(B) Leuconostocs
(C) Lactococcus
(D) Streptococcus
(E) Answer not known

7. During the manufacture of yoghurt vitamins like niacin and ———, are actively synthesized by the starter cultures.

(A) B_{12}
(B) Vitamin D
(C) Folic Acid
(D) Vitamin C
(E) Answer not known

8. Organisms that possess some claimed health benefit for these who consume them are called

(A) Prebiotics
(B) Synbiotics
(C) Probiotics
(D) Neutraceuticals
(E) Answer not known

9. The disadvantage of using iodine as a sanitizing agent in milk processing is

(A) High cost
(B) Corrosive properties
(C) Residual effects on milk flavor
(D) Ineffective against spores
(E) Answer not known

10. Role of action of lactoperoxidase in raw milk is

(A) Oxidation of thiocyanate
(B) Binding to iron
(C) Hydrolysis of bacterial cell wall
(D) Neutralize bacterial toxins
(E) Answer not known

11. Mode of action of penicillin on lactic acid bacteria is

(A) Protein synthesis inhibition
(B) Cell wall synthesis inhibition
(C) DNA replication inhibition
(D) Membrane disruption
(E) Answer not known

12. Pick out the type of phage which undergoes lytic cycle.

(A) Virulent phage
(B) Temperate phage
(C) Lysogenic phage
(D) Prophage
(E) Answer not known

13. Term for the process of reducing microbial populations to a safe level is

(A) Sterilization
(B) Disinfection
(C) Sanitization
(D) Decontamination
(E) Answer not known

14. The purpose of storing starter cultures at ultra-low temperatures is

(A) To enhance microbial growth
(B) To prolong shelf life
(C) To increase fermentation activity
(D) To reduce contamination risk
(E) Answer not known

15. The frozen starter culture can be preserved in the frozen form by using

(A) Nitrogen
(B) Liquid nitrogen
(C) Ethylene
(D) Methylene
(E) Answer not known

16. Mention the purpose of ring of flame or steam when pouring the starter inoculum into the tank.

(A) To heat the inoculum
(B) To provide a sterile point of entry
(C) To cool the inoculum
(D) To mix the inoculum
(E) Answer not known

17. In tetrapak system, the mother and feeder culture are prepared in a special unit called

(A) Starter vessel
(B) Viscubator
(C) Incubator
(D) Stimulators
(E) Answer not known

18. Frozen starter culture is used in industry related to

(A) Dairy products
(B) Fruits products
(C) Leather products
(D) Vegetable products
(E) Answer not known

19. A pure culture of lactic acid bacteria used in quality fermented dairy products production is

(A) Single strain starters
(B) Mixed strain starters
(C) Multiple strain starters
(D) Grouped strain starters
(E) Answer not known

20. The proliferation of phage in dairy starter culture is prevented by using

(A) PRM
(B) PCR
(C) PDA
(D) PF
(E) Answer not known

21. The enzyme activity that is commonly detected in chromogenic media to confirm the presence of E.Coli in dairy products is

(A) β - Galactosidase
(B) Urease
(C) β - Glucuronidase
(D) Catalase
(E) Answer not known

22. The removal of the oxygen from milk and formation of bacterial metabolites cause the colour to disappear in

(A) Dye reduction test
(B) Presumptive test
(C) Completed test
(D) Confirmatory test
(E) Answer not known

23. In the standard plate count method maximum number of colonies considered for counting on a plate is

(A) 100
(B) 200
(C) 300
(D) 400
(E) Answer not known

24. The mold that is primarily responsible for producing aflatoxin is

(A) Aspergillus niger
(B) Aspergillus flavus
(C) Fusarium oxysporum
(D) Cladoporium herbarum
(E) Answer not known

25. Find the common application of RT-PCR in medical diagnostics?

(A) Protein quantification
(B) DNA sequencing
(C) Detection of viral RNA
(D) Cell counting
(E) Answer not known

26. The type of Biosensor that uses the yeast trichosporon cutaneum to detect organic pollution is

(A) BOD biosensor
(B) Gas biosensor
(C) Immunoassay biosensor
(D) Phenol biosensor
(E) Answer not known

27. The factor most significantly impact the accuracy of SPC when determining the microbial load in high fat or high viscosity food products is

(A) Choice of diluent
(B) Incubation temperature
(C) Homogenization method
(D) Type of agar medium
(E) Answer not known

28. In MBRT, if blue colour does not disappear uniformly the end point is estimated as

(A) The time required for the milk to show no blue colour after heating
(B) The time required for the milk to show no blue colour after refrigeration
(C) The time required for the milk to show no blue colour after mixing
(D) The time required for the milk to show no blue colour after incubation
(E) Answer not known

29. The factors influencing standard plate count are :

(A) temperature of incubation
(B) period of incubation
(C) amount of oxygen
(D) composition of plating medium
(E) Answer not known

30. Putrefied dairy waste mixed in sewers may cause

(A) Corrosion
(B) Black colouration
(C) Flocculation
(D) Precipitation
(E) Answer not known

31. Lactic starters should be resistant to ————————

(A) antibiotics and bacteriophages
(B) temperature and pH
(C) pressure and temperature
(D) yeast and mold
(E) Answer not known

32. The sediment free waste water in dairy effluent plant is pumped into ———————— for coagulation.

(A) equalization tank
(B) clarifier
(C) aeration tank
(D) sludge bed
(E) Answer not known

33. Equalization tank in dairy effluent treatment plant contains

(A) Flash mixer
(B) HDPE aeration grid with lime slurry
(C) Clarifier
(D) Sludge dryer
(E) Answer not known

34. Match the proposed standards for drinking water with bacterial count.

Parameters	Count (Colony Forming Unit)
(a) Total bacterial count (37°C)	1. < 1100 ml^{-1}
(b) Total bacterial count (22°C)	2. < 120 ml^{-1}
(c) Fecal streptococci	3. < 10 ml^{-1}
(d) Sulfite reducing clostridia	4. < 100 ml^{-1}

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

(E) Answer not known

35. In SDS - page, proteins migrate through the gel depending on their

(A) Shape and charge

(B) Size and mass

(C) Size and mass/charge ratio

(D) Shape and mass/charge ratio

(E) Answer not known

36. Assertion [A] : Elispot assay is a modification of ELISA.

Reason [R] : It allows quantitative determination of number of cells producing a particular type of molecule.

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true and [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

37. In Indirect ELISA, two antibodies are used – Choose the correct reason.

(A) The primary antibody is coated in the well and a secondary antibody will be added to detect the antibody

(B) The primary antibody is coated in the well and a secondary antibody will be added to detect the antigen

(C) The secondary antibody is present in the sample. It is detected by an enzyme-conjugated primary antibody

(D) The primary antibody is present in the sample. It is detected by an enzyme conjugated secondary antibody

(E) Answer not known

38. Simple staining is useful to determine all the given characteristics of bacteria Except

(A) Size

(B) Shape

(C) Spore

(D) Arrangement

(E) Answer not known

39. Spectrophotometry is an analytical technique to measure microbial growth in terms of

(A) Cell count
(B) Cell activity
(C) Cell function
(D) Cell mass
(E) Answer not known

40. While doing capsule staining, the smears are not heat-fixed. Choose the correct reason.

(A) On heating, capsule becomes hard and does not take stain
(B) On heating, capsule swells and lyses
(C) On heating, capsule shrinks and disintegrates
(D) Capsules are heat resistant
(E) Answer not known

41. Assertion [A] : High pressure hydrostatic pressure is a way to prevent bacterial food spoilage.

Reason [R] : HHP is more detrimental to eukaryotic cell membrane.

(A) Both are true but [R] is not the correct reason for [A]
(B) Both are true and [R] is the correct reason for [A]
(C) Both are false
(D) [A] is true, but [R] is false
(E) Answer not known

42. One of the following is not true statement regarding Nisin.

(A) Nisin is a GRAS listed bacteriocin

(B) Nisin inactivates clostridium botulinm during canning process

(C) Nisin is toxic to humans and binds to lipid II during cell wall synthesis

(D) Nisin is a small amphilic peptide produced by a lactococcus lactis strain

(E) Answer not known

43. Assertion.[A] : Cleansing . with dilute acids before packaging reduces microbial spoilage.

Reason [R] : Low pH decreases the activity of other chemical preservatives

(A) [A] is true but [R] is false

(B) [A] is false but [R] is true

(C) Both are true ; but [R] is not correct reason for [A]

(D) Both are true and [R] is correct reason for [A]

(E) Answer not known

44. One of the following statement is correct about rancidity.

(A) Anaerobic breakdown of protein

(B) Short chain fatty acid formation from fats

(C) Foul smelling cadaverine formation

(D) Foul smelling putrescine production

(E) Answer not known

45. Pick out the false statement.

(A) Food spoilage mesophiles have human and animal origin

(B) Strict psychrophiles will not grow above 20°C

(C) Bacillus and clostridium are thermophillic anaerobic spore formers

(D) Arrhenius law describes relationship between temperature and rate of chemical reactions

(E) Answer not known

46. Give the expansion for MAP in preventing food spoilage.

(A) Microbe Avoided Packaging

(B) Modified Atmospheric Packaging

(C) Modified Atmospheric Pressure

(D) Microbial Aflatoxin Prevention

(E) Answer not known

47. Assertion [A] : Spore dehydration is achieved by a combination of physical compression of protoplast and osmotic extraction of water by the cortex.

Reason [R] : The spore cortex is a surrounding electronegative peptidoglycan layer responsible for spore's refractile nature.

(A) [A] is true but [R] is false

(B) [A] is false but [R] is true

(C) Both are true, but [R] is not the correct reason for [A]

(D) Both are true and [R] is the correct reason for [A]

(E) Answer not known

48. Choose of the suggested psychrotroph level in raw milk as per standard to meet satisfactory quality.

(A) 10^3 cfu per ml
(B) 10^4 cfu per ml
(C) 10^5 cfu per ml
(D) 10^6 cfu per ml
(E) Answer not known

49. Select from the following is a thermophilic micro organism causing food spoilage.

(A) Micrococcus varians
(B) Alkaligens
(C) Bacillus stearothermophilus
(D) Staphylococcus aureus
(E) Answer not known

50. One of the following medium allows the growth of desirable species which makes the medium suitable for the growth of other species.

(A) Elective media
(B) Diagnostic media
(C) Resuscitation media
(D) Selective media
(E) Answer not known

51. One of the following Milk product produced by mesosphilic fermentation is

(A) Buttermilk
(B) Kefir
(C) Yogurt
(D) Viili
(E) Answer not known

52. One of the following is used for making Berke field filters?

(A) Unglazed porcelain
(B) Polycarbonates
(C) Diatomaceous earth
(D) Fibreglass
(E) Answer not known

53. One of the following acts as the elective reagent in Baird Parker Agar?

(A) Lithium chloride
(B) Sodium Pyruvate
(C) Egg yolk
(D) Yeast extract
(E) Answer not known

54. Choose the right answer.

Mastitic infection can occur via the blood or by trauma to the udder, but it far more commonly occurs via :

(A) Milk volume
(B) Streak canal of the teat
(C) Environment
(D) Resistivity of the host
(E) Answer not known

55. Choose the right answer.

If the mastitis is severe, ———— may appear in the milk.

(A) Colostrum
(B) Viruses
(C) Pus and blood
(D) Fungal cells
(E) Answer not known

56. Choose the right answer.

Total cell count of milk from uninfected udder ranges from 1 to 5 lakhs/ml, of which 10% are

(A) Lymphocytes
(B) Polymorpho nuclear leucocytes
(C) Phagocytes
(D) Complement
(E) Answer not known

57. Choose the right answer.

An abnormal form of PrP which is a ————————, is responsible for BSE.

(A) Lipoprotein
(B) Nucleoprotein
(C) Glycoprotein
(D) Lipopolysaccharide
(E) Answer not known

58. Reason and Assertion Type.

Assertion [A] : Phagocytosis and killing by the PMN cell is less effective in milk than in blood.

Reason [R] : PMN cells ingest large quantities of fat and casein and staphylococcus aureus derived protein – A are present in them.

(A) [A] is true but [R] is false
(B) Both [A] and [R] are true and [R] is the correct explanation of [A]
(C) [A] is false, [R] is true
(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]
(E) Answer not known

59. Select the true sources about microbial contamination of milk.

(i) Exterior of the teats and udder
(ii) Immediate refrigeration
(iii) Handling and storage equipment

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

60. Select the incorrect pairs:

(1) Brucellosis – Bacillus anthracis

(2) Gas Gangrene – Clostridium septicum

(3) Mastitis – Many agents

(4) Listeriosis – Listeriapomona

(A) (1) and (3) are correct (B) (1) and (2) are correct

(C) (2) and (3) are correct (D) (3) and (4) are correct

(E) Answer not known

61. Koplik's spots of measles infection are indicators of

(A) Viral entry

(B) Viral replication

(C) Viral maturation

(D) Viral release from infected cells

(E) Answer not known

62. When compared to acridine orange, Fluorescein diacetate proves to be a better stain in indicating viability of microorganisms contaminating food because

(A) It binds to double-stranded DNA with orange fluorescence

(B) It binds to single-stranded RNA with green fluorescence

(C) It binds only cells that have specific receptors

(D) It binds only cells with esterase activity

(E) Answer not known

63. The standard nomenclature system of influenza virus includes all, except

(A) Geographical origin
(B) HI titre
(C) Serotype
(D) HA and NA subtypes
(E) Answer not known

64. All of the below are enterically transmitted viruses except.

(A) Rota virus
(B) Polio virus
(C) Noro virus
(D) Herpes virus
(E) Answer not known

65. Listeria monocytogenes is a facultative intracellular pathogen. It escapes phagocytosis by

(A) Production of Listeriase
(B) Production of Listeriolysin
(C) Production of Listerin
(D) Motility
(E) Answer not known

66. One of the following is not a culture characteristic of yersinia enterocolitica. Identify.

(A) It needs anaerobic culture conditions for growth
(B) It can grow in a wide temperature range from – 1°c to + 40°c
(C) It grows in media containing 5% salt
(D) It grows optimally at pH 7 - 8
(E) Answer not known

67. E-coli 0157:H7 has been implicated in food infection outbreaks. The statement which is true about E.coli 0157:H7 is

(A) It causes traveler's diarrhea

(B) It commonly spreads through infected ground beef

(C) It causes diarrheal disease in infants and small children

(D) It is also called as entero invasive E.coli

(E) Answer not known

68. Match the Salmonella Typhi careers with their typical characteristics.

(a) Temporary career	1. Shed bacilli for 3 weeks to 3 months
(b) Convalescent career	2. Shed bacilli intermittently
(c) Chronic career	3. Shed bacilli for more than 3 months
(d) Urinary career	4. Shed bacilli for more than 1 year

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

(E) Answer not known

69. The breakdown of organic matter into smaller substances by microorganisms such as bacteria and fungi is known as

(A) Biodeterioration

(B) Biodegradation

(C) Biofouling

(D) Bioradiation

(E) Answer not known

70. The primary effect of eutrophication on aquatic ecosystems is

(A) Reduced plant growth
(B) Increased water clarity
(C) Changes in species composition
(D) Increased plant growth
(E) Answer not known

71. The name of the algal toxin leading to respiratory diseases is

(A) Microcystin
(B) Saxitoxin
(C) Domoic acid
(D) Tetrodotoxin
(E) Answer not known

72. The primary component of the extra cellular matrix in bio films is

(A) Proteins
(B) Polysaccharides
(C) Nucleic acids
(D) Lipids
(E) Answer not known

73. Find the term for the process by which microorganisms attach to surfaces.

(A) Adsorption
(B) Absorption
(C) Adhesion
(D) Attachment
(E) Answer not known

74. Name the stage of composting, that is associated with high rate and maximum degradation of organic materials.

(A) Mesophilic stage
(B) Thermophilic stage
(C) Acidogenic stage
(D) Methanogenic stage
(E) Answer not known

75. Mention the typical temperature level for mesophilic microorganism in composting method.

(A) 0°c to 15°c
(B) 15°c to 30°c
(C) 20°c to 40°c
(D) 45°c to 60°c
(E) Answer not known

76. The most commonly used modern process for the biological treatment of sewage water is

(A) Trickling treatment
(B) Activated sludge treatment
(C) Aerobic treatment
(D) Anaerobic treatment
(E) Answer not known

77. Mention the main purpose of tertiary treatment of waste water.

(A) Removal of large solid waste
(B) Removal of insoluble materials
(C) Removal of organic waste
(D) Removal of inorganic waste
(E) Answer not known

78. Mention the material that is not used for biogas production.

(A) Animal manure
(B) Food waste
(C) Plastic waste
(D) Agricultural residues
(E) Answer not known

79. The type of static piles with periodical turning and mixing of sludge during the composting is called as

(A) Aerated static pile system
(B) Windrow system
(C) In-vessel system
(D) Core-vessel system
(E) Answer not known

80. GRIT chambers used in waste water treatment - choose the reason.

(A) To remove organic biodegradable solids
(B) To remove large floating debris
(C) To remove smaller solids
(D) To add chemicals to the waste water
(E) Answer not known

81. Find out the correct answer :

(A) 1 nanometre = 0.001cm
(B) 1 nanometre = 0.001 mm
(C) 1 nanometre = 0.001μm
(D) 1 nanometre = 0.001dm
(E) Answer not known

82. Spoilage of milk turns

(A) Opaque to clear
(B) Clear to opaque
(C) Clear to translucent
(D) Translucent to opaque
(E) Answer not known

83. Food poisoning from butter is mainly due to

(A) Salmonella enterica
(B) Escherichia coli
(C) Listeria monocytogenes
(D) Staphylococcus aureus
(E) Answer not known

84. The production of enterotoxin during storage of milk is due to the action of

(A) Pseudomonas sp.
(B) Staphylococci sp.
(C) Klebsiella sp.
(D) Clostridium sp.
(E) Answer not known

85. Kefir and Koumiss production involves

(A) Yeast - lactic acid fermentation
(B) Mold - lactic acid fermentation
(C) Algal - lactic acid fermentation
(D) Lactic acid fermentation
(E) Answer not known

86. Lactoferrin in milk acts like an anti microbial constituent and is a (an)

(A) Extrinsic factor
(B) Intrinsic factor
(C) Environmental factor
(D) Ambient physical factor
(E) Answer not known

87. One of the following statement is not true related to manufacture of fluid milk products.

(A) Involves fractionation process like centrifugal separation to produce cream or skin milk

(B) Concentration process like membrane separation are used to produce high calcium milks

(C) Preservation process such as pasteurization and refrigeration in used

(D) Homogenization process to separate fat in liquid product is applied

(E) Answer not known

88. Choose a common habitant of udder which is non-pathogenic to humans when gets access through milk

(A) Escherichia coli

(B) Staphylococcus aureus

(C) Corynebacteruim pyogenis

(D) Streptococcus agalactiae

(E) Answer not known

89. While following the scheme for safety assessment of probiotic cultures the following properties are studied using certain safety factors. Identify the incorrect pair.

(1)	Infective property	–	In vitro and invivo testing
(2)	Toxicity	–	Oral administration of product in volunters
(3)	Clinical assessment	–	Potential for side effects and disease specific effects
(4)	Epidemiology	–	Surveillance of large populations using new strains

(A) (1) and (3)
(B) (1) only
(C) (2) only
(D) (2) and (4)
(E) Answer not known

90. Identify the standard which is not specified by BIS for sweetened condensed milk.

(A) Maximum bacterial count 5000 cfu/g
(B) Maximum yeast and mold count 10 cfu/g
(C) Maximum bacterial count 500 cfu/g
(D) Coliforms negative
(E) Answer not known

91. Match the proposed sample size for determining bacteriological quality with the dairy products :

(a)	Raw milk	1.	200 g
(b)	Fermented milk	2.	50 – 500g
(c)	Condensed milk	3.	200 ml
(d)	Dried milk	4.	100 g

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

(E) Answer not known

92. Mention the scientist who observed the health benefits of fermented milk.

(A) Louis Pasteur
(B) Alexander Fleming
(C) Robert Koch
(D) Elie metchni Koff
(E) Answer not known

93. Mention the most common way of preventing over acidification of yogurt.

(A) Pasteurize the yogurt after the fermentation
(B) Pasteurize the yogurt before the fermentation
(C) Incubating the yogurt in high temperature
(D) Incubating the yogurt in low temperature
(E) Answer not known

94. The red colour changes in milk is due to contamination by

(A) Pseudomonas putida
(B) Pseudomonas synxantha
(C) Pseudomonas fluorescens
(D) Brevibacterium erythrogenes
(E) Answer not known

95. Bactofugation in milk processing is a (the)

(A) Disinfection process
(B) Removing of bacteria by centrifugation
(C) Pasteurisation process
(D) Homogenization process
(E) Answer not known

96. Select the group that is at risk of severe listeriosis infection from the following.

(A) Healthy adult
(B) Pregnant women
(C) Children under five years old
(D) Elderly people
(E) Answer not known

97. Aflatoxin ingestion can cause

(A) Skin cancer
(B) Lung cancer
(C) Liver cancer
(D) Breast cancer
(E) Answer not known

98. Select the E.coli strain that is entero pathogenic, invasive and toxigenic.

(A) E.coli O167 : J7
(B) E.coli O127 : I7
(C) E.coli O157 : H7
(D) E.coli P157 : K7
(E) Answer not known

99. Sour or acid flavour of milk is produced by

(A) Pseudomonas fluorescens
(B) Alkaligenes viscolactis
(C) Pseudomonas aeruginosa
(D) Streptococcus lactis
(E) Answer not known

100. Choose the following statements that are true about Mycotoxins:

(i) They are secondary metabolites and not proteins or enteric toxins

(ii) Many are carcinogens and when consumed, can cause cancer in different tissues in the body

(iii) Causing toxicity of organs by all mycotoxins is a known simple mechanism

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

101. ISO standard that provides guidelines for the general requirements for the competence of testing and calibration laboratories is

(A) ISO 9001
(B) ISO 14001
(C) ISO 17025
(D) ISO 22000
(E) Answer not known

102. The most common method for detecting coliforms in water is

(A) Culture on selective and differential media
(B) Microscopy
(C) PCR
(D) ELISA
(E) Answer not known

103. The primary enforcement tool used by the FDA to ensure compliance with GMP regulation is

(A) Warning letters
(B) Import alerts
(C) Recall orders
(D) Injunctions
(E) Answer not known

104. Choose the right answer :

FSSAI stands for

(A) Food Safety and Standards Authority of India
(B) Food Security and Sanitation Authority of India
(C) Food Security and Standards Authority of India
(D) Food Sanitation Standard Authority of India
(E) Answer not known

105. The typical pH range for water in oil emulsion products like mayonnaise and salad dressings is

(A) 2.0 – 2.5
(B) 3.5 – 4.5
(C) 5.0 – 6.0
(D) 2.5 – 3.0
(E) Answer not known

106. Choose the right answer.

Quality assurances main purpose is to verify that ———— is being maintained.

(A) Monitoring
(B) Control
(C) Assurance
(D) System verification
(E) Answer not known

107. Arranging event type :

Arrange the following events of the HACCP in order :

(1) Determine the critical control points
(2) Establish monitoring procedures
(3) Conduct a hazard analysis
(4) Establish critical limit

(A) (2), (3), (1), (4)
(B) (1), (2), (4), (3)
(C) (4), (3), (2), (1)
(D) (3), (1), (4), (2)
(E) Answer not known

108. Choose the right answer :

Sanitation is a key to minimizing post processing contamination and build up of

(A) Sterilization
(B) Hygiene
(C) An intelligent layout
(D) Biofilm
(E) Answer not known

109. Choose the right answer :

As a continuous exercise to modernize GMPs and to enhance their effectiveness and relevance, a comprehensive revision is being undertaken by the

(A) Employees
(B) FDA
(C) Agencies
(D) Working personnel
(E) Answer not known

110. Choose the right answer :

Bacteriological testing of ice must be done on ———— basis for plants using municipal water supplies.

(A) A semi annual
(B) An annual
(C) A quarterly
(D) A monthly
(E) Answer not known

111. Find the reason :

Variables sampling plans are employer

(A) To isolate selected microbes
(B) To exclude specific microbes
(C) Heterogeneity of microbes distribution
(D) To isolate unique microbes
(E) Answer not known

112. Identify the microorganism found in the dairy products considered to be serious hazard but not life threatening

(A) Bifidi bacterium
(B) Bacillus
(C) S. enteritidis
(D) Lactobacillus
(E) Answer not known

113. ———— post-process contamination outbreaks recorded with dehydrated dairy products.

(A) Bacillus
(B) Salmonella
(C) E.coli
(D) Aeromonads
(E) Answer not known

114. Bactofugation applied in the milk to remove

(A) Molds
(B) Bacteria
(C) Fat
(D) Protein
(E) Answer not known

115. ICMSF (2002) prefers the term "tolerable level of risk" is related to

(A) Microbial count
(B) Consumption of food
(C) Quality of food
(D) Package of food
(E) Answer not known

116. The abbreviation "TLR" used by ICMSF 2002 refers to

(A) Toll like receptors
(B) Teaching and learning responsibility
(C) Tolerable level of risk
(D) Tolerable level of radiation
(E) Answer not known

117. One of the following organisms were used as universal indicators of hygiene

(A) Staphylococcus
(B) Bacillus
(C) Coliform counts
(D) Salmonella
(E) Answer not known

118. Heat resistant lipases present in the pasteurized milk are due to

(A) Azatobacter
(B) Bacillus
(C) Staphylococcus aureos
(D) Acinetobacter
(E) Answer not known

119. Aerobic plate count of ice cream may contain

(A) Staphylococcus
(B) Bacillus
(C) Coliforms
(D) Non coliforms
(E) Answer not known

120. Sample is rejected if sample

(A) Exceeds "M"
(B) Within 'm'
(C) Between "m" and "M'
(D) Lesser "c'
(E) Answer not known

121. The situation that happens when a bacteria is placed in a hypotonic solution is

(A) water will enter the cell and bursting occurs
(B) water will enter the cell and lysis occurs
(C) water will enter the cell and the pH will be decreased
(D) water will enter the cell and the temperature will be decreased
(E) Answer not known

122. Larger microorganisms such as protists and yeast can be directly counted using

(A) Hemocytometers
(B) Petroff-Hausser counting chambers
(C) Coulter counters
(D) Electron microscopes
(E) Answer not known

123. Sporulation in bacteria occur due to

(A) Lack of pH
(B) Lack of temperature
(C) Lack of pressure
(D) Lack of nutrients
(E) Answer not known

124. The process by which a bacterial cell loses water when placed in a hypertonic solution is called as

(A) Thermolysis
(B) Alkalosis
(C) Plasmolysis
(D) Acidolysis
(E) Answer not known

125. Bacteria that require oxygen for their survival are known as

(A) Myobacteria
(B) Actinobacteria
(C) Thermophilic bacteria
(D) Obligate aerobes
(E) Answer not known

126. Choose the method that is not a viable one for counting bacteria

(A) Pour plate method
(B) Spread plate method
(C) Spectrophotometry method
(D) Bacterial typing method
(E) Answer not known

127. The photosynthetic pigment present in red algae and cyanobacteria is called as

(A) Carotenoids
(B) Phycobiliproteins
(C) Bacteriochlorophylls
(D) Bacteriorhodopsin
(E) Answer not known

128. ———— is the precursor produced from the pentose phosphate pathway and is used to synthesize vitamin B6.

(A) Erythrose 4-phosphate
(B) Ribose-5-phosphate
(C) Glyceraldehyde-3-phosphate
(D) Fructose 1-6-bisphosphate
(E) Answer not known

129. The oxidation of one acetyl-COA molecule in TCA cycle generates

(A) 2 CO_2, 3 NADH, 1 $FADH_2$ and 1 GTP
(B) 3 CO_2, 4 NADH, 2 $FADH_2$ and 2 GTP
(C) 2 CO_2, 3 NADH, 2 $FADH_2$ and 1 GTP
(D) 2 CO_2, 3 NADH, 1 $FADH_2$ and 2 GTP
(E) Answer not known

130. The electron transport chains of bacteria operate in

(A) Mitochondria
(B) Cytoplasm
(C) Plasma membrane
(D) Nucleus
(E) Answer not known

131. E.Coli transports sugars and amino acid by

(A) Passive diffusion
(B) Facilitated diffusion
(C) Active transport
(D) Group translocation
(E) Answer not known

132. The diffusion involving carrier proteins is called as

(A) Passive diffusion
(B) Facilitated diffusion
(C) Active transport
(D) Group translocation
(E) Answer not known

133. The dark reaction in photosynthesis is controlled by

(A) CO_2, temperature, water
(B) CO_2, light, water
(C) CO_2, temperature, light
(D) CO_2, oxygen, light
(E) Answer not known

134. Saḅouraud Dextrose Agar (SDA) has a low pH of about 5.6 reason is

(A) Growth of environmental organisms is favoured at low pH
(B) Growth of yeasts is inhibited at such low pH
(C) Low pH encourages growth of molds
(D) Low pH inhibits growth of most bacteria
(E) Answer not known

135. Assertion [A] : In a liquid culture, it is difficult to identify and isolate the bacteria in pure culture.

Reason [R] : Liquid culture is preferred for preparing bulk cultures.

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true and [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

136. Both facilated diffusion and active transport involves permeases in uptake of microbial nutrients. But they differ in their mechanisms how?

(A) Active transport uses metabolic energy and cannot concentrate substances

(B) Active transport uses metabolic energy and can concentrate substances

(C) Active transport does not use energy and cannot concentrate substances

(D) Permeases in facilated diffusion are less efficient

(E) Answer not known

137. Name of the medium that is selective for staphylococcus

(A) Blood agar

(B) Mannitol salt agar

(C) Nutrient agar

(D) Peptone broth

(E) Answer not known

138. Haemophilus influenzae requires niacin as a growth factor because

(A) It helps in transfer of acyl groups
(B) It acts as a precursor of coenzyme A
(C) It acts as a precursor of NAD and NADP
(D) It helps in amino acid metabolism
(E) Answer not known

139. Microorganisms use nitrogen for the synthesis of all of the following except

(A) Amino aids
(B) Enzyme cofactors
(C) Biotin
(D) Purines
(E) Answer not known

140. The nutritional type of most pathogenic bacteria is

(A) Chemolithoautotroph
(B) Photoorgano heterotroph
(C) Chemolitho heterotroph
(D) Chemoorgano heterotroph
(E) Answer not known

141. Choose the following statement which is true about the probiotics that could potentially be used as substitutes for drugs?

(A) Probiotic supplement cannot eradicate helicobacter pyroli
(B) Probiotics can be a potential substitutes for aminosalicylates and cortio steroids in the management of IBD
(C) Probiotics can be used instead of laxatives in the management of in frequent bowel function
(D) Probiotic bacteria cannot be used instead of anti diarrheal drugs
(E) Answer not known

142. Choose the desirable characteristic of probiotic microbes from the following :

(A) Survival in association with the host immune system and non inflammatory nature

(B) Non immunostimulatory for the mucosal immune system

(C) Genetic instability

(D) Technologically unsuitable for process applications

(E) Answer not known

143. Lactose intolerant person can take yoghurt because of the two following reasons,

(1) Yoghurt increases immunity

(2) Upto half the lactose of milk is hydrolysed by the LABs in yoghurt

(3) Better weight gain observed by consuming yoghurt

(4) It decreases intestinal natural microflora

(A) (2) and (3) are correct

(B) (1) and (2) are correct

(C) (3) and (4) are correct

(D) (1) and (4) are correct

(E) Answer not known

144. Choose the following statement which is not true about recombinant bouine somatotrophin (rBST)?

(A) Dairy product from rBST cows are secure for human consumption

(B) Milk from rBST cows have high level of IGF-1

(C) Milk from rBST cows have high fat content

(D) Milk from rBST have high protein content

(E) Answer not known

145. Which one of the following given statement is not true?

(A) Lactobacillus plantarum produces lactolin

(B) L.bulgaricus secretes bulgarican

(C) L.acidophilus produce acidophilin and acidolin

(D) L.plantarum produce bacterlocin

(E) Answer not known

146. As per the ISAPP, which criteria cannot be considered as prebiotics?

(A) Resistant to breakdown by stomach acid and enzymes of human

(B) Discriminating fermentation by intestinal microbes

(C) Selectively stimulate the growth and activity of beneficial bacteria

(D) Digested through upper part of the gastrointestinal tract

(E) Answer not known

147. ———— probiotic microbe is used to treat chronic urinary track infection.

(A) B. longum

(B) B. breve

(C) B. thermophilum

(D) Bifidobacterium breve

(E) Answer not known

148. Pick out the food ingredient which is not produced by genetically engineered microorganisms?

(A) Chymosin

(B) Tryptophan

(C) Bouine tryptophan

(D) Bouine somatotrophin

(E) Answer not known

149. Choose the following that describes the role of synthetic biology in metabolic engineering

(A) Mathematical model based predictions

(B) Reconstruction of cellular system

(C) Construction of new biological components

(D) It involves redesigning metabolic pathways

(E) Answer not known

150. Identify the correct statement about recombinant chymosin.

(1) It is less effective than traditional calf chymosin

(2) It is produced in bacteria, yeast and molds using gene engineering

(3) It has produced satisfactory results and widely approved for commercial use

(4) It is produced commercially by cell culture

(A) (1) and (2) true

(B) (3) and (4) true

(C) (2) and (3) true

(D) (1) and (4) true

(E) Answer not known

151. The class of immunoglobulin predominantly found in bovine milk is

(A) IgA

(B) IgE

(C) IgG

(D) IgM

(E) Answer not known

152. How does PEP-PTS lac system contribute to lactose metabolism in bacteria?

(A) By converting lactose into lactic acid
(B) By phosphorylating lactose during its transport into the cell
(C) By Breaking down lactose into glucose and galactose
(D) By promoting β-galactosidase activity
(E) Answer not known

153. _____ enzyme is used in polymerase chain reaction.

(A) Polynucleotide Kinase
(B) Alkaline Phosphotase
(C) Reverse Transcriptase
(D) DNA Polymerase
(E) Answer not known

154. Choose the probiotic strain that survives well in cheddar cheese over 6 months?

(A) Lactobacillus Acidophilus
(B) Lactobacillus Bifidum
(C) Bifidobacterium Bifidum
(D) Bifidobacterium longum
(E) Answer not known

155. An ideal cloning vector should be

(1) Large in size
(2) With single endonuclease sites
(3) High molecular weight
(4) Contain antibiotic resistant marer

(A) (1) and (2) correct
(B) (2) and (4) correct
(C) (3) and (4) correct
(D) (1) and (3) correct
(E) Answer not known

156. Commercial chymosin used in cheese production is produced recombinantly in

(A) Streptococcus Lactis
(B) Escherichia Coli
(C) Lactobacillus Lactis
(D) Bacillus Subtilis
(E) Answer not known

157. The application of rDNA technology to Lactic Acid starter is/are primarily to achieve

(1) Acceleration of cheese ripening
(2) Development of phase resistant culture
(3) Antibiotic production
(4) Production of bioactive substances

(A) (1) only
(B) (1) and (2) only
(C) (1) and (3) only
(D) (2) and (4) only
(E) Answer not known

158. Choose the incorrect Pair :

(1) EcoRI – G /A – A – T – T – C –
(2) Bam HI – – / G – A – T – C –
(3) Hind III – A / A – G – C – T – T –
(4) Sau 3AI – G / G – A – T – C

(A) (1) and (2) correct
(B) (1) and (3) correct
(C) (2) and (4) correct
(D) (2) and (3) correct
(E) Answer not known

159. Choose the right matches of restriction Enzymes :

(1) EcoRI – Leave sticky end
(2) Hpa I – Leave blunt end
(3) Hae III – Leave sticky end
(4) Hind III – Leave blunt end

(A) (1) and (3) correct
(B) (1) and (2) correct
(C) (3) and (4) correct
(D) (2) and (4) correct
(E) Answer not known

160. Name the mechanism commonly used for the intraspecific transfer of plasmid in lactic acid bacteria

(A) Conjugation
(B) Transformation
(C) Transduction
(D) Transposition
(E) Answer not known

161. Teichoic acids possibly play a role in growth of bacterial cell by regulating the activity of an enzyme

(A) Trypsin
(B) Aminopeptidase
(C) Autolysin
(D) Lysozyme
(E) Answer not known

162. Choose the right answer among type :

Which of the following statements are true about a bacterial cell wall?

(i) The bacterial capsule is species specific

(ii) The bacterial capsule is not species specific

(iii) The bacterial capsule can be used for immunological differentiation of related species

(A) (i) only
(B) (i) and (iii) only
(C) (i) and (ii) only
(D) (ii) and (iii) only
(E) Answer not known

163. Select the incorrectly paired one :

(1) Gram negative bacterial outer membrane → Lipopolysaccharides

(2) Polysaccharide component of Lipopolysaccharide → Non antigenic

(3) Lipid A → Endotoxin properties

(4) Lipid A → Does not contain fatty acids and Glucosamine

(A) (1) and (3) are correct
(B) (1) and (2) are correct
(C) (2) and (3) are correct
(D) (3) and (4) are correct
(E) Answer not known

164. Choose the Right matches :

(1)	Chemical structure of NAM	–	Has a peptide stem
(2)	D and L forms of amino acids	–	Does not alternate to each other in E-coli
(3)	Parallel Tetrapeptide side chains	–	Linked by a Pentaglycine peptide cross bridge
(4)	NAG and NAM	–	Linked together by α-1,4-linkage

(A) (1) and (3) are correct
(B) (1) and (2) are correct
(C) (2) and (3) are correct
(D) (3) and (4) are correct
(E) Answer not known

165. Choose the right answers :

Carboxysomes are the polyhedral bodies containing :

(A) 1,3-Ribulose Triphosphate Carboxylase
(B) 1,5-Ribulose Biphosphate Carboxylase
(C) 1,4-Ribose Pentaphosphate Carboxylase
(D) 1,3- Ribose Triphosphate Carboxylase
(E) Answer not known

166. Reason and Assertion type :

Assertion [A] : At temperatures between 30 and 40°C, in E.Coli, 20 different chaperones or heat shock proteins are produced within 5 minutes.

Reason [R] : When E.Coli cells are exposed to high temperature, metabolic poisons and other stressful condition, the concentrations of chaperones or heat shock proteins increases

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true; [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(E) Answer not known

167. The cytoplasmic membrane is the site of many metabolic activities. Select its sound activities.

(i) It consists of enzymes of Biosynthetic pathways

(ii) It has about no respiratory proteins

(iii) It shows selective permeability

(A) (i) only

(B) (i) and (ii) only

(C) (ii) and (iii) only

(D) (i) and (iii) only

(E) Answer not known

168. Choose the wrong matches type :
Select the incorrectly paired ones :

(1) Col Plasmids – Pseudomonas putida
(2) Penicillinase Plasmids – Staphylococcus aureus
(3) Ri-Plasmids – Agrobacterium Rhizogenes
(4) Cryptic Plasmids – High molecular weight DNA (functional)

(A) (1) and (3) are correct
(B) (1) and (2) are correct
(C) (2) and (3) are correct
(D) (3) and (4) are correct
(E) Answer not known

169. Arranging event type arrange the following germination events in order :

(1) Axial-filament formation
(2) Engulfment of Forespore
(3) Vegetative cells
(4) Spore septum formation

(A) (2), (3), (1), (4)
(B) (1), (2), (4), (3)
(C) (4), (3), (2), (1)
(D) (3), (1), (4), (2)
(E) Answer not known

170. Reason and Assertion type :

Assertion [A] : The Cyanobacterial cells can remain at certain depth of water where they can get sufficient light, oxygen and nutrients due to gas vesicles.

Reason [R] : The gas vesicles maintain Buoyancy.

(A) [A] is true but [R] is false

(B) Both [A] and [R] are true; and [R] is the correct explanation of [A]

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true; but [R] is not the correct explanation of [A]

(E) Answer not known

171. Choose the right answer :

In bacterial cell the hook is present outside the cell wall and connects :

(A) Filament to the cell membrane

(B) Basal body to the mesosome

(C) Filament to the basal body

(D) Basal body to the capsule

(E) Answer not known

172. Choose the right answer :

Select the correct composition of Endospores

(A) RNA, large amount of DNA and small amount of Organic Acid

(B) DNA, small amount of Carbohydrates and small amount of Amino Acid

(C) DNA, small amount of RNA and large amount of Organic Acid

(D) RNA, large amount of Amino Acid and small amount of Pimelic Acid

(E) Answer not known

173. Yeasts and mold can tolerate _____ in food substances.

(A) pH 8.0

(B) pH 3.0

(C) pH 6.0

(D) pH 10.0

(E) Answer not known

174. Defective water supply in a milk plant may introduce the _____ virus to milk.

(A) Hepatitis

(B) Polio

(C) Rota

(D) FMD

(E) Answer not known

175. Phage resistant starters are used in

(A) Antibiotic production

(B) Enzyme production starters

(C) Lactic acid starters

(D) Yeast starters

(E) Answer not known

176. Air in dairy plant may contain _____ of the starter culture bacteria used in the plant.

(A) Yeast
(B) Mold
(C) Aerosols of yeast
(D) Bacteriophage
(E) Answer not known

177. One among the following virus causes respiratory infections in poultry.

(A) Pox virus
(B) Echo virus
(C) Ornithosis virus
(D) Rota virus
(E) Answer not known

178. _____ is an animal virus which cause food borne diseases in humans.

(A) Hepatitis virus
(B) Herpes virus
(C) Rota virus
(D) Influenza virus
(E) Answer not known

179. Yeast cells are dried to yield active dry yeast is

(A) 9% moisture
(B) > 8% moisture
(C) < 5.5% moisture
(D) > 5% moisture
(E) Answer not known

180. Match the organisms with products :

(a)	Saccharomyces cerevisiae	1.	Fats and lipids
(b)	Pencillium sp	2.	Koji for sake
(c)	Aspergillus oryzae	3.	Wine
(d)	Trichosporon pullulans	4.	Roquefort cheese

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

(E) Answer not known

181. Why the bacterial mRNA is described as polycistronic?

(A) It has a single coding region

(B) It has multiple coding regions

(C) It is transcribed by DNA polymerase I

(D) Multiple copies of mRNA molecules are produced from a DNA

(E) Answer not known

182. How long can introns be in a multicellular Eukaryote?

(A) As few base pairs

(B) Less than one kilobase

(C) One kilobase

(D) More than one kilobase

(E) Answer not known

183. Which of the following statements about the wobble hypothesis is correct?

(A) It explains the redundancy of the genetic code

(B) It allows a single tRNA to recognize multiple codons

(C) It involves the first base of the codon and the third base of the anticodon

(D) It is responsible for the high fidelity of protein synthesis

(E) Answer not known

184. In the context of DNA structure, why the strands are called as Antiparallel?

(A) Due to the opposite orientation of the two strands of the DNA double helix

(B) Due to the complementary base pairing between adenine and thymine

(C) Due to the helical twist of DNA strands

(D) Due to the interaction between the sugar phosphate backbone

(E) Answer not known

185. Assertion [A] : DNA polymerase is essential for the synthesis of new DNA strands during replication.

Reason [R] : DNA polymerase unwinds the DNA double helix to create single strand template for replication.

(A) Both [A] and [R] are true [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true but [R] is false

(D) [A] is false but [R] is true

(E) Answer not known

186. Match the Enzyme with it's getic locus :

(a)	DNA polymerase I	1.	Par E
(b)	Helicase	2.	Pol A
(c)	Primase	3.	dna B
(d)	Topoisomerase IV	4.	dna G

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

(E) Answer not known

187. Which of the following Statement is true about the stability of RNA?

(i) RNA is more stable than DNA in alkaline condition

(ii) RNA is less stable than DNA due to the presence of 2' hydroxyl group

(iii) RNA is more stable than DNA, due to it's singe stranded nature.

(iv) Cell contain myriad RNA degrading enzymes

(A) (i) only
(B) (iii) only
(C) (ii) and (iii) only
(D) (ii) and (iv) only
(E) Answer not known

188. The regulatory mechanism that controls the controls the efficiency of transcription of tryptophan biosynthetic pathway is

(A) Repression
(B) Suppression
(C) Activation
(D) Attenuation
(E) Answer not known

189. The enzyme that initiates transcription is

(A) DNA polymerase
(B) RNA polymerase
(C) Helicase
(D) Ligase
(E) Answer not known

190. The protein that gives functional shape for the newly synthesized polypeptide is

(A) Chaperones
(B) Peptidyl transferases
(C) Heat shock proteins
(D) ABC protein
(E) Answer not known

191. _____ protein prevents Reassociation of 30S and 50S ribosome subunits during translation.

(A) IF-1
(B) IF-2
(C) IF-3
(D) IF-4
(E) Answer not known

192. The sensor kinase protein of two component signal transduction system is present in the

(A) Plasma membrane
(B) Cytoplasmic membrane
(C) Nuclear membrane
(D) Mitochondria
(E) Answer not known

193. Lac operon of *E.coli* contains _____ structural genes.

(A) 4
(B) 5
(C) 3
(D) 1
(E) Answer not known

194. A small molecule that stimulates gene transcription by binding an activator protein is called a (an)

(A) Repressor
(B) Corepressor
(C) Inducer
(D) Operator
(E) Answer not known

195. Bacteria taking up free DNA molecules from their environment is called as

(A) Transduction
(B) Transformation
(C) Conjugation
(D) Mutation
(E) Answer not known

196. The type of mutation that results in premature stop codon from the following is

(A) Missense mutation
(B) Nonsense mutation
(C) Frameshift mutation
(D) Silent mutation
(E) Answer not known

197. Give the name of the Donor cell that is involved in conjugation?

(A) F – Cell
(B) F + Cell
(C) Recipient Cell
(D) HFR Cell
(E) Answer not known

198. Neutral mutation means

(A) A mutation that increases fitness
(B) A mutation that decrease fitness
(C) A mutation with no significant effect on fitness
(D) A mutation that changes the genome size
(E) Answer not known

199. The Luria – Delbruck test is also known as

(A) Positive Selection Test
(B) Ames Test
(C) Indirect Selection Test
(D) Fluctuation Test
(E) Answer not known

200. Pyrimidine dimers, a type of DNA damage formation results from which of the following?

(A) Exposure to Ultraviolet Radiation
(B) Exposure to d-Alpha Radiation
(C) Exposure to Gamma Radiation
(D) Exposure to Chemical Radiation
(E) Answer not known